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EP.21.115
April 12, 2021

UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN SENATE
COMMITTEE ON EDUCATIONAL POLICY
(Final; Information)

EP.21.115 Report of Administrative Approvals through April 12, 2021

Senate committees are authorized to act for and in the name of the Senate on minor matters. Below is a listing of the administrative approvals the Senate Committee on Educational Policy approved at its meeting on April 12, 2021. Additional information for each approval is attached.

A. Undergraduate Programs

1) **Civil Engineering, BS** – revise the: 1) required orientation course, replacing CEE 195, About Civil Engineering (1 hour) with CEE 190, Project Based Introduction to CEE (4 hours) and 2) Advanced Composition general education requirement, replacing BTW 261, Principles Bus Comm (3 hours) with CEE 300, Behavior of Materials (4 hours). Update the Areas of Study list to add CEE 360, Structural Engineering (3 hours), CEE 412, High-Speed Rail Engineering (3 or 4 hours), CEE 435, Public Health Engineering (3 or 4 hours), CEE 473, Wind Effects on Structures (4 hours), and CEE 484, Applied Soil Mechanics (3 or 4 hours) and remove CEE 480, Foundation Engineering (3 hours), CEE 498, Special Topics: Sections WE (1 to 4 hours), and TAM 427, Mechanics of Polymers (3 hours). The credit hours under orientation and professional development changes from 1 to 4 and for advanced composition from 3 to 4. CEE 300 is already a required course in the curriculum, so this keeps the overall hours required for the degree at 128.
2) **Engineering Mechanics, BS** – in the list of Foundational Mathematics and Science courses, replace MATH 415, Applied Liner Algebra (3 hours) with MATH 257, Linear Algebra with Computational Applications (3 hours). In the list of Secondary Field Option Electives from which students choose 12 hours, replace TAM 499, Senior Thesis (3 hours) with TAM 497, Independent Study (1 to 3 hours). Add MSE 455, Macromolecular Solids (3 hours) and remove MATH 423, Differential Geometry (3 or 4 hours), MATH 447, Real Variables (3 or 4 hours), MATH 482, Linear Programming (3 or 4 hours), MATH 484, Nonlinear Programming (3 or 4 hours), MATH 489, Dynamics & Differential Eqns (3 or 4 hours), MATH 490, Advanced Topics in Mathematics (1 to 4 hours), STAT 400, Statistics and Probability I (4 hours), STAT 410, Statistics and Probability II (3 or 4 hours), and TAM 427, Mechanics of Polymers (3 hours). There is no change to the total hours required for the degree.
3) **Mechanical Engineering, BS** -- in the list of Foundational Mathematics and Science courses, replace MATH 415, Applied Liner Algebra (3 hours) with MATH 257, Linear Algebra with Computational Applications (3 hours). In the list of technical electives from which students choose 6 hours, remove AE 427, Mechanics of Polymers (3 hours), CEE 480, Foundation Engineering (3 hours), MSE 454, Mechanics of Polymers (3 hours) and add SE 400, Engineering Law (3 or 4 hours). Add a footnote indicating CS 124, Introduction to Computer Science I (3 hours) can be substituted for CS 125, Introduction to Computer Science (4 hours). There is no change to the total hours required for the degree.
4) **Computer Science + Animal Sciences, BS** – in keeping with the Computer Science, BS, revisions approved as EP.21.075, revise the Mathematical Foundations list to include MATH 257, Linear Algebra with Computational Applications (3 hours) as an "or" choice with MATH 225, Introductory Matrix Theory (2

hours). In the list of Computer Science Core courses, replace CS 125, Introduction to Computer Science (4 hours) and CS 126, Software Design Studio (3 hours) with CS 124, Introduction to Computer Science I (3 hours) and CS 128, Introduction to Computer Science II (3 hours); add CS 222, Software Design Lab (1 hour); and update the description of the two 400-level CS courses to select from "Any two 400-level CS courses except CS 491" to "Any two 400-level CS courses above CS 403 except CS 421 and CS 491." In the list of Basic Animal Sciences Courses from which students are to choose three, remove ANSC 510, Science of Animal Well-Being (1.5 hours), which was deactivated effective Fall 2020. There is no change to the total hours required for the degree.

5) **Computer Science + Crop Science, BS** – in keeping with the Computer Science, BS, revisions approved as EP.21.075, revise the Mathematical Foundations list to include MATH 257, Linear Algebra with Computational Applications (3 hours) as an "or" choice with MATH 225, Introductory Matrix Theory (2 hours), MATH 415, Applied Linear Algebra (3 or 4 hours), or MATH 416, Abstract Linear Algebra (3 or 4 hours). In the list of Computer Science Core courses, replace CS 125, Introduction to Computer Science (4 hours) and CS 126, Software Design Studio (3 hours) with CS 124, Introduction to Computer Science I (3 hours) and CS 128, Introduction to Computer Science II (3 hours); and add CS 222, Software Design Lab (1 hour). In the list of Crop Sciences Core Courses from which students are to choose 14 hours, remove CPSC 226, Introduction to Weed Science (3 hours), CPSC 270, Applied Entomology (3 hours), and PLPA 204, Introductory Plant Pathology (3) and add CPSC 212, Introduction to Plant Protection (4 hours). There is no change to the total hours required for the degree.
6) **Computer Science + Anthropology, BSLAS** -- in keeping with the Computer Science, BS, revisions approved as EP.21.075, revise the Mathematical Foundations list to include MATH 257, Linear Algebra with Computational Applications (3 hours) as an "or" choice with MATH 225, Introductory Matrix Theory (2 hours). In the list of Required Computer Science Coursework, replace CS 125, Introduction to Computer Science (4 hours) and CS 126, Software Design Studio (3 hours) with CS 124, Introduction to Computer Science I (3 hours) and CS 128, Introduction to Computer Science II (3 hours); add CS 222, Software Design Lab (1 hour); replace CS 241, System Programming (4 hours) with CS 240, Introduction to Computer Systems (3 hours) and update the description of the two 400-level CS courses to select from "Any two 400-level CS courses except CS 491" to "Any two 400-level CS courses above CS 403 except CS 421 and CS 491." In the list of Required Foundation Courses of which students are to select four, add ANTH 110, Humanizing Science (3 hours). In the list of Electives of which students are to select 6-9 hours from a list, remove ANTH 362, Body, Personhood, and Culture (3 hours). There is no change to the total hours required for the degree.
7) **Computer Science + Astronomy, BSLAS** -- in keeping with the Computer Science, BS, revisions approved as EP.21.075, revise the Mathematical Foundations list to include MATH 257, Linear Algebra with Computational Applications (3 hours) as an "or" choice with MATH 225, Introductory Matrix Theory (2 hours). In the list of Required Computer Science Coursework, replace CS 125, Introduction to Computer Science (4 hours) and CS 126, Software Design Studio (3 hours) with CS 124, Introduction to Computer Science I (3 hours) and CS 128, Introduction to Computer Science II (3 hours); add CS 222, Software Design Lab (1 hour); replace CS 241, System Programming (4 hours) with CS 240, Introduction to Computer Systems (3 hours) and update the description of the two 400-level CS courses to select from "Any two 400-level CS courses except CS 491" to "Any two 400-level CS courses above CS 403 except CS 421 and CS 491." There is no change to the total hours required for the degree.
8) **Computer Science + Geography & Geographic Information Science, BSLAS** -- in keeping with the Computer Science, BS, revisions approved as EP.21.075, revise the Mathematical Foundations list to include MATH 257, Linear Algebra with Computational Applications (3 hours) as an "or" choice with MATH 225, Introductory Matrix Theory (2 hours). In the list of Required Computer Science Coursework,

replace CS 125, Introduction to Computer Science (4 hours) and CS 126, Software Design Studio (3 hours) with CS 124, Introduction to Computer Science I (3 hours) and CS 128, Introduction to Computer Science II (3 hours); add CS 222, Software Design Lab (1 hour); replace CS 241, System Programming (4 hours) with CS 240, Introduction to Computer Systems (3 hours) and update the description of the two 400-level CS courses to select from "Any two 400-level CS courses except CS 491" to "Any two 400-level CS courses above CS 403 except CS 421 and CS 491." In the list of Two additional GIS courses from which students are to select 6 hours, add GEOG 407, Foundations of CyberGIS & Geospatial Data Science. There is no change to the total hours required for the degree.

9) **Computer Science + Chemistry, BSLAS** -- in keeping with the Computer Science, BS, revisions approved as EP.21.075, revise the Mathematical Foundations list to include MATH 257, Linear Algebra with Computational Applications (3 hours) as an "or" choice with MATH 225, Introductory Matrix Theory (2 hours). In the list of Required Computer Science Coursework, replace CS 125, Introduction to Computer Science (4 hours) and CS 126, Software Design Studio (3 hours) with CS 124, Introduction to Computer Science I (3 hours) and CS 128, Introduction to Computer Science II (3 hours); add CS 222, Software Design Lab (1 hour); replace CS 241, System Programming (4 hours) with CS 240, Introduction to Computer Systems (3 hours) and update the description of the two 400-level CS courses to select from "Any two 400-level CS courses except CS 491" to "Any two 400-level CS courses above CS 403 except CS 421 and CS 491." There is no change to the total hours required for the degree.
10) **Computer Science + Advertising, BS** -- in keeping with the Computer Science, BS, revisions approved as EP.21.075, revise the Mathematical Foundations list to include MATH 257, Linear Algebra with Computational Applications (3 hours) as an "or" choice with MATH 225, Introductory Matrix Theory (2 hours). In the list of Required Computer Science Coursework, replace CS 125, Introduction to Computer Science (4 hours) and CS 126, Software Design Studio (3 hours) with CS 124, Introduction to Computer Science I (3 hours) and CS 128, Introduction to Computer Science II (3 hours); add CS 222, Software Design Lab (1 hour); replace CS 241, System Programming (4 hours) with CS 240, Introduction to Computer Systems (3 hours) and update the description of the two 400-level CS courses to select from "Any two 400-level CS courses except CS 491" to "Any two 400-level CS courses above CS 403 except CS 421 and CS 491." There is no change to the total hours required for the degree.
11) **Computer Science + Statistics, BSLAS** -- in keeping with the Computer Science, BS, revisions approved as EP.21.075, revise the Mathematical Foundations list to include MATH 257, Linear Algebra with Computational Applications (3 hours) as an "or" choice with MATH 225, Introductory Matrix Theory (2 hours). In the list of Required Computer Science Coursework, replace CS 125, Introduction to Computer Science (4 hours) and CS 126, Software Design Studio (3 hours) with CS 124, Introduction to Computer Science I (3 hours) and CS 128, Introduction to Computer Science II (3 hours); add CS 222, Software Design Lab (1 hour); replace CS 241, System Programming (4 hours) with CS 240, Introduction to Computer Systems (3 hours) and update the description of the two 400-level CS courses to select from "Any two 400-level CS courses except CS 491" to "Any two 400-level CS courses above CS 403 except CS 421 and CS 491." In the list of courses from which students are to select 3-4 hours to fulfill the Probability and Statistics Foundation requirement, add STAT 107, Data Science Discovery (3 hours), remove CS 361, Probability & Statistics for Computer Science (3 hours); MATH 347, Fundamental Mathematics (3 hours); MATH 441, Differential Equations (3 or 4 hours); MATH 444, Elementary Real Analysis (3 or 4 hours); MATH 447, Real Variables (3 or 4 hours); and STAT 305, Statistics Programming Methods (3 hours). Add a choose-from list called Statistical Application Electives from which students are to choose one course/3 hours with the following courses in that list: STAT 431, Applied Bayesian Analysis (3 or 4 hours); STAT 432, Basics of Statistical Learning (3 or 4 hours); and STAT 434, Survival Analysis (3 or 4 hours). Remove

STAT 420, Methods of Applied Statistics (3 or 4 hours), from the list. There is no change to the total hours required for the degree.

12) **Computer Science + Mathematics, BSLAS** -- in keeping with the Computer Science, BS, revisions approved as EP.21.075, revise the Mathematical Foundations list to include MATH 257, Linear Algebra with Computational Applications (3 hours) as an "or" choice with MATH 225, Introductory Matrix Theory (2 hours). In the list of Required Computer Science Coursework, replace CS 125, Introduction to Computer Science (4 hours) and CS 126, Software Design Studio (3 hours) with CS 124, Introduction to Computer Science I (3 hours) and CS 128, Introduction to Computer Science II (3 hours); add CS 222, Software Design Lab (1 hour); replace CS 241, System Programming (4 hours) with CS 240, Introduction to Computer Systems (3 hours); replace CS 457, Numerical Methods II (3 hours) with CS 450, Numerical Analysis (3 or 4 hours); and update the description of the two 400-level CS courses to select from "Any two 400-level CS courses except CS 491" to "Any two 400-level CS courses above CS 403 except CS 421 and CS 491." In the GROUP II list from which students select at least six 400-level mathematics and computer science courses, including one from each group, add MATH 413, Intro to Combinatorics (3 or 4 hours) and MATH 427, Honors Abstract Algebra (3 hours). In the GROUP IV list, add MATH 424, Honors Real Analysis (3 hours). In the GROUP V list, remove CS 481, Advanced Topics in Stochastic Processes & Applications (3 or 4 hours) and CS 482, Simulation (3 or 4 hours). There is no change to the total hours required for the degree.
13) **Computer Science + Economics, BSLAS** -- in keeping with the Computer Science, BS, revisions approved as EP.21.075, revise the Mathematical Foundations list to include MATH 257, Linear Algebra with Computational Applications (3 hours) as an "or" choice with MATH 225, Introductory Matrix Theory (2 hours). In the list of Required Computer Science Coursework, replace CS 125, Introduction to Computer Science (4 hours) and CS 126, Software Design Studio (3 hours) with CS 124, Introduction to Computer Science I (3 hours) and CS 128, Introduction to Computer Science II (3 hours); add CS 222, Software Design Lab (1 hour); replace CS 241, System Programming (4 hours) with CS 240, Introduction to Computer Systems (3 hours); and update the description of the two 400-level CS courses to select from "Any two 400-level CS courses except CS 491" to "Any two 400-level CS courses above CS 403 except CS 421 and CS 491." There is no change to the total hours required for the degree.
14) **Computer Science + Philosophy, BSLAS** -- in keeping with the Computer Science, BS, revisions approved as EP.21.075, revise the Mathematical Foundations list to include MATH 257, Linear Algebra with Computational Applications (3 hours) as an "or" choice with MATH 225, Introductory Matrix Theory (2 hours). In the list of Required Computer Science Coursework, replace CS 125, Introduction to Computer Science (4 hours) and CS 126, Software Design Studio (3 hours) with CS 124, Introduction to Computer Science I (3 hours) and CS 128, Introduction to Computer Science II (3 hours); add CS 222, Software Design Lab (1 hour); replace CS 241, System Programming (4 hours) with CS 240, Introduction to Computer Systems (3 hours); and update the description of the two 400-level CS courses to select from "Any two 400-level CS courses except CS 491" to "Any two 400-level CS courses above CS 403 except CS 421 and CS 491." There is no change to the total hours required for the degree.

10KP0106BS: CIVIL ENGINEERING, BS

In Workflow

1. U Program Review (dforgacs@illinois.edu; eastuby@illinois.edu; aledward@illinois.edu)
2. 1251 Head (jroesler@illinois.edu; barros@illinois.edu; johnpop@illinois.edu)
3. KP Committee Chair (bsnewell@illinois.edu; danko@illinois.edu; kcp@illinois.edu; jmakela@illinois.edu)
4. KP Dean (candyd@illinois.edu)
5. University Librarian (jpwilkin@illinois.edu)
6. Provost (kmartens@illinois.edu)
7. Senate EPC (bjlehman@illinois.edu; moorhouz@illinois.edu; kmartens@illinois.edu)
8. Senate (jtempel@illinois.edu)
9. U Senate Conf (none)
10. Board of Trustees (none)
11. IBHE (none)
12. DMI (eastuby@illinois.edu; aledward@illinois.edu; dforgacs@illinois.edu)

Approval Path

1. Sat, 27 Mar 2021 19:36:15 GMT
   Deb Forgacs (dforgacs): Approved for U Program Review
2. Sat, 27 Mar 2021 23:11:04 GMT
   John Popovics (johnpop): Approved for 1251 Head
3. Tue, 06 Apr 2021 19:03:55 GMT
   Brooke Newell (bsnewell): Approved for KP Committee Chair
4. Tue, 06 Apr 2021 19:05:43 GMT
   Candy Deaville (candyd): Approved for KP Dean
5. Tue, 06 Apr 2021 19:39:00 GMT
   John Wilkin (jpwilkin): Approved for University Librarian
6. Tue, 06 Apr 2021 21:42:45 GMT
   Kathy Martensen (kmartens): Approved for Provost

History

1. Dec 13, 2018 by Deb Forgacs (dforgacs)
2. Apr 25, 2019 by Deb Forgacs (dforgacs)
3. Aug 12, 2019 by Deb Forgacs (dforgacs)
4. Feb 26, 2020 by Brooke Newell (bsnewell)
5. Mar 31, 2020 by Deb Forgacs (dforgacs)
6. Apr 14, 2020 by Deb Forgacs (dforgacs)

Date Submitted:Fri, 26 Mar 2021 21:19:52 GMT

Viewing:10KP0106BS : Civil Engineering, BS

Changes proposed by: Becky Stillwell

Proposal Type

Proposal Type:

Major (ex. Special Education)

This proposal is for a:

Revision

Proposal Title:

If this proposal is one piece of a multi-element change please include the other impacted programs here.*example: A BS revision with multiple concentration revisions*

Administrative approval: BS revision with several course changes.

EP Control Number

EP.21.115

Official Program Name

Civil Engineering, BS

Effective Catalog Term

Fall 2021

Sponsor College

Grainger College of Engineering

Sponsor Department

Civil and Environmental Engineering

Sponsor Name

John Popovics

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Program Description and Justification

Justification for proposal change:

The proposal is for:

1) Replacing CEE 195 with CEE 190 - Project Based Introduction to CEE

2) Replacing BTW 261 with CEE 300 - Behavior of Materials

3) Updating Areas of Study with technical courses, this includes CEE 360, CEE 412, CEE 435, CEE 473 and 484.

4) Removing CEE 480 and TAM 427, both courses are being deactivated.

With these changes, the credit hours under Orientation and professional development has changed from 1 to 4 hours. Written communication will see a change in hours from 7 to 8 hours. CEE 300 is already part of our curriculum and will be required to all students in our department keeping the overall required course hours at 128.

Justification: The changes in our Orientation and professional development hours will give students first year students an opportunity to take a course with "hands on" project work including a team presentation. It will also provide students exposure to some engineering design and civil engineering case studies. This scope of the class will enhance the overall curriculum and interest in our major.

CEE 300 is our advanced composition course. The class serves as an in-depth technical writing course, with weekly lab reports, and exposes them to this skill set that will be needed as they enter their professional careers upon graduation.

CEE has updated a few of our areas of study to allow additional courses to be added to them. The following technical courses have been added to provide more depth into each discipline, CEE 360, CEE 412, CEE 435, CEE 473 and 484.

CEE 480 and TAM 427 are being deactivated and removed from our program.

Corresponding Degree

BS Bachelor of Science

Is this program interdisciplinary?

No

Academic Level

Undergraduate

Will you admit to the concentration directly?

No

Is a concentration required for graduation?

No

CIP Code

140801 - Civil Engineering, General.

Is This a Teacher Certification Program?

No

Will specialized accreditation be sought for this program?

No

Admission Requirements

Desired Effective Admissions Term

Fall 2021

Is this revision a change to the admission status of the program?

No

Provide a brief narrative description of the admission requirements for this program. Where relevant, include information about licensure requirements, student background checks, GRE and TOEFL scores, and admission requirements for transfer students.

No Changes

Describe how critical academic functions such as admissions and student advising are managed.

No changes

Enrollment

Describe how this revision will impact enrollment and degrees awarded.

No Changes

Estimated Annual Number of Degrees Awarded

What is the matriculation term for this program?

Fall

What is the typical time to completion of this program?

4 years

What are the minimum Total Credit Hours required for this program?

128

Delivery Method

Is this program available on campus and online?

No

This program is available:

On Campus

Budget

Are there budgetary implications for this revision?

No

Will the program or revision require staffing (faculty, advisors, etc.) beyond what is currently available?

No

Resource Implications

Facilities

Will the program require new or additional facilities or significant improvements to already existing facilities?

No

Technology

Will the program need additional technology beyond what is currently available for the unit?

No

Non-Technical Resources

Will the program require additional supplies, services or equipment (non-technical)?

No

Resources

For each of these items, be sure to include in the response if the proposed new program or change will result in replacement of another program(s). If so, which program(s), what is the anticipated impact on faculty, students, and instructional resources? Please attach any letters of support/ acknowledgement from faculty, students, and/or other impacted units as appropriate.

Faculty Resources

Please address the impact on faculty resources including any changes in numbers of faculty, class size, teaching loads, student-faculty ratios, etc. Describe how the unit will support student advising, including job placement and/or admission to advanced studies.

No changes

Library Resources

Describe your proposal's impact on the University Library's resources, collections, and services. If necessary please consult with the appropriate disciplinary specialist within the University Library.

No changes

Instructional Resources

Will there be any reduction in other course offerings, programs or concentrations by your department as a result of this new program/proposed change?

No

Does the program include other courses/subjects impacted by the creation/revision of this program?

Yes

Required courses

BTW 261 - Principles Tech Comm
CEE 480 - Foundation Engineering

Explain how the inclusion or removal of the courses/subjects listed above impacts the offering departments.

The CEE Department is removing its requirement for BTW 261 - Principles of Tech Communication as our Advanced Composition course. We are replacing this course with CEE 300 - Behavior of Materials as our department's required course for Advanced Composition. This change will impact the enrollment for BTW 261 as CEE students will no longer register for this class.

The CEE Department is also removing CEE 480 - Foundation Engineering as this course's content overlaps with CEE 484 - Applied Soil Mechanics. Both courses are offered in the spring semester which has decreased enrollment. CEE 480 has had the following enrollment over the last five years: 2016 - 39, 2017 - 40, 2018 - 22, 2019 - 19, and 2020 -19. CEE 484 has added a 3hr or 4hr option to assist undergraduates who take this course for their primary or secondary area of study.

Attach letters of support from other departments.

BTW 261 Acknowledgment Confirmation.pdf
CEE 480 Deactivation Acknowledgement ABE, MATSE, MECHSE.pdf

Financial Resources

How does the unit intend to financially support this proposal?

No changes

Will the unit need to seek campus or other external resources?

No

Are you seeking a change in the tuition rate or differential for this program?

Yes

Program Regulation and Assessment

Briefly describe the plan to assess and improve student learning, including the program's learning objectives; when, how, and where these learning objectives will be assessed; what metrics will be used to signify student's achievement of the stated learning objectives; and the process to ensure assessment results are used to improve student learning. (Describe how the program is aligned with or meets licensure, certification, and/or entitlement requirements, if applicable).

Monitoring of changes and action items Reviewed annually at retreats All faculty.

Monitoring of changes and action items Discussed at committee meetings (ongoing) Curriculum committee.

Program outcomes and learning objectives:
The Civil and Environmental Engineering Program prepares graduates to achieve the following student outcomes by the time of graduation:

1. Successfully enter the civil and environmental engineering profession as practicing engineers and consultants with prominent companies and organizations in diverse areas that include structural, transportation, geotechnical, materials, environmental, and water resources engineering; construction management; and emerging fields including sustainability, resilience, and risk.
2. Pursue graduate education and research at major research universities in civil and environmental engineering, and related fields.
3. Pursue professional licensure.
4. Advance to leadership positions in their profession.
5. Engage in continued learning through professional development.
6. Participate in and contribute to professional societies and community service.

Course Outcome Assessments (Completed by Instructors)
All of the required courses (CEE 195, 201, 202 & 495), core courses (CEE 300, 310, 320, 330, 340, 350, 360, & 380), integrated design courses (CEE 401, 415, 421, 449, 453, 465, 484 & 493), and laboratory courses (CEE 300, 401, 405, 449, 458 & 483)comprising the Illinois CEE undergraduate program collectively represent the essential elements of the curriculum. Our primary processes for regularly assessing and evaluating the extent to which the student outcomes are being attained therefore focus on direct assessment related to these 23 courses. At the end of the semester, instructors of those 23 classes are asked to complete a "CEE ABET 1-7 Course Outcome Assessment" form, and at the beginning of a term instructors of those same courses are provided with a completed version of the form from a previous offering of the course for their information and further consideration.

The form asks the instructor of a course to first specifically indicate how much they feel their class helped students to develop each outcome (on a 1-5 scale, where "5" means a great deal of emphasis was placed on that particular outcome). It then also asks for the rubrics they use to assess students' performance ratings in terms of the 1-7 students outcomes, as well as what is the percentage of students in the class attaining the level deemed satisfactory for each outcome (assuming they have assessed on that particular outcome). For the most important student outcomes in a course (those having an emphasis score of 4 or 5), the expected level of attainment is ideally greater than 80%. The forms, which are collected and maintained by the CEE Associate Head and Director of Undergraduate Studies for documentation purposes, further ask instructors to reflect on what are their overall impressions of a course and how it might be improved, which is valuable to future instructors of the class and/or even to themselves the next time they teach the course.

The above addresses the process to ensure assessment results are used to improve student learning, in accordance with our accrediting board, ABET.

Is the career/profession for graduates of this program regulated by the State of Illinois?

No

Program of Study

"Baccalaureate degree requires at least 120 semester credit hours or 180 quarter credit hours and at least 40 semester credit hours (60 quarter credit hours) in upper division courses" (source: https://www.ibhe.org/assets/files/PrivateAdminRules2017.pdf). For proposals for new bachelor's degrees, if this minimum is not explicitly met by specifically-required 300- and/or 400-level courses, please provide information on how the upper-division hours requirement will be satisfied.

All proposals must attach the new or revised version of the Academic Catalog program of study entry. Contact your college office if you have questions.

Revised programs

CEE SidebySide3 Curriculum March 2021.xlsx

Attach a side-by-side comparison with the existing program AND, if the revision references or adds "chose-from" lists of courses students can select from to fulfill requirements, a listing of these courses, including the course rubric, number, title, and number of credit hours.

Catalog Page Text

Catalog Page Text: Description of program for the catalog page. This is not official content, it is used to help build the catalog pages for the program. Can be edited in the catalog by the college or department.

No Changes...recently updated.

Statement for Programs of Study Catalog

Graduation Requirements

Minimum Overall GPA:2.0
Minimum hours required for graduation:128 hours
General education:Students must complete the Campus General Education (https://courses.illinois.edu/gened/DEFAULT/DEFAULT/)**requirements including the campus general education language requirement.One of the SBS courses must be an introductory economics course (ECON 102 or ECON 103).Specific Advanced Composition course required for this degree is listed below.**

Orientation and Professional Development

Code	Title	Hours
CEE 195	Course CEE 195 Not Found	1
CEE 190	Project-Based Introduction to CEE[1]	4
CEE 495	Professional Practice[2]	0
ENG 100	Engineering Orientation[3]	0
Total Hours		4

Foundational Mathematics and Science

Code	Title	Hours
CHEM 102	General Chemistry I	3
CHEM 103	General Chemistry Lab I	1
CHEM 104	General Chemistry II	3
CHEM 105	General Chemistry Lab II	1
MATH 221	Calculus I[4]	4
MATH 225	Introductory Matrix Theory	2
MATH 231	Calculus II	3
MATH 241	Calculus III	4
MATH 285	Intro Differential Equations[5]	3
PHYS 211	University Physics: Mechanics	4
PHYS 212	University Physics: Elec & Mag	4
PHYS 213	Univ Physics: Thermal Physics	2
Total Hours		34

Civil Engineering Technical Core

Code	Title	Hours
CEE 201	Systems Engrg & Economics	3
CEE 202	Engineering Risk & Uncertainty	3
CS 101	Intro Computing: Engrg & Sci	3
SE 101	Engineering Graphics & Design	3
TAM 211	Statics	3
TAM 212	Introductory Dynamics	3
TAM 251	Introductory Solid Mechanics	3
TAM 335	Introductory Fluid Mechanics	4
Total Hours		25

Science Elective

Code	Title	Hours
Science elective, selected in accord with recommendations for the chosen primary field in civil engineering.		3
ATMS 120	Severe and Hazardous Weather	3
CHBE 321	Thermodynamics	4
CHEM 222	Quantitative Analysis Lecture	2
CS 357	Numerical Methods I	3
ECE 205	Electrical and Electronic Circuits	3
GEOL 107	Physical Geology	4
GEOL 118	Natural Disasters	3
ME 200	Thermodynamics	3
STAT 420	Methods of Applied Statistics	3 or 4

Civil Engineering Technical Electives

Students choose primary and secondary fields, of which there are seven traditional areas of study and three interdisciplinary programs. The specific choices of courses in this category are made through the submission of a Plan of Study, which is subject to approval by the faculty Program Review Committee.

Code	Title	Hours
Civil engineering technical courses, selected as follows, to at least include:		**34**
Civil Engineering Core Courses		
The courses that are required and recommended for the primary and secondary fields are listed below. Select at least 5 courses from the following list:		15-16
CEE 300	Behavior of Materials[6]	4
CEE 310	Transportation Engineering	3
CEE 320	Construction Engineering	3
CEE 330	Environmental Engineering	3
CEE 340	Energy and Global Environment	3
CEE 350	Water Resources Engineering	3
CEE 360	Structural Engineering	3
CEE 380	Geotechnical Engineering	3
Primary Field Advanced Technical Electives. Select courses from approved lists for appropriate programs of study within the seven areas or three interdisciplinary programs of civil engineering. Design experience is distributed in 200-level, 300-level, and 400-level CEE courses including integrated design courses. See list below:		**12-13**
Construction Engineering and Management		
Science Electives Required - NONE		
Science Electives Recommended - See below:		
ATMS 120	Severe and Hazardous Weather	3
ATMS 303	Synoptic-Dynamic Wea Analysis	4
ECE 205	Electrical and Electronic Circuits	3
FIN 221	Corporate Finance	3
GEOL 107	Physical Geology	4

GEOL 118	Natural Disasters	3
GEOL 333	Earth Materials and the Env	4
GEOL 380	Environmental Geology	4
ME 200	Thermodynamics	3
NPRE 201	Energy Systems	2 or 3
SE 400	Engineering Law	3 or 4
STAT 420	Methods of Applied Statistics	3 or 4
UP 205	Ecology & Environmental Sustainability	3
Civil Engineering Core Courses:		
CEE 300	Behavior of Materials	4
CEE 320	Construction Engineering	3
CEE 360	Structural Engineering	3
CEE 380	Geotechnical Engineering	3
Civil Engineering Core Courses Recommended- None		
Advanced Technical Courses - Required:		
CEE 420	Construction Productivity	3 or 4
CEE 421	Construction Planning (Required Integrated Design Course)	3 or 4
CEE 422	Construction Cost Analysis	3 or 4
CEE 461	Reinforced Concrete I	3
Advanced Technical Courses - Recommended:		
CEE 401	Concrete Materials	4
CEE 424	Sustainable Const Methods	4
CEE 460	Steel Structures I	3
CEE 469	Wood Structures	3 or 4
CEE 480	Course CEE 480 Not Found	
Construction Materials Engineering		
Science Electives Required - None		
Science Electives Recommended:		
GEOL 107	Physical Geology	4
ME 430	Failure of Engrg Materials	3 or 4
MSE 201	Phases and Phase Relations	3
TAM 427	Mechanics of Polymers	3
TAM 428	Mechanics of Composites	3
Civil Engineering Core Courses Required:		
CEE 300	Behavior of Materials	4
CEE 310	Transportation Engineering	3
Civil Engineering Core Courses Recommended:		
CEE 360	Structural Engineering	3
CEE 380	Geotechnical Engineering	3
Advanced Technical Courses Required:		
CEE 401	Concrete Materials (Required Integrated Design Course)	4
CEE 405	Asphalt Materials I	3 or 4
Advanced Technical Courses Recommended:		
CEE 406	Pavement Design I	3 or 4
CEE 460	Steel Structures I	3
CEE 461	Reinforced Concrete I	3
CEE 469	Wood Structures	3 or 4
CEE 483	Soil Mechanics and Behavior	4
MSE 401	Thermodynamics of Materials	3
MSE 402	Kinetic Processes in Materials	3
MSE 406	Thermal-Mech Behavior of Matls	3
MSE 420	Ceramic Materials & Properties	3

MSE 450	Polymer Science & Engineering	3 or 4
Environmental Engineering		
Science Electives Required - None		
Science Electives Recommended:		
CHEM 222	Quantitative Analysis Lecture	2
CHEM 232	Elementary Organic Chemistry I	3 or 4
CS 357	Numerical Methods I	3
GEOL 107	Physical Geology	4
MCB 300	Microbiology	3
ME 200	Thermodynamics	3
MSE 401	Thermodynamics of Materials	3
STAT 420	Methods of Applied Statistics	3 or 4
Civil Engineering Core Courses Required:		
CEE 330	Environmental Engineering	3
Civil Engineering Core Courses Recommended:		
CEE 350	Water Resources Engineering	3
CEE 380	Geotechnical Engineering	3
Advanced Technical Courses Required - At least one of:		
CEE 437	Water Quality Engineering	3
CEE 440	Fate Cleanup Environ Pollutant	4
CEE 445	Air Quality Modeling	4
CEE 446	Air Quality Engineering	4
Advanced Technical Course Recommended:		
CEE 430	Ecological Quality Engineering	2
CEE 434	Environmental Systems I	3
CEE 435	Public Health Engineering	3 or 4
CEE 438	Science & Environmental Policy	3
CEE 442	Environmental Engineering Principles, Physical	4
CEE 443	Env Eng Principles, Chemical	4
CEE 444	Env Eng Principles, Biological	4
CEE 445	Air Quality Modeling	4
CEE 447	Atmospheric Chemistry	4
CEE 449	Environmental Engineering Lab (Required Integrated Design Course)	3
CEE 452	Hydraulic Analysis and Design	3
CEE 453	Urban Hydrology and Hydraulics	4
CEE 457	Groundwater	3
Geotechnical Engineering		
Science Electives Required:		
GEOL 107	Physical Geology	4
Science Electives Recommended:		
GEOL 333	Earth Materials and the Env	4
GEOL 380	Environmental Geology	4
GEOL 401	Geomorphology	4
GEOL 411	Structural Geol and Tectonics	4
GEOL 440	Sedimentology and Stratigraphy	4
GEOL 470	Introduction to Hydrogeology	4
Civil Engineering Core Courses Required:		
CEE 360	Structural Engineering	3
CEE 380	Geotechnical Engineering	3
Civil Engineering Core Courses Recommended:		
CEE 300	Behavior of Materials	4
CEE 310	Transportation Engineering	3

CEE 320	Construction Engineering	3
CEE 330	Environmental Engineering	3
CEE 350	Water Resources Engineering	3
Advanced Technical Courses Required:		
CEE 483	Soil Mechanics and Behavior	4
CEE 484	Applied Soil Mechanics (Required Integrated Design Course)	3 or 4
Advanced Technical Courses Recommended:		
CEE 457	Groundwater	3
CEE 460	Steel Structures I	3
CEE 461	Reinforced Concrete I	3
CEE 463	Reinforced Concrete II	3 or 4
Structural Engineering		
Science Electives Required - None		
Science Electives Recommended:		
CS 357	Numerical Methods I	3
ECE 205	Electrical and Electronic Circuits	3
GEOL 107	Physical Geology	4
GEOL 118	Natural Disasters	3
ME 200	Thermodynamics	3
Civil Engineering Core Courses:		
CEE 300	Behavior of Materials	4
CEE 360	Structural Engineering	3
CEE 380	Geotechnical Engineering	3
Civil Engineering Core Courses Recommended:		
CEE 320	Construction Engineering	3
Advanced Technical Courses Required:		
CEE 460	Steel Structures I	3
CEE 461	Reinforced Concrete I	3
CEE 465	Design of Structural Systems (Required Integrated Design Course)	3
CEE 470	Structural Analysis	4
Advanced Technical Courses Recommended - None		
Transportation Engineering		
Science Electives Required - None		
Science Electives Recommended:		
CS 357	Numerical Methods I	3
ECE 205	Electrical and Electronic Circuits	3
GEOL 107	Physical Geology	4
ME 200	Thermodynamics	3
ME 340	Dynamics of Mechanical Systems	3.5
MSE 401	Thermodynamics of Materials	3
SE 320	Control Systems	4
STAT 420	Methods of Applied Statistics	3 or 4
Civil Engineering Core Courses Required:		
CEE 300	Behavior of Materials	4
CEE 310	Transportation Engineering	3
Civil Engineering Core Courses Recommended:		
CEE 320	Construction Engineering	3
CEE 330	Environmental Engineering	3
CEE 350	Water Resources Engineering	3
CEE 360	Structural Engineering	3
CEE 380	Geotechnical Engineering	3

Advanced Technical Courses: You must select one course from each of the three Areas below and one course from the recommended list.		
Area 1 - Facilities		
CEE 405	Asphalt Materials I	3 or 4
CEE 406	Pavement Design I	3 or 4
CEE 407	Airport Design	3 or 4
Area 2 - Systems:		
CEE 407	Airport Design	3 or 4
CEE 415	Geometric Design of Roads (Required Integrated Design Course)	4
CEE 416	Traffic Capacity Analysis	3 or 4
CEE 418	Public Transportation Systems	3 or 4
Area 3 - Railroad:		
CEE 408	Railroad Transportation Engrg	3 or 4
CEE 409	Railroad Track Engineering	3 or 4
CEE 410	Railway Signaling & Control	3 or 4
CEE 411	RR Project Design & Constr	3 or 4
CEE 412	High-Speed Rail Engineering	3 or 4
Recommended:		
CEE 401	Concrete Materials	4
CEE 405	Asphalt Materials I	3 or 4
CEE 406	Pavement Design I	3 or 4
CEE 407	Airport Design	3 or 4
CEE 408	Railroad Transportation Engrg	3 or 4
CEE 409	Railroad Track Engineering	3 or 4
CEE 410	Railway Signaling & Control	3 or 4
CEE 411	RR Project Design & Constr	3 or 4
CEE 412	High-Speed Rail Engineering	3 or 4
CEE 415	Geometric Design of Roads	4
CEE 416	Traffic Capacity Analysis	3 or 4
CEE 417	Urban Transportation Planning	4
CEE 418	Public Transportation Systems	3 or 4
Water Resources Engineering and Science		
Science Electives Required - None		
Science Electives Recommended:		
CS 357	Numerical Methods I	3
GEOL 107	Physical Geology	4
ME 200	Thermodynamics	3
Civil Engineering Core Courses Required:		
CEE 350	Water Resources Engineering	3
Civil Engineering Core Courses Recommended:		
CEE 300	Behavior of Materials	4
CEE 320	Construction Engineering	3
CEE 330	Environmental Engineering	3
CEE 360	Structural Engineering	3
CEE 380	Geotechnical Engineering	3
Advanced Technical Courses Required (Choose one):		
CEE 452	Hydraulic Analysis and Design	3
CEE 453	Urban Hydrology and Hydraulics (Required Integrated Design Course)	4
Advanced Technical Courses Recommended:		
CEE 432	Stream Ecology	3 or 4
CEE 433	Water Technology and Policy	3 or 4
CEE 434	Environmental Systems I	3

CEE 437	Water Quality Engineering	3
CEE 450	Surface Hydrology	3
CEE 451	Environmental Fluid Mechanics	3
CEE 452	Hydraulic Analysis and Design	3
CEE 453	Urban Hydrology and Hydraulics	4
CEE 457	Groundwater	3
CEE 458	Water Resources Field Methods	4
CEE 498	Special Topics (Section EH)	1 to 4
Energy-Water-Environment Sustainability		
Science Electives Required:		
ME 200	Thermodynamics	3-4
or CHBE 321	Thermodynamics	
Science Electives Recommended - None		
Civil Engineering Core Courses Required:		
CEE 340	Energy and Global Environment	3
Civil Engineering Core Courses Recommended:		
CEE 330	Environmental Engineering	3
CEE 350	Water Resources Engineering	3
Advanced Technical Courses Required:		
CEE 493	Sustainable Design Eng Tech (Must also select 3 courses from recommended list below)	4
Advanced Technical Courses Recommended:		
ABE 436	Renewable Energy Systems	3 or 4
ARCH 441	Heat and Moisture in Buildings	3
CEE 424	Sustainable Const Methods	4
CEE 433	Water Technology and Policy	3 or 4
CEE 434	Environmental Systems I	3
CEE 437	Water Quality Engineering	3
CEE 446	Air Quality Engineering	4
CEE 449	Environmental Engineering Lab	3
CEE 450	Surface Hydrology	3
CEE 452	Hydraulic Analysis and Design	3
CEE 453	Urban Hydrology and Hydraulics	4
CEE 457	Groundwater	3
CEE 498	Special Topics (Section EH)	1 to 4
ENG 471	Seminar Energy & Sustain Engrg	1
ME 400	Energy Conversion Systems	3 or 4
NPRE 402	Nuclear Power Engineering	3 or 4
NPRE 475	Wind Power Systems	3 or 4
Societal Risk and Hazard Mitigation		
Science Electives Required - None		
Science Electives Recommended:		
FIN 230	Introduction to Insurance	3
GEOL 118	Natural Disasters	3
LAW 301	Introduction to Law	2 or 3
NRES 287	Environment and Society	3
STAT 420	Methods of Applied Statistics	3 or 4
Civil Engineering Core Courses Required:		
CEE 340	Energy and Global Environment	3
Civil Engineering Core Courses Recommended:		
CEE 300	Behavior of Materials	4
CEE 310	Transportation Engineering	3
CEE 320	Construction Engineering	3

CEE 330	Environmental Engineering	3
CEE 350	Water Resources Engineering	3
CEE 360	Structural Engineering	3
CEE 380	Geotechnical Engineering	3
Advanced Technical Courses Required:		
CEE 491	Decision and Risk Analysis (and select 3 from the recommended list below)	3 or 4
Advanced Technical Courses Recommended:		
CEE 406	Pavement Design I	3 or 4
CEE 416	Traffic Capacity Analysis	3 or 4
CEE 417	Urban Transportation Planning	4
CEE 437	Water Quality Engineering	3
CEE 440	Fate Cleanup Environ Pollutant	4
CEE 449	Environmental Engineering Lab	3
CEE 460	Steel Structures I	3
CEE 461	Reinforced Concrete I	3
CEE 465	Design of Structural Systems	3
CEE 472	Structural Dynamics I	3 or 4
CEE 498	Special Topics (Section WE)	1 to 4
CEE 473	Wind Effects on Structures	4
IE 410	Advanced Topics in Stochastic Processes & Applications	3 or 4
NPRE 442	Radioactive Waste Management	3
SE 450	Decision Analysis I	3 or 4
STAT 425	Statistical Modeling I	3 or 4
STAT 429	Time Series Analysis	3 or 4
STAT 430	Topics in Applied Statistics	3 or 4
UP 438	Disasters and Urban Planning	4
Sustainable and Resilient Infrastructure Systems		
Science Electives Required - None		
Science Electives Recommended:		
ATMS 120	Severe and Hazardous Weather	3
CS 357	Numerical Methods I	3
ENSU 300	Environmental Sustainability	3
ESE 140	Climate and Global Change	3
ESE 320	Water Planet, Water Crisis	3
ESE 482	Challenges of Sustainability	3
FIN 221	Corporate Finance	3
GEOG 103	Earth's Physical Systems	4
NPRE 201	Energy Systems	2 or 3
NRES 439	Env and Sustainable Dev	3
SE 320	Control Systems	4
STAT 420	Methods of Applied Statistics	3 or 4
UP 406	Urban Ecology	4
Civil Engineering Core Courses Required:		
CEE 340	Energy and Global Environment	3
Civil Engineering Core Courses Recommended:		
CEE 300	Behavior of Materials	4
CEE 310	Transportation Engineering	3
CEE 320	Construction Engineering	3
CEE 330	Environmental Engineering	3
CEE 350	Water Resources Engineering	3
CEE 360	Structural Engineering	3
CEE 380	Geotechnical Engineering	3

Advanced Technical Courses Required:		
CEE 491	Decision and Risk Analysis (And select 3 courses from the recommended list below)	3 or 4
Advanced Technical Courses Recommended:		
ABE 436	Renewable Energy Systems	3 or 4
CEE 401	Concrete Materials	4
CEE 406	Pavement Design I	3 or 4
CEE 408	Railroad Transportation Engrg	3 or 4
CEE 409	Railroad Track Engineering	3 or 4
CEE 416	Traffic Capacity Analysis	3 or 4
CEE 417	Urban Transportation Planning	4
CEE 418	Public Transportation Systems	3 or 4
CEE 421	Construction Planning	3 or 4
CEE 424	Sustainable Const Methods	4
CEE 434	Environmental Systems I	3
CEE 453	Urban Hydrology and Hydraulics	4
CEE 458	Water Resources Field Methods	4
CEE 465	Design of Structural Systems	3
CEE 493	Sustainable Design Eng Tech	4
CEE 498	Special Topics (Section PS)	1 to 4
MSE 489	Matl Select for Sustainability	3 or 4
UP 466	Energy & the Built Environment	4
UP 480	Sustainable Design Principles	2
General Civil Engineering		
Science Electives Required - Choose one course from recommended list below:		
Science Electives Recommended:		
GEOL 107	Physical Geology	4
CHEM 222	Quantitative Analysis Lecture	2
CHEM 232	Elementary Organic Chemistry I	3 or 4
ME 200	Thermodynamics	3
STAT 400	Statistics and Probability I	4
Civil Engineering Core Courses Required - Should take 7 courses from list below:		
CEE 300	Behavior of Materials	4
CEE 310	Transportation Engineering	3
CEE 320	Construction Engineering	3
CEE 330	Environmental Engineering	3
CEE 340	Energy and Global Environment	3
CEE 350	Water Resources Engineering	3
CEE 360	Structural Engineering	3
CEE 380	Geotechnical Engineering	3
Advanced Technical Courses Required - Option I: Pick no more than one course from each area below such that the sum of the core and advanced courses is at least 34 credit hours. Option II: Pick 2 courses from one area and no more than one course from each of the remaining areas to total 34 credit hours.		
Construction:		
CEE 420	Construction Productivity	3 or 4
CEE 421	Construction Planning	3 or 4
CEE 422	Construction Cost Analysis	3 or 4
Environmental:		
CEE 437	Water Quality Engineering	3
CEE 440	Fate Cleanup Environ Pollutant	4
CEE 446	Air Quality Engineering	4
Geotechnical:		
CEE 480	Course CEE 480 Not Found	

CEE 483	Soil Mechanics and Behavior	4
CEE 484	Applied Soil Mechanics	3 or 4
Materials:		
CEE 401	Concrete Materials	4
Structures:		
CEE 460	Steel Structures I	3
CEE 461	Reinforced Concrete I	3
Transportation:		
CEE 405	Asphalt Materials I	3 or 4
CEE 406	Pavement Design I	3 or 4
CEE 407	Airport Design	3 or 4
CEE 408	Railroad Transportation Engrg	3 or 4
CEE 409	Railroad Track Engineering	3 or 4
CEE 410	Railway Signaling & Control	3 or 4
CEE 411	RR Project Design & Constr	3 or 4
CEE 412	High-Speed Rail Engineering	3 or 4
CEE 415	Geometric Design of Roads	4
CEE 416	Traffic Capacity Analysis	3 or 4
CEE 417	Urban Transportation Planning	4
CEE 418	Public Transportation Systems	3 or 4
Water Resources:		
CEE 452	Hydraulic Analysis and Design	3
CEE 453	Urban Hydrology and Hydraulics	4
Secondary Field Advanced Technical Electives. Select courses from approved lists to complement the primary area and add breadth to the program of study. See list below:		**6**
Construction Engineering and Management		
Civil Engineering Core Courses Required:		
CEE 320	Construction Engineering	3
Advanced Technical Courses Required:		
CEE 421	Construction Planning	3 or 4
CEE 420	Construction Productivity	3-4
or CEE 422	Construction Cost Analysis	
Advanced Technical Courses Recommended:		
CEE 424	Sustainable Const Methods	4
Construction Materials Engineering		
Civil Engineering Core Courses Required:		
CEE 300	Behavior of Materials	4
Advanced Technical Courses Required - Pick 2 courses from the recommended list below:		
Advanced Technical Courses Recommended:		
CEE 401	Concrete Materials	4
CEE 405	Asphalt Materials I	3 or 4
CEE 406	Pavement Design I	3 or 4
Environmental Engineering		
Civil Engineering Core Courses Required:		
CEE 330	Environmental Engineering	3
Advanced Technical Courses Required - Choose 2 courses from the recommended list below:		
CEE 430	Ecological Quality Engineering	2
CEE 434	Environmental Systems I	3
CEE 435	Public Health Engineering	3 or 4
CEE 437	Water Quality Engineering	3
CEE 438	Science & Environmental Policy	3
CEE 445	Air Quality Modeling	4

CEE 442	Environmental Engineering Principles, Physical	4
CEE 443	Env Eng Principles, Chemical	4
CEE 444	Env Eng Principles, Biological	4
CEE 446	Air Quality Engineering	4
CEE 447	Atmospheric Chemistry	4
CEE 449	Environmental Engineering Lab	3
Geotechnical Engineering		
Civil Engineering Core Courses Required:		
CEE 380	Geotechnical Engineering	3
Advanced Technical Courses Required:		
CEE 480	Course CEE 480 Not Found	0-4
or CEE 484	Applied Soil Mechanics	
CEE 483	Soil Mechanics and Behavior	4
CEE 484	Applied Soil Mechanics	3 or 4
Advanced Technical Courses Recommended - NONE		
Structural Engineering		
Civil Engineering Core Courses Required:		
CEE 360	Structural Engineering	3
Advanced Technical Courses Required:		
CEE 460	Steel Structures I	3
CEE 461	Reinforced Concrete I	3
Transportation Engineering		
Civil Engineering Core Courses Required:		
CEE 310	Transportation Engineering	3
Advanced Technical Courses Required: Select 2 courses, each from a different Area		
Area 1 - Facilities:		
CEE 405	Asphalt Materials I	3 or 4
CEE 406	Pavement Design I	3 or 4
CEE 407	Airport Design	3 or 4
Area 2 - Systems:		
CEE 407	Airport Design	3 or 4
CEE 415	Geometric Design of Roads	4
CEE 416	Traffic Capacity Analysis	3 or 4
CEE 418	Public Transportation Systems	3 or 4
Area 3 - Railroad:		
CEE 408	Railroad Transportation Engrg	3 or 4
CEE 409	Railroad Track Engineering	3 or 4
CEE 410	Railway Signaling & Control	3 or 4
CEE 411	RR Project Design & Constr	3 or 4
CEE 412	High-Speed Rail Engineering	3 or 4
Water Resources Engineering and Science		
Civil Engineering Core Courses Required:		
CEE 350	Water Resources Engineering	3
Advanced Technical Courses Required: 2 courses from the recommended list below:		
Advanced Technical Courses Recommended:		
CEE 432	Stream Ecology	3 or 4
CEE 433	Water Technology and Policy	3 or 4
CEE 450	Surface Hydrology	3
CEE 451	Environmental Fluid Mechanics	3
CEE 452	Hydraulic Analysis and Design	3
CEE 453	Urban Hydrology and Hydraulics	4
CEE 457	Groundwater	3

CEE 458	Water Resources Field Methods	4
CEE 498	Special Topics (Section EH)	1 to 4
Energy-Water-Environment Sustainability		
Civil Engineering Core Courses Required:		
CEE 340	Energy and Global Environment	3
Advanced Technical Courses Required:		
CEE 493	Sustainable Design Eng Tech (and select one course from the recommended list below:)	4
Advanced Technical Courses Recommended:		
ABE 436	Renewable Energy Systems	3 or 4
ARCH 441	Heat and Moisture in Buildings	3
CEE 424	Sustainable Const Methods	4
CEE 433	Water Technology and Policy	3 or 4
CEE 434	Environmental Systems I	3
CEE 437	Water Quality Engineering	3
CEE 446	Air Quality Engineering	4
CEE 449	Environmental Engineering Lab	3
CEE 450	Surface Hydrology	3
CEE 452	Hydraulic Analysis and Design	3
CEE 453	Urban Hydrology and Hydraulics	4
CEE 457	Groundwater	3
CEE 498	Special Topics (Section EH)	1 to 4
ENG 471	Seminar Energy & Sustain Engrg	1
ME 400	Energy Conversion Systems	3 or 4
NPRE 402	Nuclear Power Engineering	3 or 4
NPRE 475	Wind Power Systems	3 or 4
Societal Risk and Hazard Mitigation		
Civil Engineering Core Courses Required - None		
Advanced Technical Courses Required:		
CEE 491	Decision and Risk Analysis (and select one from the recommended list below:)	3 or 4
Advanced Technical Courses Recommended:		
CEE 406	Pavement Design I	3 or 4
CEE 416	Traffic Capacity Analysis	3 or 4
CEE 417	Urban Transportation Planning	4
CEE 437	Water Quality Engineering	3
CEE 440	Fate Cleanup Environ Pollutant	4
CEE 449	Environmental Engineering Lab	3
CEE 460	Steel Structures I	3
CEE 461	Reinforced Concrete I	3
CEE 465	Design of Structural Systems	3
CEE 472	Structural Dynamics I	3 or 4
CEE 498	Special Topics (Section EW)	1 to 4
CEE 473	Wind Effects on Structures	4
IE 410	Advanced Topics in Stochastic Processes & Applications	3 or 4
NPRE 442	Radioactive Waste Management	3
SE 450	Decision Analysis I	3 or 4
STAT 425	Statistical Modeling I	3 or 4
STAT 429	Time Series Analysis	3 or 4
STAT 430	Topics in Applied Statistics	3 or 4
UP 438	Disasters and Urban Planning	4
Sustainable and Resilient Infrastructure Systems		
Civil Engineering Core Courses Required:		
CEE 340	Energy and Global Environment	3

Civil Engineering Core Courses Recommended:		
CEE 300	Behavior of Materials	4
CEE 310	Transportation Engineering	3
CEE 320	Construction Engineering	3
CEE 330	Environmental Engineering	3
CEE 350	Water Resources Engineering	3
CEE 380	Geotechnical Engineering	3
Advanced Technical Courses Required:		
CEE 491	Decision and Risk Analysis (And select one course from the recommended list below:)	3 or 4
Advanced Technical Courses Recommended:		
ABE 436	Renewable Energy Systems	3 or 4
CEE 401	Concrete Materials	4
CEE 406	Pavement Design I	3 or 4
CEE 408	Railroad Transportation Engrg	3 or 4
CEE 409	Railroad Track Engineering	3 or 4
CEE 416	Traffic Capacity Analysis	3 or 4
CEE 417	Urban Transportation Planning	4
CEE 418	Public Transportation Systems	3 or 4
CEE 421	Construction Planning	3 or 4
CEE 424	Sustainable Const Methods	4
CEE 434	Environmental Systems I	3
CEE 453	Urban Hydrology and Hydraulics	4
CEE 458	Water Resources Field Methods	4
CEE 465	Design of Structural Systems	3
CEE 493	Sustainable Design Eng Tech	4
CEE 498	Special Topics (Section PS)	1 to 4
MSE 489	Matl Select for Sustainability	3 or 4
UP 466	Energy & the Built Environment	4
UP 480	Sustainable Design Principles	2
Global Context		
Science Electives Recommended:		
CPSC 116	The Global Food Production Web	3
ESE 140	Climate and Global Change	3
ESE 320	Water Planet, Water Crisis	3
ESE 482	Challenges of Sustainability	3
Civil Engineering Core Courses Recommended:		
CEE 330	Environmental Engineering	3
or CEE 350	Water Resources Engineering	
CEE 340	Energy and Global Environment	3
Advanced Technical Courses Recommended: Must take at least 3 credit hours in each of the 2 areas below:		
Knowledge and Skills Needed to Effectively Address Global Issues:		
ACE 451	Agriculture in Intl Dev	3 to 4
ATMS 421	Earth Systems Modeling	4
CEE 438	Science & Environmental Policy	3
CEE 445	Air Quality Modeling	4
CEE 447	Atmospheric Chemistry	4
CEE 450	Surface Hydrology	3
ECON 420	International Economics	2 to 4
Global CEE Design:		
CEE 408	Railroad Transportation Engrg	3 or 4
CEE 417	Urban Transportation Planning	4
CEE 437	Water Quality Engineering	3

CEE 449	Environmental Engineering Lab	3
CEE 465	Design of Structural Systems	3
CEE Multidisciplinary		
Science Electives Recommended: Any recommended science electives from existing CEE Primary and Secondary listed above		
Civil Engineering Core Courses Recommended: Core courses relevant to the student's interests		
Advanced Technical Courses: Students work with CEE Academic Advisors		
Atmosphere Science (Primary Field: Environmental Engineering)		
Civil Engineering Core Courses Required:		
CEE 330	Environmental Engineering	3
Advanced Technical Courses Recommended:		
ATMS 302	Atmospheric Dynamics I	3
ATMS 410	Radar Remote Sensing	4
ATMS 411	Satellite Remote Sensing	4
ATMS 421	Earth Systems Modeling	4
CEE 445	Air Quality Modeling	4
CEE 447	Atmospheric Chemistry	4
Chemistry (Primary Field: Environmental Engineering)		
Civil Engineering Core Courses Required:		
CEE 330	Environmental Engineering	3
Advanced Technical Courses Recommended:		
CHEM 232	Elementary Organic Chemistry I	3 or 4
CHEM 315	Instrumental Chem Systems Lab	2
CHEM 332	Elementary Organic Chem II	4
CHEM 420	Instrumental Characterization	2
CHEM 440	Physical Chemistry Principles	4
Chemical Engineering (Primary Field: Environmental Engineering)		
Civil Engineering Core Courses Required:		
CEE 330	Environmental Engineering	3
CEE 350	Water Resources Engineering	3
Advanced Technical Courses Recommended:		
CHBE 321	Thermodynamics	4
CHBE 421	Momentum and Heat Transfer	4
CHBE 422	Mass Transfer Operations	4
CHBE 424	Chemical Reaction Engineering	3
Microbiology (Primary Field: Environmental Engineering)		
Civil Engineering Core Courses Required:		
CEE 330	Environmental Engineering	3
Advanced Technical Courses Recommended:		
MCB 301	Experimental Microbiology	3
MCB 431	Microbial Physiology	3
MCB 450	Introductory Biochemistry	3
CEE 444	Env Eng Principles, Biological	4
Toxicology (Primary Field: Environmental Engineering)		
Civil Engineering Core Courses Required:		
CEE 330	Environmental Engineering	3
Advanced Technical Courses Recommended:		
CHEM 332	Elementary Organic Chem II	4
ENVS 431	Environ Toxicology & Health	3
ENVS 480	Basic Toxicology	3
MCB 450	Introductory Biochemistry	3

Electives

Code	Title	Hours
The Grainger College of Engineering Liberal Education course list, or additional courses from the campus General Education lists for Social and Behavioral Sciences or Humanities and the Arts[7]		6
Free electives. Additional unrestricted course work, subject to certain exceptions as noted by the College, so that there are at least 128 credit hours earned toward the degree.[8]		6
Total Hours of Curriculum to Graduate		**128**

1 *CEE 190 is offered in the fall semester.*

2 *CEE 495 is offered in the fall and spring semesters.*

3 *External transfer students take ENG 300.*

4 MATH 220*may be substituted, with four of the five credit hours applying toward the degree.*MATH 220*is appropriate for students with no background in calculus.*

5 *Math 284 or Math 286 (4 hours) are acceptable substitutes for MATH 285 (3 hours).*

6 *CEE 300 satisfies the General Education Advanced Composition requirement.*

7 *The Grainger College of Engineering approved liberal education course list can be found*here *(*https://wiki.illinois.edu/wiki/display/ugadvise/Degree+Requirements/#DegreeRequirements-GeneralEducationElectives*). Note that these credit hours could carry the required cultural studies designation required for campus general education requirements.*

8 *The Grainger College of Engineering restrictions to free electives can be found*here *(*https://wiki.illinois.edu/wiki/display/ugadvise/Degree+Requirements/#DegreeRequirements-FreeElectives*).*

EP Documentation

DMI Documentation

Banner/Codebook Name

BS:Civil Engineering -UIUC

Program Code:

10KP0106BS

Degree Code

BS

Major Code

0106

Program Reviewer Comments

Brooke Newell (bsnewell) (Wed, 24 Mar 2021 18:26:52 GMT): Rollback: per discussion
Deb Forgacs (dforgacs) (Fri, 26 Mar 2021 13:20:35 GMT): Rollback: requested.
Kathy Martensen (kmartens) (Tue, 06 Apr 2021 21:42:42 GMT): Admin approval: No change to total hours required, doesn't restrict options.

Key: 113

Key

GREEN HIGHLIGHT = Course addition, updated hours and added footnotes.

RED HIGHLIGHT = Course has been removed due to it no longer being offered to on-campus students.

Current Requirement	Current Hours		Revised Requirements	New Hours
Orientation and Professional Development	**1**		**Orientation and Professional Development**	**4**
			CEE 190: Project-Based Introduction to CEE [1]	4
CEE 195: About Civil Engineering	1			
CEE 495: Professional Practice	0		CEE 495: Professional Practice [2]	0
ENG 100: Engineering Orientation [1]	0		ENG 100: Engineering Orientation [3]	0
Foundational Mathematics and Science	**34**		**Foundational Mathematics and Science**	**34**
CHEM 102: General Chemistry I	3		CHEM 102: General Chemistry I	3
CHEM 103: General Chemistry Lab I	1		CHEM 103: General Chemistry Lab I	1
CHEM 104: General Chemistry II	3		CHEM 104: General Chemistry II	3
CHEM 105: General Chemistry Lab II	1		CHEM 105: General Chemistry Lab II	1
MATH 221: Calculus I [2]	4		MATH 221: Calculus I [4]	4
MATH 225: Matrix Theory	2		MATH 225: Matrix Theory	2
MATH 231: Calculus II	3		MATH 231: Calculus II	3
MATH 241: Calculus III	4		MATH 241: Calculus III	4
MATH 285: Intro Differential Equations	3		MATH 285: Intro Differential Equations [5]	3
PHYS 211: University Physics: Mechanics	4		PHYS 211: University Physics: Mechanics	4
PHYS 212: University Physics: Elec & Mag	4		PHYS 212: University Physics: Elec & Mag	4
PHYS 213: Thermal Physics	2		PHYS 213: Thermal Physics	2
Civil Engineering Technical Core	**25**		**Civil Engineering Technical Core**	**25**
CEE 201: Systems Engrg & Economics	3		CEE 201: Systems Engrg & Economics	3
CEE 202: Engineering Risk & Uncertainty	3		CEE 202: Engineering Risk & Uncertainty	3
CS 101: Intro Computing: Engrg & Sci	3		CS 101: Intro Computing: Engrg & Sci	3
SE 101: Engineering Graphics & Design	3		SE 101: Engineering Graphics & Design	3
TAM 211: Statics	3		TAM 211: Statics	3
TAM 212: Introductory Dynamics	3		TAM 212: Introductory Dynamics	3
TAM 251: Introductory Solid Mechanics	3		TAM 251: Introductory Solid Mechanics	3
TAM 335: Introductory Fluid Mechanics	4		TAM 335: Introductory Fluid Mechanics	4
Science Elective	**3**		**Science Elective**	**3**
ATMS 120: Severe & Hazardous Weather	3		ATMS 120: Severe & Hazardous Weather	3
CHBE 321: Thermodynamics	4		CHBE 321: Thermodynamics	4
CHEM 222: Quantitative Analysis Lecture	2		CHEM 222: Quantitative Analysis Lecture	2
CS 357: Numerical Methods I	3		CS 357: Numerical Methods I	3
ECE 205: Electrical and Electronic Circuits	3		ECE 205: Electrical and Electronic Circuits	3
GEOL 107: Physical Geology	4		GEOL 107: Physical Geology	4
GEOL 118: Natural Disasters	3		GEOL 118: Natural Disasters	3
ME 200: Thermodynamics	3		ME 200: Thermodynamics	3
Stat 420: Methods of Applied Statistics	3 or 4		Stat 420: Methods of Applied Statistics	3 or 4
Civil Engineering Technical Electives	34		**Civil Engineering Technical Electives**	34
Civil Engineering Core Courses	15-16		**Civil Engineering Core Courses**	15-16
CEE 300: Behavior of Materials	4		CEE 300: Behavior of Materials [6]	4
CEE 310: Transportation Engineering	3		CEE 310: Transportation Engineering	3
CEE 320: Construction Engineering	3		CEE 320: Construction Engineering	3
CEE 330: Environmental Engineering	3		CEE 330: Environmental Engineering	3
CEE 340: Energy and Global Environment	3		CEE 340: Energy and Global Environment	3
CEE 350: Water Resources Engineering	3		CEE 350: Water Resources Engineering	3
CEE 360: Structural Engineering	3		CEE 360: Structural Engineering	3
CEE 380: Geotechnical Engineering	3		CEE 380: Geotechnical Engineering	3
Primary Field Advanced Technical Electives	**12-13**		**Primary Field Advanced Technical Electives**	**12-13**
Construction Engineering & Management			**Construction Engineering & Management**	
Science Elective Required: None			**Science Elective Required: None**	
Science Electives Recommended - See below:			**Science Electives Recommended - See below:**	
ATMS 120: Severe and Hazardous Weather	3		ATMS 120: Severe and Hazardous Weather	3
ATMS 303: Synoptic-Dynamic Wea Analysis	4		ATMS 303: Synoptic-Dynamic Wea Analysis	4
ECE 205: Electrical and Electronic Circuits	3		ECE 205: Electrical and Electronic Circuits	3
FIN 221: Corporate Finance	3		FIN 221: Corporate Finance	3
GEOL 107: Physical Geology	4		GEOL 107: Physical Geology	4
GEOL 118: Natural Disasters	3		GEOL 118: Natural Disasters	3

GEOL 333: Earth Materials and the Env	4		GEOL 333: Earth Materials and the Env	4
GEOL 380: Environmental Geology	4		GEOL 380: Environmental Geology	4
ME 200: Thermodynamics	3		ME 200: Thermodynamics	3
NPRE 201: Energy Systems	2 or 3		NPRE 201: Energy Systems	2 or 3
SE 400: Engineering Law	3 or 4		SE 400: Engineering Law	3 or 4
STAT 420: Methods of Applied Statistics	3 or 4		STAT 420: Methods of Applied Statistics	3 or 4
UP 205: Ecology & Environmental Sustainability	3		UP 205: Ecology & Environmental Sustainability	3
Civil Engineering Core Courses Required:			**Civil Engineering Core Courses:**	
CEE 300: Behavior of Materials	4		CEE 300: Behavior of Materials	4
CEE 320: Construction Engineering	3		CEE 320: Construction Engineering	3
CEE 360: Structural Engineering	3		CEE 360: Structural Engineering	3
CEE 380: Geotechnical Engineering	3		CEE 380: Geotechnical Engineering	3
Civil Engineering Core Courses Recommended- None			**Civil Engineering Core Courses Recommended- None**	
Advanced Technical Courses - Required:			**Advanced Technical Courses - Required:**	
CEE 420: Construction Productivity	3 or 4		CEE 420: Construction Productivity	3 or 4
CEE 421: Construction Planning (Required Integrated Design Course)	3 or 4		CEE 421: Construction Planning (Required Integrated Design Course)	3 or 4
CEE 422: Construction Cost Analysis	3 or 4		CEE 422: Construction Cost Analysis	3 or 4
CEE 461: Reinforced Concrete I	3		CEE 461: Reinforced Concrete I	3
Advanced Technical Courses - Recommended:			**Advanced Technical Courses - Recommended:**	
CEE 401: Concrete Materials	4		CEE 401: Concrete Materials	4
CEE 424: Sustainable Const Methods	4		CEE 424: Sustainable Const Methods	4
CEE 460: Steel Structures I	3		CEE 460: Steel Structures I	3
CEE 469: Wood Structures	3 or 4		CEE 469: Wood Structures	3 or 4
CEE 480 Foundation Engineering	3			
Construction Materials Engineering			**Construction Materials Engineering**	
Science Electives Required - None			**Science Electives Required - None**	
Science Electives Recommended:			**Science Electives Recommended:**	
GEOL 107: Physical Geology	4		GEOL 107: Physical Geology	4
ME 420: Failure of Engrg Materials	3 or 4		ME 420: Failure of Engrg Materials	3 or 4
MSE 201: Phases and Phase Relations	3		MSE 201: Phases and Phase Relations	3
TAM 427: Mechanics of Polymers	3			
TAM 428: Mechanics of Composites	3		TAM 428: Mechanics of Composites	3
Civil Engineering Core Courses Required:			**Civil Engineering Core Courses Required:**	
CEE 300: Behavior of Materials	4		CEE 300: Behavior of Materials	4
CEE 310 Transportation Engineering	3		CEE 310 Transportation Engineering	3
Civil Engineering Core Courses Recommended:			**Civil Engineering Core Courses Recommended:**	
CEE 360: Structural Engineering	3		CEE 360: Structural Engineering	3
CEE 380: Geotechnical Engineering	3		CEE 380: Geotechnical Engineering	3
Advanced Technical Courses Required:			**Advanced Technical Courses Required:**	
CEE 401: Concrete Materials (Required Integrated Design Course)	4		CEE 401: Concrete Materials (Required Integrated Design Course)	4
CEE 405: Asphalt Materials I	4		CEE 405: Asphalt Materials I	4
CEE 406: Pavement Design I	3 or 4		CEE 406: Pavement Design I	3 or 4
CEE 460: Steel Structures I	3		CEE 460: Steel Structures I	3
CEE 461: Reinforced Concrete I	3		CEE 461: Reinforced Concrete I	3
CEE 469 Wood Structures	3 or 4		CEE 469 Wood Structures	3 or 4
CEE 483 Soil Mechanics and Behavior	4		CEE 483 Soil Mechanics and Behavior	4
MSE 401: Thermodynamics of Materials	3		MSE 401: Thermodynamics of Materials	3
MSE 402: Kinetic Processes in Materials	3		MSE 402: Kinetic Processes in Materials	3
MSE 406: Thermal-Mech Behavior of Matls	3		MSE 406: Thermal-Mech Behavior of Matls	3
MSE 420: Ceramic Materials & Properties	3		MSE 420: Ceramic Materials & Properties	3
MSE 450: Polymer Science & Engineering	3 or 4		MSE 450: Polymer Science & Engineering	3 or 4
Environmental Engineering			**Environmental Engineering**	
Science Electives Required - None			**Science Electives Required - None**	
Science Electives Recommended:			**Science Electives Recommended:**	
CHEM 222: Quantitative Analysis Lecture	2		CHEM 222: Quantitative Analysis Lecture	2
CHEM 232: Elementary Organic Chemistry I	3 or 4		CHEM 232: Elementary Organic Chemistry I	3 or 4
CS 357: Numerical Methods I	3		CS 357: Numerical Methods I	3
GEOL 107: Physical Geology	4		GEOL 107: Physical Geology	4
MCB 300: Microbiology	3		MCB 300: Microbiology	3
ME 200: Thermodynamics	3		ME 200: Thermodynamics	3
MSE 401: Thermodynamics of Materials	3		MSE 401: Thermodynamics of Materials	3

STAT 420: Methods of Applied Statistics	3 or 4		STAT 420: Methods of Applied Statistics	3 or 4
Civil Engineering Core Courses Required:			**Civil Engineering Core Courses Required:**	
CEE 330 - Environmental Engineering	3		CEE 330 - Environmental Engineering	3
Civil Engineering Core Courses Recommended:			**Civil Engineering Core Courses Recommended:**	
CEE 350 - Water Resources Engineering	3		CEE 350 - Water Resources Engineering	3
CEE 380 - Geotechnical Engineering	3		CEE 380 - Geotechnical Engineering	3
Advanced Technical Courses Required - At least one of:			**Advanced Technical Courses Required - At least one of:**	
CEE 437: Water Quality Engineering	3		CEE 437: Water Quality Engineering	3
CEE 440: Fate Cleanup Environ Pollutant	4		CEE 440: Fate Cleanup Environ Pollutant	4
CEE 445: Air Quality Modeling	4		CEE 445: Air Quality Modeling	4
CEE 446: Air Quality Engineering	4		CEE 446: Air Quality Engineering	4
Advanced Technical Course Recommended:			**Advanced Technical Course Recommended:**	
CEE 430: Ecological Quality Engineering	2		CEE 430: Ecological Quality Engineering	2
CEE 434: Environmental Systems I	3		CEE 434: Environmental Systems I	3
			CEE 435: Public Health Engineereing	3 or 4
CEE 438: Science & Environmental Policy	3		CEE 438: Science & Environmental Policy	3
CEE 442: Environmental Engineering Principles, Physical	4		CEE 442: Environmental Engineering Principles, Physical	4
CEE 443: Env Eng Principles, Chemical	4		CEE 443: Env Eng Principles, Chemical	4
CEE 444: Env Eng Principles, Biological	4		CEE 444: Env Eng Principles, Biological	4
CEE 445: Air Quality Modeling	4		CEE 445: Air Quality Modeling	4
CEE 447: Atmospheric Chemistry	4		CEE 447: Atmospheric Chemistry	4
CEE 449: Environmental Engineering Lab (Required Integrated Design Course)	3		CEE 449: Environmental Engineering Lab (Required Integrated Design Course)	3
CEE 452: Hydraulic Analysis and Design	3		CEE 452: Hydraulic Analysis and Design	3
CEE 453: Urban Hydrology and Hydraulics	4		CEE 453: Urban Hydrology and Hydraulics	4
CEE 457: Groundwater	3		CEE 457: Groundwater	3
Geotechnical Engineering			**Geotechnical Engineering**	
Science Elective Required:			**Science Elective Required:**	
GEOL 107: Physical Geology	4		GEOL 107: Physical Geology	4
Science Elective Recommended:			**Science Elective Recommended:**	
GEOL 333: Earth Materials and the Env	4		GEOL 333: Earth Materials and the Env	4
GEOL 380: Environmental Geology	4		GEOL 380: Environmental Geology	4
GEOL 401: Geomorphology	4		GEOL 401: Geomorphology	4
GEOL 411: Structural Geol and Tectonics	4		GEOL 411: Structural Geol and Tectonics	4
GEOL 440: Sedimentology and Stratigraphy	4		GEOL 440: Sedimentology and Stratigraphy	4
GEOL 470: Introduction to Hydrogeology	4		GEOL 470: Introduction to Hydrogeology	4
Civil Engineering Core Courses Required:			**Civil Engineering Core Courses Required:**	
CEE 360: Structural Engineering	3		CEE 360: Structural Engineering	3
CEE 380: Geotechnical Engineering	3		CEE 380: Geotechnical Engineering	3
Civil Engineering Core Courses Recommended:			**Civil Engineering Core Courses Recommended:**	
CEE 300: Behavior of Materials	4		CEE 300: Behavior of Materials	4
CEE 310: Transportation Engineering	3		CEE 310: Transportation Engineering	3
CEE 320: Construction Engineering	3		CEE 320: Construction Engineering	3
CEE 330: Environmental Engineering	3		CEE 330: Environmental Engineering	3
CEE 350: Water Resources Engineering	3		CEE 350: Water Resources Engineering	3
Advanced Technical Courses Required:			**Advanced Technical Courses Required:**	
CEE 483: Soil Mechanics and Behavior	4		CEE 483: Soil Mechanics and Behavior	4
CEE 484: Applied Soil Mechanics (Required Integrated Design Course)	3 or 4		CEE 484: Applied Soil Mechanics (Required Integrated Design Course)	3 or 4
Advanced Technical Courses Recommended:			**Advanced Technical Courses Recommended:**	
CEE 457: Groundwater	3		CEE 457: Groundwater	3
CEE 460: Steel Structures I	3		CEE 460: Steel Structures I	3
CEE 461: Reinforced Concrete I	3		CEE 461: Reinforced Concrete I	3
CEE 463: Reinforced Concrete II	3 or 4		CEE 463: Reinforced Concrete II	3 or 4
Structural Engineering			**Structural Engineering**	
Science Elecitve Required: None			**Science Elecitve Required: None**	
Science Elecitve Recommended:			**Science Elecitve Recommended:**	
CS 357: Numerical Methods I	3		CS 357: Numerical Methods I	3
ECE 205: Electrical and Electronic Circuits	3		ECE 205: Electrical and Electronic Circuits	3
GEOL 107: Physical Geology	4		GEOL 107: Physical Geology	4
GEOL 118: Natural Disasters	3		GEOL 118: Natural Disasters	3
ME 200: Thermodynamics	3		ME 200: Thermodynamics	3
Civil Engineering Core Courses Required:			**Civil Engineering Core Courses Required:**	
CEE 300: Behavior of Materials	4		CEE 300: Behavior of Materials	4

CEE 360: Structural Engineering	3		CEE 360: Structural Engineering	3
CEE 380: Geotechnical Engineering	3		CEE 380: Geotechnical Engineering	3
Civil Engineering Core Courses Recommended:			**Civil Engineering Core Courses Recommended:**	
Construction Engineering	3		Construction Engineering	3
Advanced Technical Courses Required:			**Advanced Technical Courses Required:**	
CEE 460: Steel Structures I	3		CEE 460: Steel Structures I	3
CEE 461: Reinforced Concrete I	3		CEE 461: Reinforced Concrete I	3
CEE 465: Design of Structural Systems (Required Integrated Design Course)	3		CEE 465: Design of Structural Systems (Required Integrated Design Course)	3
CEE 470: Structural Analysis	4		CEE 470: Structural Analysis	4
Transportation Engineering			**Transportation Engineering**	
Science Elecitve Required: None			**Science Elecitve Required: None**	
Science Elecitve Recommended:			**Science Elecitve Recommended:**	
CS 357: Numerical Methods I	3		CS 357: Numerical Methods I	3
ECE 205: Electrical and Electronic Circuits	3		ECE 205: Electrical and Electronic Circuits	3
GEOL 107: Physical Geology	4		GEOL 107: Physical Geology	4
ME 200: Thermodynamics	3		ME 200: Thermodynamics	3
ME 340: Dynamics of Mechanical Systems	3.5		ME 340: Dynamics of Mechanical Systems	3.5
MSE 201: Thermodynamics of Materials	3		MSE 201: Thermodynamics of Materials	3
SE 320: Control Systems	4		SE 320: Control Systems	4
STAT 420: Methods of Applied Statistics	3 or 4		STAT 420: Methods of Applied Statistics	3 or 4
Civil Engineering Core Courses Required:			**Civil Engineering Core Courses Required:**	
CEE 300: Behavior of Materials	4		CEE 300: Behavior of Materials	4
CEE 310: Trainsportation Engineering	3		CEE 310: Trainsportation Engineering	3
Civil Engineering Core Courses Recommended:			**Civil Engineering Core Courses Recommended:**	
Construction Engineering	3		Construction Engineering	3
Environmental Engineering	3		Environmental Engineering	3
Water Resources Engineering	3		Water Resources Engineering	3
Structural Engineering	3		Structural Engineering	3
Geotechnical Engineering	3		Geotechnical Engineering	3
Advanced Technical Courses: You must select one course from each of the three Areas below and one course from the recommended list.			**Advanced Technical Courses: You must select one course from each of the three Areas below and one course from the recommended list.**	
Area 1 - Facilities			**Area 1 - Facilities**	
CEE 405: Asphalt Materials I	3 or 4		CEE 405: Asphalt Materials I	3 or 4
CEE 406: Pavement Design I	3 or 4		CEE 406: Pavement Design I	3 or 4
CEE 407: Airport Design	3 or 4		CEE 407: Airport Design	3 or 4
Area 2 - Systems:			**Area 2 - Systems:**	
CEE 407: Airport Design	3 or 4		CEE 407: Airport Design	3 or 4
CEE 415: Geometric Design of Roads (Required Integrated Design Course)	4		CEE 415: Geometric Design of Roads (Required Integrated Design Course)	4
CEE 416: Traffic Capacity Analysis	3 or 4		CEE 416: Traffic Capacity Analysis	3 or 4
CEE 408: Railroad Transportation Engrg	3 or 4		CEE 408: Railroad Transportation Engrg	3 or 4
CEE 409: Railroad Track Engineering	3 or 4		CEE 409: Railroad Track Engineering	3 or 4
CEE 410: Railway Signaling & Control	3 or 4		CEE 410: Railway Signaling & Control	3 or 4
CEE 411: RR Project Design & Constr	3 or 4		CEE 411: RR Project Design & Constr	3 or 4
			CEE 412: High Speed Rail Engineering	3 or 4
Advanced Technical Courses Recommended:			**Advanced Technical Courses Recommended:**	
CEE 401: Concrete Materials	4		CEE 401: Concrete Materials	4
CEE 405: Asphalt Materials I	3 or 4		CEE 405: Asphalt Materials I	3 or 4
CEE 406: Pavement Design I	3 or 4		CEE 406: Pavement Design I	3 or 4
CEE 407: Airport Design	3 or 4		CEE 407: Airport Design	3 or 4
CEE 408 Railroad Transportation Engrg	3 or 4		CEE 408 Railroad Transportation Engrg	3 or 4
CEE 409: Railroad Track Engineering	3 or 4		CEE 409: Railroad Track Engineering	3 or 4
CEE 410: Railway Signaling & Control	3 or 4		CEE 410: Railway Signaling & Control	3 or 4
CEE 411: RR Project Design & Constr	3 or 4		CEE 411: RR Project Design & Constr	3 or 4
CEE 412: High Speed Rail Engineering	3 or 4		CEE 412: High Speed Rail Engineering	3 or 4
CEE 415: Geometric Design of Roads (Required Integrated Design Course)	4		CEE 415: Geometric Design of Roads (Required Integrated Design Course)	4
CEE 416: Traffic Capacity Analysis	3 or 4		CEE 416: Traffic Capacity Analysis	3 or 4
CEE 417: Urban Transportation Planning	4		CEE 417: Urban Transportation Planning	4
CEE 418: Public Transportation Systems	3 or 4		CEE 418: Public Transportation Systems	3 or 4
Water Resources Engineering			**Water Resources Engineering**	
Science Electives Required: None			**Science Electives Required: None**	
Science Electives Recommended:			**Science Electives Recommended:**	

CS 357: Numerical Methods I	3		CS 357: Numerical Methods I	3
GEOL 107: Physical Geology	4		GEOL 107: Physical Geology	4
ME 200: Thermodynamics	3		ME 200: Thermodynamics	3
Civil Engineering Core Courses Required:			**Civil Engineering Core Courses Required:**	
CEE 350: Water Resources Engineering	3		CEE 350: Water Resources Engineering	3
Civil Engineering Core Courses Recommended:			**Civil Engineering Core Courses Recommended:**	
CEE 300: Behavior of Materials	4		CEE 300: Behavior of Materials	4
CEE 320: Construction Engineering	3		CEE 320: Construction Engineering	3
CEE 330: Environmental Engineering	3		CEE 330: Environmental Engineering	3
CEE 360: Structural Engineering	3		CEE 360: Structural Engineering	3
CEE 380: Geotechnical Engineering	3		CEE 380: Geotechnical Engineering	3
Advanced Technical Courses Required (Choose one):			Advanced Technical Courses Required (Choose one):	
CEE 452: Hydraulic Analysis and Design	3		CEE 452: Hydraulic Analysis and Design	3
CEE 453: Urban Hydrology and Hydraulics (Required Integrated Design Course)	4		CEE 453: Urban Hydrology and Hydraulics (Required Integrated Design Course)	4
Advanced Technical Courses Recommended:			**Advanced Technical Courses Recommended:**	
CEE 432: Stream Ecology	3 or 4		CEE 432: Stream Ecology	3 or 4
CEE 433: Water Technology and Policy	3 or 4		CEE 433: Water Technology and Policy	3 or 4
CEE 434: Environmental Systems I	3		CEE 434: Environmental Systems I	3
CEE 437: Water Quality Engineering	3		CEE 437: Water Quality Engineering	3
CEE 450: Surface Hydrology	3		CEE 450: Surface Hydrology	3
CEE 451; Environmental Fluid Mechanics	3		CEE 451; Environmental Fluid Mechanics	3
CEE 452: Hydraulic Analysis and Design	3		CEE 452: Hydraulic Analysis and Design	3
CEE 453: Urban Hydrology and Hydraulics	4		CEE 453: Urban Hydrology and Hydraulics	4
CEE 457: Groundwater	3		CEE 457: Groundwater	3
CEE 458: Water Resources Field Methods	4		CEE 458: Water Resources Field Methods	4
CEE 498: Special Topics (Section EH)	1 to 4		CEE 498: Special Topics (Section EH)	1 to 4
Energy-Water-Environment Sustainability			**Energy-Water-Environment Sustainability**	
Science Electives Required:			**Science Electives Required:**	
ME 200 Thermodynamics or	3		ME 200 Thermodynamics or	3
CHBE 221 Thermodynamics	4		CHBE 221 Thermodynamics	4
Science Electives Recommended: None			**Science Electives Recommended: None**	
Civil Engineering Core Courses Required:			**Civil Engineering Core Courses Required:**	
CEE 340: Energy and Global Environment	3		CEE 340: Energy and Global Environment	3
Civil Engineering Core Courses Recommended:			**Civil Engineering Core Courses Recommended:**	
CEE 330: Environmental Engineering	3		CEE 330: Environmental Engineering	3
CEE 350: Water Resources Engineering	3		CEE 350: Water Resources Engineering	3
Advanced Technical Courses Required:			**Advanced Technical Courses Required:**	
CEE 493: Sustainable Design Eng Tech (Must also select 3 courses from recommended list below)	4		CEE 493: Sustainable Design Eng Tech (Must also select 3 courses from recommended list below)	4
Advanced Technical Courses Recommended:			**Advanced Technical Courses Recommended:**	
ABE 436: Renewable Energy Systems	3 or 4		ABE 436: Renewable Energy Systems	3 or 4
ARCH 441: Heat and Moisture in Buildings	3		ARCH 441: Heat and Moisture in Buildings	3
CEE 424: Sustainable Const Methods	4		CEE 424: Sustainable Const Methods	4
CEE 433: Water Technology and Policy	3 or 4		CEE 433: Water Technology and Policy	3 or 4
CEE 434: Environmental Systems I	3		CEE 434: Environmental Systems I	3
CEE 437: Water Quality Engineering	3		CEE 437: Water Quality Engineering	3
CEE 446: Air Quality Engineering	4		CEE 446: Air Quality Engineering	4
CEE 449: Environmental Engineering Lab	3		CEE 449: Environmental Engineering Lab	3
CEE 450: Surface Hydrology	3		CEE 450: Surface Hydrology	3
CEE 452: Hydraulic Analysis and Design	3		CEE 452: Hydraulic Analysis and Design	3
CEE 453: Urban Hydrology and Hydraulics	4		CEE 453: Urban Hydrology and Hydraulics	4
CEE 457: Groundwater	3		CEE 457: Groundwater	3
CEE 498: Special Topics (Section EH)	1 to 4		CEE 498: Special Topics (Section EH)	1 to 4
ENG 471: Seminar Energy & Sustain Engrg	1		ENG 471: Seminar Energy & Sustain Engrg	1
ME 400: Energy Conversion Systems	3 or 4		ME 400: Energy Conversion Systems	3 or 4
NPRE 402: Nuclear Power Engineering	3 or 4		NPRE 402: Nuclear Power Engineering	3 or 4
NPRE 475: Wind Power Systems	3 or 4		NPRE 475: Wind Power Systems	3 or 4
Societal Risk and Hazard Mitigation			**Societal Risk and Hazard Mitigation**	
Science Electives Required: None			**Science Electives Required: None**	
Science Electives Recommended:			**Science Electives Recommended:**	
FIN 230: Introduction to Insurance	3		FIN 230: Introduction to Insurance	3
GEOL 118: Natural Disasters	3		GEOL 118: Natural Disasters	3
LAW 301: Introduction to Law	2 or 3		LAW 301: Introduction to Law	2 or 3

NRES 287: Environment and Society	3		NRES 287: Environment and Society	3
STAT 420: Methods of Applied Statistics	3 or 4		STAT 420: Methods of Applied Statistics	3 or 4
Civil Engineering Core Courses Required:			**Civil Engineering Core Courses Required:**	
CEE 340: Energy and Global Environment	3		CEE 340: Energy and Global Environment	3
Civil Engineering Core Courses Recommended:			**Civil Engineering Core Courses Recommended:**	
CEE 300: Behavior of Materials	4		CEE 300: Behavior of Materials	4
CEE 310: Transportation Engineering	3		CEE 310: Transportation Engineering	3
CEE 320: Construction Engineering	3		CEE 320: Construction Engineering	3
CEE 330: Environmental Engineering	3		CEE 330: Environmental Engineering	3
CEE 350: Water Resources Engineering	3		CEE 340: Water Resources Engineering	3
CEE 360: Structural Engineering	3		CEE 360: Structural Engineering	3
CEE 380: Geotechnical Engineering	3		CEE 380: Geotechnical Engineering	3
Advanced Technical Courses Required:			**Advanced Technical Courses Required:**	
CEE 491: Decision and Risk Analysis (and select 3 from the recommended list below)	3 or 4		CEE 491: Decision and Risk Analysis (and select 3 from the recommended list below)	3 or 4
Advanced Technical Courses Recommended:			**Advanced Technical Courses Recommended:**	
CEE 406: Pavement Design I	3 or 4		CEE 406: Pavement Design I	3 or 4
CEE 416: Traffic Capacity Analysis	3 or 4		CEE 416: Traffic Capacity Analysis	3 or 4
CEE 417: Urban Transportation Planning	4		CEE 417: Urban Transportation Planning	4
CEE 437: Water Quality Engineering	3		CEE 437: Water Quality Engineering	3
CEE 440: Fate Cleanup Environ Pollutant	4		CEE 440: Fate Cleanup Environ Pollutant	4
CEE 449: Environmental Engineering Lab	3		CEE 449: Environmental Engineering Lab	3
CEE 460: Steel Structures I	3		CEE 460: Steel Structures I	3
CEE 461: Reinforced Concrete I	3		CEE 461: Reinforced Concrete I	3
CEE 465: Design of Structural Systems	3		CEE 465: Design of Structural Systems	3
CEE 470: Structural Dynamics I	3 or 4		CEE 470: Structural Dynamics I	3 or 4
Special Topics (Section WE)	1 to 4			
			CEE 473: Wind Effects on Structures	4
IE 410: Advanced Topics in Stochastic Processes & Applications	3 or 4		IE 410: Advanced Topics in Stochastic Processes & Applications	3 or 4
NPRE 442: Radioactive Waste Management	3		NPRE 442: Radioactive Waste Management	3
SE 450: Decision Analysis I	3 or 4		SE 450: Decision Analysis I	3 or 4
STAT 425: Statistical Modeling I	3 or 4		STAT 425: Statistical Modeling I	3 or 4
STAT 429: Time Series Analysis	3 or 4		STAT 429: Time Series Analysis	3 or 4
STAT 430: Topics in Applied Statistics	3 or 4		STAT 430: Topics in Applied Statistics	3 or 4
UP 438: Disasters and Urban Planning	4		UP 438: Disasters and Urban Planning	4
Sustainable and Resilient Infrastructure Systems			**Sustainable and Resilient Infrastructure Systems**	
Science Electives Required: None			**Science Electives Required: None**	
Science Electives Recommended:			**Science Electives Recommended:**	
ATMS 120: Severe and Hazardous Weather	3		ATMS 120: Severe and Hazardous Weather	3
ENSU 300: Numerical Methods I	3		ENSU 300: Numerical Methods I	3
ESE 140: Environmental Sustainability	3		ESE 140: Environmental Sustainability	3
ESE 320: Climate and Global Change	3		ESE 320: Climate and Global Change	3
ESE 482: Water Planet, Water Crisis	3		ESE 482: Water Planet, Water Crisis	3
ESE 482: Challenges of Sustainability	3		ESE 482: Challenges of Sustainability	3
FIN 221: Corporate Finance	3		FIN 221: Corporate Finance	3
GEOG 103: Earth's Physical Systems	4		GEOG 103: Earth's Physical Systems	4
NPRE 201: Energy Systems	2 or 3		NPRE 201: Energy Systems	2 or 3
NRES 439: Env and Sustainable Dev	3		NRES 439: Env and Sustainable Dev	3
SE 320: Control Systems	4		SE 320: Control Systems	4
STAT 420: Methods of Applied Statistics	3 or 4		STAT 420: Methods of Applied Statistics	3 or 4
UP 406: Urban Ecology	4		UP 406: Urban Ecology	4
Civil Engineering Core Courses Required:			**Civil Engineering Core Courses Required:**	
CEE 340: Energy and Global Environment	3		CEE 340: Energy and Global Environment	3
Civil Engineering Core Courses Recommended:			**Civil Engineering Core Courses Recommended:**	
CEE 300: Behavior of Materials	4		CEE 300: Behavior of Materials	4
CEE 310: Transportation Engineering	3		CEE 310: Transportation Engineering	3
CEE 320: Construction Engineering	3		CEE 320: Construction Engineering	3
CEE 330: Environmental Engineering	3		CEE 330: Environmental Engineering	3
CEE 350: Water Resources Engineering	3		CEE 350: Water Resources Engineering	3
			CEE 360: Structural Engineering	3
CEE 380: Geotechnical Engineering	3		CEE 380: Geotechnical Engineering	3
Advanced Technical Courses Required:			**Advanced Technical Courses Required:**	
CEE 491: Decision and Risk Analysis (and select 3 from the recommended list below)	3 or 4		CEE 491: Decision and Risk Analysis (and select 3 from the recommended list below)	3 or 4
ABE 436: Renewable Energy Systems	3 or 4		ABE 436: Renewable Energy Systems	3 or 4

CEE 401: Concrete Materials	4		CEE 401: Concrete Materials	4
CEE 406: Pavement Design I	3 or 4		CEE 406: Pavement Design I	3 or 4
CEE 408: Railroad Transportation Engrg	3 or 4		CEE 408: Railroad Transportation Engrg	3 or 4
CEE 409: Railroad Track Engineering	3 or 4		CEE 409: Railroad Track Engineering	3 or 4
CEE 416: Traffic Capacity Analysis	3 or 4		CEE 416: Traffic Capacity Analysis	3 or 4
CEE 417: Urban Transportation Planning	4		CEE 417: Urban Transportation Planning	4
CEE 418: Public Transportation Systems	3 or 4		CEE 418: Public Transportation Systems	3 or 4
CEE 421: Construction Planning	3 or 4		CEE 421: Construction Planning	3 or 4
CEE 424: Sustainable Const Methods	4		CEE 424: Sustainable Const Methods	4
CEE 434: Environmental Systems I	3		CEE 434: Environmental Systems I	3
CEE 453: Urban Hydrology and Hydraulics	4		CEE 453: Urban Hydrology and Hydraulics	4
CEE 458: Water Resources Field Methods	4		CEE 458: Water Resources Field Methods	4
CEE 465: Design of Structural Systems	3		CEE 465: Design of Structural Systems	3
CEE 493: Sustainable Design Eng Tech	4		CEE 493: Sustainable Design Eng Tech	4
Special Topics (Section PS)	1 to 4		Special Topics (Section PS)	1 to 4
MSE 489: Matl Select for Sustainability	3 or 4		MSE 489: Matl Select for Sustainability	3 or 4
UP 466: Energy & the Built Environment	4		UP 466: Energy & the Built Environment	4
UP 480: Sustainable Design Principles	2		UP 480: Sustainable Design Principles	2
General Civil Engineering			**General Civil Engineering**	
Science Electives Required - Choose one course from recommended list below:			**Science Electives Required - Choose one course from recommended list below:**	
Science Electives Recommended:			**Science Electives Recommended:**	
GEOL 107: Physical Geology	4		GEOL 107: Physical Geology	4
CHEM 222: Quantitative Analysis Lecture	2		CHEM 222: Quantitative Analysis Lecture	2
CHEM 232: Elementary Organic Chemistry I	3 or 4		CHEM 232: Elementary Organic Chemistry I	3 or 4
ME 200: Thermodynamics	3		ME 200: Thermodynamics	3
STAT 420: Statistics and Probability I	4		STAT 420: Statistics and Probability I	4
Civil Engineering Core Courses Required - Should take 7 courses from list below:			**Civil Engineering Core Courses Required - Should take 7 courses from list below:**	
CEE 300: Behavior of Materials	4		CEE 300: Behavior of Materials	4
CEE 310: Transportation Engineering	3		CEE 310: Transportation Engineering	3
CEE 320: Construction Engineering	3		CEE 320: Construction Engineering	3
CEE 330: Environmental Engineering	3		CEE 330: Environmental Engineering	3
CEE 340: Energy and Global Environment	3		CEE 340: Energy and Global Environment	3
CEE 350: Water Resources Engineering	3		CEE 350: Water Resources Engineering	3
CEE 360: Structural Engineering	3		CEE 360: Structural Engineering	3
CEE 380: Geotechnical Engineering	3		CEE 380: Geotechnical Engineering	3
Advanced Technical Courses Required - Option I: Pick no more than one course from each area below such that the sum of the core and advanced courses is at least 34 credit hours. Option II: Pick 2 courses from one area and no more than one course from each of the remaining areas to total 34 credit hours.			**Advanced Technical Courses Required - Option I: Pick no more than one course from each area below such that the sum of the core and advanced courses is at least 34 credit hours. Option II: Pick 2 courses from one area and no more than one course from each of the remaining areas to total 34 credit hours.**	
Construction:			**Construction:**	
CEE 420: Construction Productivity	3 or 4		CEE 420: Construction Productivity	3 or 4
CEE 421: Construction Planning	3 or 4		CEE 421: Construction Planning	3 or 4
CEE 422: Construction Cost Analysis	3 or 4		CEE 422: Construction Cost Analysis	3 or 4
Environmental			**Environmental**	
Water Quality Engineering	3		Water Quality Engineering	3
Fate Cleanup Environ Pollutant	4		Fate Cleanup Environ Pollutant	4
Air Quality Engineering	4		Air Quality Engineering	4
Geotechnical			**Geotechnical**	
CEE 480: Foundation Engineering	3			
CEE 483: Soil Mechanics and Behavior	4		CEE 483: Soil Mechanics and Behavior	4
			CEE 484: Applied Soil Mechanics	3 or 4
Materials			**Materials**	
CEE 401: Concrete Materials	4		CEE 401: Concrete Materials	4
Structures			**Structures**	
CEE 460: Steel Structures I	3		CEE 460: Steel Structures I	3
CEE 461: Reinforced Concrete I	3		CEE 461: Reinforced Concrete I	3
Transportation			**Transportation**	
CEE 405: Asphalt Materials I	3 or 4		CEE 405: Asphalt Materials I	3 or 4
CEE 406: Pavement Design I	3 or 4		CEE 406: Pavement Design I	3 or 4
CEE 407: Airport Design	3 or 4		CEE 407: Airport Design	3 or 4

CEE 408 Railroad Transportation Engrg	3 or 4		CEE 408 Railroad Transportation Engrg	3 or 4
CEE 409: Railroad Track Engineering	3 or 4		CEE 409: Railroad Track Engineering	3 or 4
CEE 410: Railway Signaling & Control	3 or 4		CEE 410: Railway Signaling & Control	3 or 4
CEE 411: RR Project Design & Constr	3 or 4		CEE 411: RR Project Design & Constr	3 or 4
CEE 412: High Speed Rail Engineering	3 or 4		CEE 412: High Speed Rail Engineering	3 or 4
CEE 415: Geometric Design of Roads	4		CEE 415: Geometric Design of Roads	4
CEE 416: Traffic Capacity Analysis	3 or 4		CEE 416: Traffic Capacity Analysis	3 or 4
CEE 417: Urban Transportation Planning	4		CEE 417: Urban Transportation Planning	4
CEE 418: Public Transportation Systems	3 or 4		CEE 418: Public Transportation Systems	3 or 4
Water Resources			**Water Resources**	
CEE 452: Hydraulic Analysis and Design	3		CEE 452: Hydraulic Analysis and Design	3
CEE 453: Urban Hydrology and Hydraulics	4		CEE 453: Urban Hydrology and Hydraulics	4
Secondary Field Advanced Technical Electives. Select courses from approved lists to complement the primary area and add breadth to the program of study. See list below:	**6**		Secondary Field Advanced Technical Electives. Select courses from approved lists to complement the primary area and add breadth to the program of study. See list below:	**6**
Construction Engineering and Management			**Construction Engineering and Management**	
Civil Engineering Core Courses Required:			**Civil Engineering Core Courses Required:**	
CEE 320: Construction Engineering	3		CEE 320: Construction Engineering	3
Advanced Technical Courses Required:			**Advanced Technical Courses Required:**	
CEE 421: Construction Planning	3 or 4		CEE 421: Construction Planning	3 or 4
CEE 420: Construction Productivity or	3 or 4		CEE 420: Construction Productivity or	3 or 4
CEE 422: Construction Cost Analysis			CEE 422: Construction Cost Analysis	
Advanced Technical Courses Recommended:			**Advanced Technical Courses Recommended:**	
CEE 424: Sustainable Const Methods	4		CEE 424: Sustainable Const Methods	4
Construction Materials Engineering			**Construction Materials Engineering**	
Civil Engineering Core Courses Required:			**Civil Engineering Core Courses Required:**	
CEE 300: Behavior of Materials	4		CEE 300: Behavior of Materials	4
Advanced Technical Courses Required - Pick 2 courses from the recommended list below:			**Advanced Technical Courses Required - Pick 2 courses from the recommended list below:**	
Advanced Technical Courses Recommended:			**Advanced Technical Courses Recommended:**	
CEE 401: Concrete Materials	4		CEE 401: Concrete Materials	4
CEE 405Asphalt Materials I	3 or 4		CEE 405Asphalt Materials I	3 or 4
CEE 406: Pavement Design I	3 or 4		CEE 406: Pavement Design I	3 or 4
Environmental Engineering			**Environmental Engineering**	
Civil Engineering Core Courses Required:			**Civil Engineering Core Courses Required:**	
CEE 330 - Environmental Engineering	3		CEE 330 - Environmental Engineering	3
Advanced Technical Courses Required - Choose 2 courses from the recommended list below:			**Advanced Technical Courses Required - Choose 2 courses from the recommended list below:**	
CEE 430: Ecological Quality Engineering	2		CEE 430: Ecological Quality Engineering	2
CEE 434: Environmental Systems I	3		CEE 434: Environmental Systems I	3
			CEE 435: Public Health Engineering	3 or 4
CEE 438: Science & Environmental Policy	3		CEE 438: Science & Environmental Policy	3
CEE 442: Environmental Engineering Principles, Physical	4		CEE 442: Environmental Engineering Principles, Physical	4
CEE 443: Env Eng Principles, Chemical	4		CEE 443: Env Eng Principles, Chemical	4
CEE 444: Env Eng Principles, Biological	4		CEE 444: Env Eng Principles, Biological	4
CEE 445: Air Quality Modeling	4		CEE 445: Air Quality Modeling	4
CEE 447: Atmospheric Chemistry	4		CEE 447: Atmospheric Chemistry	4
CEE 449: Environmental Engineering Lab	3		CEE 449: Environmental Engineering Lab	3
Geotechnical Engineering			**Geotechnical Engineering**	
Civil Engineering Core Courses Required:			**Civil Engineering Core Courses Required:**	
CEE 380: Geotechnical Engineering	3		**CEE 380: Geotechnical Engineering**	3
Advanced Technical Courese Required:			**Advanced Technical Courese Required:**	
CEE 483: Soil Mechanics and Behavior	4		CEE 483: Soil Mechanics and Behavior	4
CEE 480: Foundation Engineering or	3			
			CEE 484: Applied Soil Mechanics	3 or 4
Advanced Technical Courses Recommended: None			**Advanced Technical Courses Recommended: None**	
Structural Engineering			**Structural Engineering**	
Civil Engineering Core Courses Required:			**Civil Engineering Core Courses Required:**	
CEE 360: Structural Engineering	3		CEE 360: Structural Engineering	3
Advanced Technical Courses Required:			**Advanced Technical Courses Required:**	
CEE 460: Steel Structures I	3		CEE 460: Steel Structures I	3
CEE 461: Reinforced Concrete I	3		CEE 461: Reinforced Concrete I	3

Transportation Engineering			**Transportation Engineering**	
Civil Engineering Core Courses Required:			**Civil Engineering Core Courses Required:**	
CEE 310 - Transportation Engineering	3		CEE 310 - Transportation Engineering	3
Advanced Technical Courses Required: Select 2 courses, each from a different Area			**Advanced Technical Courses Required: Select 2 courses, each from a different Area**	
Area 1 - Facilities:			**Area 1 - Facilities:**	
CEE 405: Asphalt Materials I	3 or 4		CEE 405: Asphalt Materials I	3 or 4
CEE 406: Pavement Design I	3 or 4		CEE 406: Pavement Design I	3 or 4
CEE 407: Airport Design	3 or 4		CEE 407: Airport Design	3 or 4
Area 2 - Systems:			**Area 2 - Systems:**	
CEE 407: Airport Design	3 or 4		CEE 407: Airport Design	3 or 4
CEE 415: Geometric Design of Roads	4		CEE 415: Geometric Design of Roads	4
CEE 416: Traffic Capacity Analysis	3 or 4		CEE 416: Traffic Capacity Analysis	3 or 4
CEE 418: Public Transportation Systems	3 or 4		CEE 418: Public Transportation Systems	3 or 4
Area 3 - Railroad			**Area 3 - Railroad**	
CEE 408 Railroad Transportation Engrg	3 or 4		CEE 408 Railroad Transportation Engrg	3 or 4
CEE 409: Railroad Track Engineering	3 or 4		CEE 409: Railroad Track Engineering	3 or 4
CEE 410: Railway Signaling & Control	3 or 4		CEE 410: Railway Signaling & Control	3 or 4
CEE 411: RR Project Design & Constr	3 or 4		CEE 411: RR Project Design & Constr	3 or 4
			CEE 412: High Speed Rail Engineering	3 or 4
Water Resources Engineering and Science			**Water Resources Engineering and Science**	
Civil Engineering Core Courses Required:			**Civil Engineering Core Courses Required:**	
CEE 350: Water Resources Engineering	3		CEE 350: Water Resources Engineering	3
Advanced Technical Courses Required: 2 courses from the recommended list below:			**Advanced Technical Courses Required: 2 courses from the recommended list below:**	
Advanced Technical Courses Recommended:			**Advanced Technical Courses Recommended:**	
CEE 432: Stream Ecology	3 or 4		CEE 432: Stream Ecology	3 or 4
CEE 433: Water Technology and Policy	3 or 4		CEE 433: Water Technology and Policy	3 or 4
CEE 437: Water Quality Engineering	3		CEE 437: Water Quality Engineering	3
CEE 450: Surface Hydrology	3		CEE 450: Surface Hydrology	3
CEE 451; Environmental Fluid Mechanics	3		CEE 451; Environmental Fluid Mechanics	3
CEE 452: Hydraulic Analysis and Design	3		CEE 452: Hydraulic Analysis and Design	3
CEE 453: Urban Hydrology and Hydraulics	4		CEE 453: Urban Hydrology and Hydraulics	4
CEE 457: Groundwater	3		CEE 457: Groundwater	3
CEE 458: Water Resources Field Methods	4		CEE 458: Water Resources Field Methods	4
CEE 498: Special Topics (Section EH)	1 to 4		CEE 498: Special Topics (Section EH)	1 to 4
Energy-Water-Environment Sustainability			**Energy-Water-Environment Sustainability**	
Civil Engineering Core Courses Required:			**Civil Engineering Core Courses Required:**	
CEE 340: Energy and Global Environment	3		CEE 340: Energy and Global Environment	3
Advanced Technical Courses Required:			**Advanced Technical Courses Required:**	
CEE 493: Sustainable Design Eng Tech (and select one course from the recommended list below:)	4		CEE 493: Sustainable Design Eng Tech (and select one course from the recommended list below:)	4
Advanced Technical Courses Recommended:			**Advanced Technical Courses Recommended:**	
ABE 436: Renewable Energy Systems	3 or 4		ABE 436: Renewable Energy Systems	3 or 4
ARCH 441: Heat and Moisture in Buildings	3		ARCH 441: Heat and Moisture in Buildings	3
CEE 424: Sustainable Const Methods	4		CEE 424: Sustainable Const Methods	4
CEE 433: Water Technology and Policy	3 or 4		CEE 433: Water Technology and Policy	3 or 4
CEE 434: Environmental Systems I	3		CEE 434: Environmental Systems I	3
CEE 437: Water Quality Engineering	3		CEE 437: Water Quality Engineering	3
CEE 446: Air Quality Engineering	4		CEE 446: Air Quality Engineering	4
CEE 449: Environmental Engineering Lab	3		CEE 449: Environmental Engineering Lab	3
CEE 450: Surface Hydrology	3		CEE 450: Surface Hydrology	3
CEE 452: Hydraulic Analysis and Design	3		CEE 452: Hydraulic Analysis and Design	3
CEE 453: Urban Hydrology and Hydraulics	4		CEE 453: Urban Hydrology and Hydraulics	4
CEE 457: Groundwater	3		CEE 457: Groundwater	3
CEE 498: Special Topics (Section EH)	1 to 4		CEE 498: Special Topics (Section EH)	1 to 4
ENG 471: Seminar Energy & Sustain Engrg	1		ENG 471: Seminar Energy & Sustain Engrg	1
ME 400: Energy Conversion Systems	3 or 4		ME 400: Energy Conversion Systems	3 or 4
NPRE 402: Nuclear Power Engineering	3 or 4		NPRE 402: Nuclear Power Engineering	3 or 4
NPRE 475: Wind Power Systems	3 or 4		NPRE 475: Wind Power Systems	3 or 4
Societal Risk and Hazard Mitigation			**Societal Risk and Hazard Mitigation**	
Civil Engineering Core Courses Required - None			**Civil Engineering Core Courses Required - None**	
Advanced Technical Courses Required:			**Advanced Technical Courses Required:**	
CEE 491: Decision and Risk Analysis (and select one from the recommended list below:)	3 or 4		CEE 491: Decision and Risk Analysis (and select one from the recommended list below:)	3 or 4
Advanced Technical Courses Recommended:			**Advanced Technical Courses Recommended:**	
CEE 406: Pavement Design I	3 or 4		CEE 406: Pavement Design I	3 or 4

CEE 416: Traffic Capacity Analysis	3 or 4		CEE 416: Traffic Capacity Analysis	3 or 4
CEE 417: Urban Transportation Planning	4		CEE 417: Urban Transportation Planning	4
CEE 437: Water Quality Engineering	3		CEE 437: Water Quality Engineering	3
CEE 440: Fate Cleanup Environ Pollutant	4		CEE 440: Fate Cleanup Environ Pollutant	4
CEE 449: Environmental Engineering Lab	3		CEE 449: Environmental Engineering Lab	3
CEE 460: Steel Structures I	3		CEE 460: Steel Structures I	3
CEE 461: Reinforced Concrete I	3		CEE 461: Reinforced Concrete I	3
CEE 465: Design of Structural Systems	3		CEE 465: Design of Structural Systems	3
CEE 470: Structural Dynamics I	3 or 4		CEE 470: Structural Dynamics I	3 or 4
Special Topics (Section WE)	1 to 4			
			CEE 473: Wind Effects on Structures	4
IE 410: Advanced Topics in Stochastic Processes & Applications	3 or 4		IE 410: Advanced Topics in Stochastic Processes & Applications	3 or 4
NPRE 442: Radioactive Waste Management	3		NPRE 442: Radioactive Waste Management	3
SE 450: Decision Analysis I	3 or 4		SE 450: Decision Analysis I	3 or 4
STAT 425: Statistical Modeling I	3 or 4		STAT 425: Statistical Modeling I	3 or 4
STAT 429: Time Series Analysis	3 or 4		STAT 429: Time Series Analysis	3 or 4
STAT 430: Topics in Applied Statistics	3 or 4		STAT 430: Topics in Applied Statistics	3 or 4
UP 438: Disasters and Urban Planning	4		UP 438: Disasters and Urban Planning	4
Sustainable and Resilient Infrastructure Systems			**Sustainable and Resilient Infrastructure Systems**	
Civil Engineering Core Courses Required:			**Civil Engineering Core Courses Required:**	
CEE 340: Energy and Global Environment	3		CEE 340: Energy and Global Environment	3
Civil Engineering Core Courses Recommended:			**Civil Engineering Core Courses Recommended:**	
CEE 300: Behavior of Materials	4		CEE 300: Behavior of Materials	4
CEE 310: Transportation Engineering	3		CEE 310: Transportation Engineering	3
CEE 320: Construction Engineering	3		CEE 320: Construction Engineering	3
CEE 330: Environmental Engineering	3		CEE 330: Environmental Engineering	3
CEE 350: Water Resources Engineering	3		CEE 350: Water Resources Engineering	3
			CEE 360: Structural Engineering	3
CEE 380: Geotechnical Engineering	3		CEE 380: Geotechnical Engineering	3
Advanced Technical Courses Required:			**Advanced Technical Courses Required:**	
CEE 491: Decision and Risk Analysis (and select 3 from the recommended list below)	3 or 4		CEE 491: Decision and Risk Analysis (and select 3 from the recommended list below)	3 or 4
ABE 436: Renewable Energy Systems	3 or 4		ABE 436: Renewable Energy Systems	3 or 4
CEE 401: Concrete Materials	4		CEE 401: Concrete Materials	4
CEE 406: Pavement Design I	3 or 4		CEE 406: Pavement Design I	3 or 4
CEE 408: Railroad Transportation Engrg	3 or 4		CEE 408: Railroad Transportation Engrg	3 or 4
CEE 409: Railroad Track Engineering	3 or 4		CEE 409: Railroad Track Engineering	3 or 4
CEE 416: Traffic Capacity Analysis	3 or 4		CEE 416: Traffic Capacity Analysis	3 or 4
CEE 417: Urban Transportation Planning	4		CEE 417: Urban Transportation Planning	4
CEE 418: Public Transportation Systems	3 or 4		CEE 418: Public Transportation Systems	3 or 4
CEE 421: Construction Planning	3 or 4		CEE 421: Construction Planning	3 or 4
CEE 424: Sustainable Const Methods	4		CEE 424: Sustainable Const Methods	4
CEE 434: Environmental Systems I	3		CEE 434: Environmental Systems I	3
CEE 453: Urban Hydrology and Hydraulics	4		CEE 453: Urban Hydrology and Hydraulics	4
CEE 458: Water Resources Field Methods	4		CEE 458: Water Resources Field Methods	4
CEE 465: Design of Structural Systems	3		CEE 465: Design of Structural Systems	3
CEE 493: Sustainable Design Eng Tech	4		CEE 493: Sustainable Design Eng Tech	4
Special Topics (Section PS)	1 to 4		Special Topics (Section PS)	1 to 4
MSE 489: Matl Select for Sustainability	3 or 4		MSE 489: Matl Select for Sustainability	3 or 4
UP 466: Energy & the Built Environment	4		UP 466: Energy & the Built Environment	4
UP 480: Sustainable Design Principles	2		UP 480: Sustainable Design Principles	2
Global Context			**Global Context**	
Science Electives Recommended:			**Science Electives Recommended:**	
CPSC 116: The Global Food Production Web	3		CPSC 116: The Global Food Production Web	3
ESE 140: Climate and Global Change	3		ESE 140: Climate and Global Change	3
ESE 320: Water Planet, Water Crisis	3		ESE 320: Water Planet, Water Crisis	3
ESE 482: Challenges of Sustainability	3		ESE 482: Challenges of Sustainability	3
Civil Engineering Core Courses Recommended:			**Civil Engineering Core Courses Recommended:**	
CEE 330: Environmental Engineering or	3		CEE 330: Environmental Engineering or	3
CEE 350: Water Resources Engineering			CEE 350: Water Resources Engineering	
CEE 340: Energy and Global Environment	3		CEE 340: Energy and Global Environment	3
Advanced Technical Courses Recommended: Must take at least 3 credit hours in each of the 2 areas below:			**Advanced Technical Courses Recommended: Must take at least 3 credit hours in each of the 2 areas below:**	

Knowledge and Skills Needed to Effectively Address Global Issues:			**Knowledge and Skills Needed to Effectively Address Global Issues:**	
ACE 451: Agriculture in Intl Dev	3 to 4		ACE 451: Agriculture in Intl Dev	3 to 4
ATMS 421: Earth Systems Modeling	4		ATMS 421: Earth Systems Modeling	4
CEE 438: Science & Environmental Policy	3		CEE 438: Science & Environmental Policy	3
CEE 445: Air Quality Modeling	4		CEE 445: Air Quality Modeling	4
CEE 447: Atmospheric Chemistry	4		CEE 447: Atmospheric Chemistry	4
CEE 450: Surface Hydrology	3		CEE 450: Surface Hydrology	3
ECON 420: International Economics	2 to 4		ECON 420: International Economics	2 to 4
CEE Global Deisgn			**CEE Global Deisgn**	
CEE 408: Railroad Transportation Engrg	3 or 4		CEE 408: Railroad Transportation Engrg	3 or 4
CEE 417: Urban Transportation Planning	4		CEE 417: Urban Transportation Planning	4
CEE 437: Water Quality Engineering	3		CEE 437: Water Quality Engineering	3
CEE 449: Environmental Engineering Lab	3		CEE 449: Environmental Engineering Lab	3
CEE 465: Design of Structural Systems	3		CEE 465: Design of Structural Systems	3
CEE Multidisciplinary			**CEE Multidisciplinary**	
Science Electives Recommended: Any recommended science electives from existing CEE Primary and Secondary listed above			**Science Electives Recommended: Any recommended science electives from existing CEE Primary and Secondary listed above**	
Civil Engineering Core Courses Recommended: Core courses relevant to the student's interests			**Civil Engineering Core Courses Recommended: Core courses relevant to the student's interests**	
Advanced Technical Courses: Students work with CEE Academic Advisors			**Advanced Technical Courses: Students work with CEE Academic Advisors**	
Atmosphere Science (Primary Field: Environmental Engineering)			**Atmosphere Science (Primary Field: Environmental Engineering)**	
Civil Engineering Core Courses Required:			**Civil Engineering Core Courses Required:**	
CEE 330: Environmental Engineering	3		CEE 330: Environmental Engineering	3
Advanced Technical Courses Recommended:			**Advanced Technical Courses Recommended:**	
ATMS 302: Atmospheric Dynamics I	3		ATMS 302: Atmospheric Dynamics I	3
ATMS 410: Radar Remote Sensing	4		ATMS 410: Radar Remote Sensing	4
ATMS 411: Satellite Remote Sensing	4		ATMS 411: Satellite Remote Sensing	4
ATMS 421: Earth Systems Modeling	4		ATMS 421: Earth Systems Modeling	4
CEE 445: Air Quality Modeling	4		CEE 445: Air Quality Modeling	4
CEE 447: Atmospheric Chemistry	4		CEE 447: Atmospheric Chemistry	4
Chemical Engineering (Primary Field: Environmental Engineering)			**Chemical Engineering (Primary Field: Environmental Engineering)**	
Civil Engineering Core Courses Required:			Civil Engineering Core Courses Required:	
CEE 330: Evironmental Engineering	3		CEE 330: Evironmental Engineering	3
CEE 350: Water Resources Engineering	3		CEE 350: Water Resources Engineering	3
Advamced Technical Courses Recommended:			**Advamced Technical Courses Recommended:**	
Thermodynamics	4		Thermodynamics	4
Momentum and Heat Transfer	4		Momentum and Heat Transfer	4
Mass Transfer Operations	4		Mass Transfer Operations	4
Chemical Reaction Engineering	3		Chemical Reaction Engineering	3
Microbiology (Primary Field: Environmental Engineering)			**Microbiology (Primary Field: Environmental Engineering)**	
Civil Engineering Core Courses Required:			**Civil Engineering Core Courses Required:**	
CEE 330: Evironmental Engineering	3		CEE 330: Evironmental Engineering	3
Advanced Technical Courses Recommended:			**Advanced Technical Courses Recommended:**	
CEE 444: Env Eng Principles, Biological	4		CEE 444: Env Eng Principles, Biological	4
MCB 301: Experimental Microbiology	3		MCB 301: Experimental Microbiology	3
MCB 431: Microbial Physiology	3		MCB 431: Microbial Physiology	3
MCB 450: Introductory Biochemistry	3		MCB 450: Introductory Biochemistry	3
Toxicology (Primary Field: Environmental Engineering)			**Toxicology (Primary Field: Environmental Engineering)**	
Civil Engineering Core Courses Required:			**Civil Engineering Core Courses Required:**	
CEE 330: Evironmental Engineering	3		CEE 330: Evironmental Engineering	3
Advanced Technical Courses Recommended:			**Advanced Technical Courses Recommended:**	
CHEM 332: Elementary Organic Chem II	4		CHEM 332: Elementary Organic Chem II	4
ENVS 431: Environ Toxicology & Health	3		ENVS 431: Environ Toxicology & Health	3
ENVS 480: Basic Toxicology	3		ENVS 480: Basic Toxicology	3
MCB 450: Introductory Biochemistry	3		MCB 450: Introductory Biochemistry	3
General Education Requirements			**General Education Requirements**	
A minimum of six courses is required, as follows:	**18**		**A minimum of six courses is required, as follows:**	**18**
Social and Behavioral Sciences	6		Social and Behavioral Sciences	6
Humanities & the Arts	6		Humanities & the Arts	6

The Grainger College of Engineering Liberal Education course list, or from the campus General Education lists for Social and Behavioral Sciences or Humanities and the Arts [3]	6		The Grainger College of Engineering Liberal Education course list, or from the campus General Education lists for Social and Behavioral Sciences or Humanities and the Arts[7]	6
Cultural Studies: Non-Western Cultures (1 course)			Cultural Studies: Non-Western Cultures (1 course)	
Cultural Studies: U.S. Minorities Cultures (1 course)			Cultural Studies: U.S. Minorities Cultures (1 course)	
Cultural Studies: Western/Comparative Cultures (1 course)			Cultural Studies: Western/Comparative Cultures (1 course)	
Non-Primary Language Requirement	**0-9**		**Non-Primary Language Requirement**	**0-9**
Completion of the third semester or equivalent of a non-primary language is required. Completion of three years of a single language in high school satisfies this requirement.			Completion of the third semester or equivalent of a non-primary language is required. Completion of three years of a single language in high school satisfies this requirement.	
University Composition	**4-6**		**University Composition**	**4-6**
RHET 105: Writing and Research	4		RHET 105: Writing and Research	4
CMN 111: Oral & Written Comm I	3		CMN 111: Oral & Written Comm I	3
& CMN 112: and Oral & Written Comm II	**3**		& CMN 112: and Oral & Written Comm II	**3**
ESL 111: Intro to Academic Writing I	3		ESL 111: Intro to Academic Writing I	3
& ESL 112: and Intro to Academic Writing II	3		& ESL 112: and Intro to Academic Writing II	3
ESL 115: Principles of Academic Writing	4		ESL 115: Principles of Academic Writing	4
CEE 300: Behavior of Materials is our Advanced Composition course.	4		CEE 300: Behavior of Materials is our Advanced Composition course.	4
Free Electives	**6**		**Free Electives**	**6**
Free electives. Additional unrestricted course work, subject to certain exceptions as noted by the College, so that there are at least 128 credit hours earned toward the degree. [4]			Free electives. Additional unrestricted course work, subject to certain exceptions as noted by the College, so that there are at least 128 credit hours earned toward the degree.[8]	
Total Hours of Curriculum to Graduate	**128**		Total Hours of Curriculum to Graduate	**128**
Footnotes			**Footnotes**	
			[1] CEE 190 is offered in the Fall semester.	
			[2] CEE 495 is offered in Fall and Spring semesters.	
[1]External transfer student take ENG 300 instead.			*[3] External Transfer student takes ENG 300.*	
[2]MATH 220 *may be substituted, with four of the five credit hours applying toward the degree.* MATH 220 *is appropriate for students*			[4]MATH 220 *may be substituted, with four of the five credit hours applying toward the degree.* MATH 220 *is appropriate for students with*	
			[5]Math 284 or MATH 286 (4 hours) are acceptable substitutes for MATH 285 (3 hours).	
			[6] CEE 300 satisfies the General Education Advanced Composition Requirement.	
[3]The Grainger College of Engineering approved liberal education course list can be found here. Note that that these credit hours coud carry the required cultuaral studies designation required for campus general education requirements.			*[7]The Grainger College of Engineering approved liberal education course list can be found here. Note that that these credit hours coud carry the required cultuaral studies designation required for campus general education requirements.*	
[4]The Grainger College of Engineering restrictions to free electives can be found here.			*[8]The Grainger College of Engineering restrictions to free electives can be found here.*	

Stillwell, Rebecca Leigh

From: Boone, Anne M
Sent: Wednesday, March 24, 2021 7:50 PM
To: Stillwell, Rebecca Leigh; Rodriguez, Luis F
Cc: Maghirang, Ronaldo G
Subject: RE: Deactivation of CEE 480 - Foundation Engineering

Good evening,

Thank you for notifying us. We support this change.

Anne Marie

Anne Marie Boone

Student Academic Program Coordinator

Department of Agricultural and Biological Engineering

College of Agricultural, Consumer, and Environmental Sciences (ACES)

and The Grainger College of Engineering

University of Illinois, Urbana-Champaign

360-P Ag Eng Sci Bldg

1304 W. Pennsylvania

217-333-7038

aboone@illinois.edu

From: Stillwell, Rebecca Leigh <rborden@illinois.edu>
Sent: Wednesday, March 24, 2021 5:09 PM
To: Rodriguez, Luis F <lfr@illinois.edu>; Boone, Anne M <aboone@illinois.edu>
Subject: FW: Deactivation of CEE 480 - Foundation Engineering
Importance: High

Good afternoon,

CEE is planning to deactivate CEE 480 – Foundation Engineering as our department covers this material and more in CEE 484. I want to make sure ABE modifies your curriculum accordingly to accommodate these changes. Please respond with your departmental support of this change by tomorrow, so I can provide it as a letter of support for our curriculum changes to Brooke Newell at GCOE.

Stillwell, Rebecca Leigh

From: Nagel, Laura
Sent: Wednesday, March 24, 2021 8:35 PM
To: Stillwell, Rebecca Leigh
Subject: Re: Deactivation of CEE 480 - Foundation Engineering

Hi Becky,

Thank you for letting us know. Deactivating CEE 480 will not have any negative impact on the MatSE curriculum.

Best,

Laura Nagel
Lecturer and Chief Advisor
Materials Science and Engineering
University of Illinois Urbana-Champaign

> On Mar 24, 2021, at 4:49 PM, Stillwell, Rebecca Leigh <rborden@illinois.edu> wrote:
>
> Good afternoon,
>
> CEE is planning to deactivate CEE 480 – Foundation Engineering as our department covers this material and more in CEE 484. I want to make sure MatSe modifies your curriculum accordingly to accommodate these changes. Please respond with your departmental support of this change by tomorrow, so I can provide it as a letter of support for our curriculum changes to Brooke Newell at GCOE.
>
> Thanks,
> **Becky Stillwell**
> Senior Academic Advisor
> Civil and Environmental Engineering
> 1102 Newmark Lab
> 205 N. Mathews Ave.
> Urbana, IL 61801
> 217-333-3812
> rborden@illinois.edu

Stillwell, Rebecca Leigh

From: Ott-Monsivais, Stephanie
Sent: Wednesday, March 24, 2021 11:38 PM
To: Stillwell, Rebecca Leigh
Cc: Newell, Brooke
Subject: RE: Deactivation of CEE 480 - Foundation Engineering

Hi Becky,

MechSE is supportive of this change. I will work with Brooke to update our ME curriculum.

Best.
Stephanie

Stephanie Ott-Monsivais
Academic Advisor
Department of Mechanical Science and Engineering (MechSE) University of Illinois at Urbana-Champaign
E-mail: ottmonsi@illinois.edu
Phone: 217-300-3102
Temporary Office Location: 152A Computing Applications Building; 605 E. Springfield Ave.; Champaign, IL 61820
Office Hours: 8:30 am – noon & 1pm – 4:30 pm M – F, except 11 – noon T

From: Stillwell, Rebecca Leigh <rborden@illinois.edu>
Sent: Wednesday, March 24, 2021 4:48 PM
To: Ott-Monsivais, Stephanie <ottmonsi@illinois.edu>
Subject: Deactivation of CEE 480 - Foundation Engineering
Importance: High

Good afternoon,

CEE is planning to deactivate CEE 480 – Foundation Engineering as our department covers this material and more in CEE 484. I want to make sure MechSe modifies your curriculum accordingly to accommodate these changes. Please respond with your departmental support of this change by tomorrow, so I can provide it as a letter of support for our curriculum changes to Brooke Newell at GCOE.

Thanks,

Becky Stillwell
Senior Academic Advisor
Civil and Environmental Engineering
1102 Newmark Lab
205 N. Mathews Ave.
Urbana, IL 61801
217-333-3812
rborden@illinois.edu

Stillwell, Rebecca Leigh

From: Morris, David
Sent: Thursday, March 18, 2021 2:37 PM
To: Stillwell, Rebecca Leigh; Emmert, Kay
Subject: RE: Letter of Acknowledgment - BTW 261

Becky,

Thanks very much. If I understand you correctly, you need Kay and I as directors of the BTW program to acknowledge here that your CEE majors won't be required to take BTW 261 to meet their degree requirements? If so, we acknowledge that. Will this email be sufficient, or will you need a signed formal letter?

I wonder if you might have time for a 10-15 minute phone conversation sometime in the next couple of weeks? Kay and I are leading an effort to reform our BTW curricula and make contacts with interested programs and advisors across the campus. We'd like to get some information on how and why CEE's decision to discontinue the BTW 261 requirement was made. We're hoping we can use that information to persuade administrators in our department and college to help us make changes to our curricula so that we can better serve student need across campus.

Thanks,

Dave Morris
Senior Lecturer in English and Interim Co-Director of the Program in Professional Writing
University of Illinois
dcmorris@illinois.edu
he / him /his

From: Stillwell, Rebecca Leigh <rborden@illinois.edu>
Sent: Thursday, March 18, 2021 1:25 PM
To: McDuffie, Kristi <kmcduff@illinois.edu>; Emmert, Kay <akemmert@illinois.edu>; Morris, David <dcmorris@illinois.edu>
Subject: RE: Letter of Acknowledgment - BTW 261

Thanks Kristi!

Kay & Dave, we are looking at approximately 300 students with an average class size in our department at 150. Let me know if you need anything else. Please see my original email to Kristi in the below trail. Thanks!

Kind Regards,
Becky Stillwell
Senior Academic Advisor
Civil and Environmental Engineering
1102 Newmark Lab
205 N. Mathews Ave.
Urbana, IL 61801

217-333-3812
rborden@illinois.edu

From: McDuffie, Kristi <kmcduff@illinois.edu>
Sent: Thursday, March 18, 2021 11:58 AM
To: Stillwell, Rebecca Leigh <rborden@illinois.edu>
Cc: Stevens, Andrea <arstev@illinois.edu>; Emmert, Kay <akemmert@illinois.edu>; Morris, David <dcmorris@illinois.edu>
Subject: RE: Letter of Acknowledgment - BTW 261

Hi Becky,
Thanks for reaching out. I've added the Directors of the BTW program to this email so they can get you what you need.
I'm sure it will help Kay and Dave if you could tell them how many students will no longer need this class. I assume this is for fall 2021?
Thanks,
Kristi

Hi Kristi,

The Civil and Environmental Engineering Department is making changes to our BS degree requirements. I'm currently in the process of updating our BS Degree in CIM. I was reaching out to you as our Adv. Composition requirement of BTW 261 is no longer going to be required for CEE as our department has had its own course approved for this requirement (CEE 300).

The Grainger College of Engineering is asking me to request an acknowledgment letter of this change. (From GCOE you should obtain a letter of acknowledgement from that department so that they are aware that the enrollment in their course will go down due to the change you are making. You can respond to this email as confirmation.)

I hope you and your family are doing well. I copied Andrea on here as I wasn't sure who the appropriate contact is for this request.

If someone can respond to this email by Tuesday, March 24, I would appreciate as that is my deadline. I apologize for the short notice as I only learned of this request this morning. Thanks!

Thanks,
Becky Stillwell
Senior Academic Advisor
Civil and Environmental Engineering
1102 Newmark Lab
205 N. Mathews Ave.

Urbana, IL 61801
217-333-3812
rborden@illinois.edu

10KP0118BS: ENGINEERING MECHANICS, BS

In Workflow

1. U Program Review (dforgacs@illinois.edu; eastuby@illinois.edu; aledward@illinois.edu)
2. 1917 Head (a-jacobi@illinois.edu; sanjiv@illinois.edu)
3. KP Committee Chair (bsnewell@illinois.edu; danko@illinois.edu; kcp@illinois.edu; jmakela@illinois.edu)
4. KP Dean (candyd@illinois.edu)
5. University Librarian (jpwilkin@illinois.edu)
6. Provost (kmartens@illinois.edu)
7. Senate EPC (bjlehman@illinois.edu; moorhouz@illinois.edu; kmartens@illinois.edu)
8. Senate (jtempel@illinois.edu)
9. U Senate Conf (none)
10. Board of Trustees (none)
11. IBHE (none)
12. DMI (eastuby@illinois.edu; aledward@illinois.edu; dforgacs@illinois.edu)

Approval Path

1. Thu, 18 Mar 2021 19:49:01 GMT
   Deb Forgacs (dforgacs): Approved for U Program Review
2. Thu, 18 Mar 2021 20:28:42 GMT
   Sanjiv Sinha (sanjiv): Approved for 1917 Head
3. Tue, 06 Apr 2021 19:03:58 GMT
   Brooke Newell (bsnewell): Approved for KP Committee Chair
4. Tue, 06 Apr 2021 19:05:45 GMT
   Candy Deaville (candyd): Approved for KP Dean
5. Tue, 06 Apr 2021 19:39:11 GMT
   John Wilkin (jpwilkin): Approved for University Librarian
6. Tue, 06 Apr 2021 21:51:40 GMT
   Kathy Martensen (kmartens): Approved for Provost

History

1. Jan 15, 2019 by Stephanie Ott-Monsivais (ottmonsi)
2. Apr 25, 2019 by Deb Forgacs (dforgacs)
3. Aug 12, 2019 by Deb Forgacs (dforgacs)
4. Feb 26, 2020 by Brooke Newell (bsnewell)
5. Mar 31, 2020 by Deb Forgacs (dforgacs)
6. Apr 14, 2020 by Deb Forgacs (dforgacs)

Date Submitted:Thu, 18 Mar 2021 19:41:20 GMT

Viewing:10KP0118BS : Engineering Mechanics, BS

Changes proposed by: Stephanie Ott-Monsivais

Proposal Type

Proposal Type:

Major (ex. Special Education)

This proposal is for a:

Revision

Proposal Title:

If this proposal is one piece of a multi-element change please include the other impacted programs here.*example: A BS revision with multiple concentration revisions*

Administrative approval: A BS revision with several course changes.

EP Control Number

EP.21.115

Official Program Name

Engineering Mechanics, BS

Effective Catalog Term

Fall 2022

Sponsor College

Grainger College of Engineering

Sponsor Department

Mechanical Sci & Engineering

Sponsor Name

Stephanie Ott-Monsivais

Sponsor Email

ottmonsi@illinois.edu

College Contact

Brooke Newell

College Contact Email

bsnewell@illinois.edu

Program Description and Justification

Justification for proposal change:

1. Substitution of MATH 257 for MATH 415 due to recent addition of course FA21 and ultimate phase out of MATH 415 by the MATH department with added footnote and shift of previous footnotes. (SIIP led decision to enhance computational skills learned by our students throughout the program)
2. Replacement of TAM 499 from all seven pre-approved secondary fields (Biomechanics, Computational Mechanics, Engineering Science and Applied Mathematics, Experimental Mechanics, Fluid Mechanics, Mechanics of Materials, Solid Mechanics) with TAM 497 as TAM 499 will be deactivated. The purpose of TAM 499 is in duplication of ATM 497 and TAM 497 is the preferred option for students to register for when performing research for

consistency with MechSE's ME program. which features ME 497 for independent study research. TAM/ME 497 have a paper/thesis requirement when used for research with MechSE faculty.
3. MATH courses listed in approved field are already encompassed in the required field - removal of redundancy for Engineering Science and Applied Mathematics secondary field section, especially since a minimum of 6 hours of engineering courses is required for ABET purposes. Specifically, the Required Courses state Any 400 level MATH course, excluding MATH 415, MATH 441, and MATH 442 can be taken so MATH 423, MATH 447, MATH 482, MATH 484, MATH 489, MATH 490 and STAT 400 (aka MATH 463) and STAT 410 (aka MATH 464) are already included in the previous statement.
4. Removal of TAM 427 in Required Courses of the Mechanical of Materials secondary field since will be deactivated FA22 (cross-listed with MSE 454 and AE 427) and replacement with MSE 455 course option in the Mechanics of Materials secondary field Approved Courses. MSE is knowledgeable about these changes and suggested/support the use of MSE 455 in lieu of TAM 427. Anticipated maximum additional enrollment would be 5 EM students per academic year, which the course can accommodate.
5. Update to include CS 124 as substitute for CS 125 requirement since CS 125 will be phased out by the CS department.

Corresponding Degree

BS Bachelor of Science

Is this program interdisciplinary?

No

Academic Level

Undergraduate

Will you admit to the concentration directly?

No

Is a concentration required for graduation?

No

CIP Code

141101 - Engineering Mechanics.

Is This a Teacher Certification Program?

No

Will specialized accreditation be sought for this program?

No

Admission Requirements

Desired Effective Admissions Term

Fall 2022

Is this revision a change to the admission status of the program?

No

Provide a brief narrative description of the admission requirements for this program. Where relevant, include information about licensure requirements, student background checks, GRE and TOEFL scores, and admission requirements for transfer students.

Requirements will not change from previous admission requirements.

Describe how critical academic functions such as admissions and student advising are managed.

No changes. Admissions to EM is still handled by Illinois Admissions and student advising is handled at the college and departmental levels.

Enrollment

Describe how this revision will impact enrollment and degrees awarded.

No impact.

Estimated Annual Number of Degrees Awarded

What is the matriculation term for this program?

Fall

What is the typical time to completion of this program?

4 years

What are the minimum Total Credit Hours required for this program?

128

Delivery Method

Is this program available on campus and online?

No

This program is available:

On Campus

Budget

Are there budgetary implications for this revision?

No

Will the program or revision require staffing (faculty, advisors, etc.) beyond what is currently available?

No

Resource Implications

Facilities

Will the program require new or additional facilities or significant improvements to already existing facilities?

No

Technology

Will the program need additional technology beyond what is currently available for the unit?

No

Non-Technical Resources

Will the program require additional supplies, services or equipment (non-technical)?

No

Resources

For each of these items, be sure to include in the response if the proposed new program or change will result in replacement of another program(s). If so, which program(s), what is the anticipated impact on faculty, students, and instructional resources? Please attach any letters of support/ acknowledgement from faculty, students, and/or other impacted units as appropriate.

Attach File(s)

LetterofSupport_MSE.docx
LetterofSupport_AE.docx
Engineering Mechanics BS LOS Math.pdf
Engineering Mechanics Support Doc CS LOS.docx

Faculty Resources

Please address the impact on faculty resources including any changes in numbers of faculty, class size, teaching loads, student-faculty ratios, etc. Describe how the unit will support student advising, including job placement and/or admission to advanced studies.

No change. MSE 455 is able to accommodate the approximated number of interested students from AE and EM which is estimated to be a maximum of 5 students/year (confirmed by Laura Nagel MSE).

Library Resources

Describe your proposal's impact on the University Library's resources, collections, and services. If necessary please consult with the appropriate disciplinary specialist within the University Library.

No change.

Instructional Resources

Will there be any reduction in other course offerings, programs or concentrations by your department as a result of this new program/proposed change?

No

Does the program include other courses/subjects impacted by the creation/revision of this program?

No

Financial Resources

Will the unit need to seek campus or other external resources?

No

Are you seeking a change in the tuition rate or differential for this program?

No

Program Regulation and Assessment

Briefly describe the plan to assess and improve student learning, including the program's learning objectives; when, how, and where these learning objectives will be assessed; what metrics will be used to signify student's achievement of the stated learning objectives; and the process to ensure assessment results are used to improve student learning. (Describe how the program is aligned with or meets licensure, certification, and/or entitlement requirements, if applicable).

Data is collected and evaluated every 3 years for key curricular courses, in coordination with the faculty teaching the course in the chosen semester. Courses to be evaluated are determined by the MechSE Undergraduate Programs Committee (UPC) to be necessary to evaluate program outcomes (listed below #1. through 7.). This process allows the program to make and assess changes, advising processes, and the assessment process itself during the 6-year ABET evaluation cycle.

Each instructor (to allow for separation of lecture section results) is asked to classify the outcome attainment of all of the students in one of the five categories: Unsatisfactory (0), Marginal (1), Satisfactory (2), Mastery (3), or did not complete the assignment according to the provided rubrics. To form a metric for each program outcome, we define a performance indicator assessment ratio as the sum of the students who attained "Satisfactory (2)" and "Mastery (3)" achievement of a given performance indicator divided by the number of students who were assessed.

The UPC will evaluate all direct outcomes assessment data and discuss opportunities for improvement according to the 3-year assessment cycle. If the performance indicator assessment ratio is less than 75% for a given outcome, for a given section of a course, for a given semester then the UPC must investigate. In such cases, the UPC would first determine if further action is deemed appropriate. An example of why further action is not deemed necessary includes, but is not limited to, that the assessment ratio for one particular section of the assessed course is slightly below 75% due to small sample sizes or other explainable statistical variation in the numbers. If further action is deemed appropriate, then the UPC or a UPC appointed ad-hoc subcommittee would evaluate the assessment material, identify opportunities to improve the program if the assessment appears accurate, or improve the assessment process if the method of assessment appears lacking or inappropriate in some regard. If an improvement to either the program, assessment process or both is implemented, the performance indicator for the given outcome is reassessed and then reevaluated. If the performance

indicator assessment ratios are all equal or greater than 75%, then the level of attainment is considered satisfactory and investigation is not required for the given performance indicator of the given outcome.

———
Program outcomes and learning objectives:
The Engineering Mechanics Program prepares graduates to achieve the following student outcomes by the time of graduation:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. an ability to communicate effectively with a range of audiences.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Is the career/profession for graduates of this program regulated by the State of Illinois?

No

Program of Study

"Baccalaureate degree requires at least 120 semester credit hours or 180 quarter credit hours and at least 40 semester credit hours (60 quarter credit hours) in upper division courses" (source: https://www.ibhe.org/assets/files/PrivateAdminRules2017.pdf). For proposals for new bachelor's degrees, if this minimum is not explicitly met by specifically-required 300- and/or 400-level courses, please provide information on how the upper-division hours requirement will be satisfied.

All proposals must attach the new or revised version of the Academic Catalog program of study entry. Contact your college office if you have questions.

Revised programs

EM BS Curriculum breakout_final.xlsx

Attach a side-by-side comparison with the existing program AND, if the revision references or adds "chose-from" lists of courses students can select from to fulfill requirements, a listing of these courses, including the course rubric, number, title, and number of credit hours.

Catalog Page Text

Catalog Page Text: Description of program for the catalog page. This is not official content, it is used to help build the catalog pages for the program. Can be edited in the catalog by the college or department.

The Engineering Mechanics program at Illinois (accredited by the Engineering Accreditation Commission of ABET, www.abet.org) is a major that focuses on the principles of mechanics that underpin design and engineering in diverse industries including materials, energy, biotechnology, civil, and aerospace to name a few. Students learn rigorous mathematical, scientific, and engineering principles in subject areas such as statics, dynamics, strength of materials, and fluid dynamics. Further, Engineering Mechanics students learn how to apply these basic principles in modern engineering design through laboratory and project work. The program also benefits from a cohesive secondary field which students can tailor to fit their academic and career objectives. Engineering Mechanics is well suited for students with an interest in analysis and design, and physical principles.

Statement for Programs of Study Catalog

Graduation Requirements

Minimum Technical GPA (https://wiki.illinois.edu/wiki/display/ugadvise/Degree+Requirements/#DegreeRequirements-TechnicalGPARequirement)**:2.0**
TGPA is required for required Engineering courses and any technical elective courses. SeeTechnical GPA (https://wiki.illinois.edu/wiki/display/ugadvise/Degree+Requirements/#DegreeRequirements-TechnicalGPARequirement)to clarify requirements.

Minimum Overall GPA:2.0
Minimum hours required for graduation:128 hours
General education:Students must complete the Campus General Education (https://courses.illinois.edu/gened/DEFAULT/DEFAULT/)**requirements including the campus general education language requirement.Specific Advanced Composition courses required for this degree are listed below.**

Orientation and Professional Development

Code	Title	Hours
ENG 100	Engineering Orientation[1]	0
TAM 195	Mechanics in the Modern World	1
ME 290	Seminar	0
Total Hours		1

Foundational Mathematics and Science

Code	Title	Hours
CHEM 102	General Chemistry I	3
CHEM 103	General Chemistry Lab I[2]	1
CHEM 104	General Chemistry II	3
CHEM 105	General Chemistry Lab II[2]	1
MATH 221	Calculus I[3]	4
MATH 231	Calculus II	3
MATH 241	Calculus III	4
MATH 415	Applied Linear Algebra	3
MATH 257	Linear Algebra with Computational Applications[4]	3
MATH 441	Differential Equations[5]	3
MATH 442	Intro Partial Diff Equations	3
PHYS 211	University Physics: Mechanics	4
PHYS 212	University Physics: Elec & Mag	4
PHYS 213	Univ Physics: Thermal Physics	2
PHYS 214	Univ Physics: Quantum Physics	2
Total Hours		40

Engineering Mechanics Technical Core

Code	Title	Hours
CS 101	Intro Computing: Engrg & Sci[6]	3
ECE 205	Electrical and Electronic Circuits[7]	3
ME 170	Computer-Aided Design	3
ME 200	Thermodynamics	3
ME 470	Senior Design Project[8]	3
TAM 211	Statics	3
TAM 212	Introductory Dynamics[9]	3
TAM 251	Introductory Solid Mechanics	3
TAM 252	Solid Mechanics Design	1
TAM 270	Design for Manufacturability	3
TAM 324	Behavior of Materials[8]	4
TAM 335	Introductory Fluid Mechanics	4
TAM 412	Intermediate Dynamics	4
TAM 445	Continuum Mechanics	4

TAM 470	Computational Mechanics	3
Total Hours		47

Secondary Field Option Electives

Code	Title	Hours
Secondary field electives selected from departmentally approved courses for Secondary Field Options. Each secondary field generally specifies two required courses and two additional courses from a list of approved elective courses. For each of the secondary fields, the required and approved elective courses specified for each are listed below. To add flexibility to the program and to accommodate particular interests, the student may fashion an individualized secondary field option. The only requirements are that the courses be related to mechanics, form a coherent and cohesive group, include at least two engineering courses, and total at least 12 hours of advanced-level coursework that are distinct from required courses in the Engineering Mechanics curriculum. This can include 500-level courses, if the student has the adequate preparation, for any of the secondary field elective courses. Each student must formally declare their choice of secondary field with a Mechanical Science and Engineering Undergraduate Programs Office advisor using a Secondary Field Options form.		**12**
Biomechanics		
Required Courses		
MCB 150	Molec & Cellular Basis of Life	4
MCB 151	Molec & Cellular Laboratory	1
TAM 461	Cellular Biomechanics	4
Approved Courses		
ECE 473	Fund of Engrg Acoustics	3 or 4
ECE 380	Biomedical Imaging	3
ME 481	Whole-Body Musculoskel Biomech	3 or 4
ME 482	Musculoskel Tissue Mechanics	3 or 4
ME 483	Mechanobiology	4
BIOP 401	Introduction to Biophysics	3
TAM 499	Senior Thesis	3
TAM 497	Independent Study	1 to 3
Computational Mechanics		
Required Courses		
CS 357	Numerical Methods I	3
ME 471	Finite Element Analysis	3 or 4
Approved Courses		
CS 450	Numerical Analysis	3 or 4
CS 457	Numerical Methods II	3
ME 412	Numerical Thermo-Fluid Mechs	2 to 4
TAM 499	Senior Thesis	3
TAM 497	Independent Study	1 to 3
Engineering Science and Applied Mathematics		
Required Courses		
MATH 446	Applied Complex Variables	3-4
or MATH 448	Complex Variables	
Any 400 level MATH course, excluding MATH 415, MATH 441, and MATH 442		3 or 4
Approved Courses		
AE 353	Aerospace Control Systems	3
AE 402	Orbital Mechanics	3 or 4
CEE 491	Decision and Risk Analysis	3 or 4
ECE 329	Fields and Waves I	3
ECE 330	Power Ckts & Electromechanics	3
ECE 473	Fund of Engrg Acoustics	3 or 4
MATH 423	Differential Geometry	3 or 4
MATH 447	Real Variables	3 or 4
MATH 482	Linear Programming	3 or 4

MATH 484	Nonlinear Programming	3 or 4
MATH 489	Dynamics & Differential Eqns	3 or 4
MATH 490	Advanced Topics in Mathematics	1 to 4
PHYS 402	Light	3 or 4
STAT 400	Statistics and Probability I	4
STAT 410	Statistics and Probability II	3 or 4
TAM 499	Senior Thesis	3
TAM 497	Independent Study	1 to 3
Experimental Mechanics		
Required Courses		
TAM 456	Experimental Stress Analysis	3
ECE 206	Electrical and Electronic Circuits Lab	1
Approved Courses		
CS 357	Numerical Methods I	3
ECE 473	Fund of Engrg Acoustics	3 or 4
ME 360	Signal Processing	3.5
PHYS 402	Light	3 or 4
TAM 499	Senior Thesis	3
TAM 497	Independent Study	1 to 3
Fluid Mechanics		
Required Courses		
TAM 435	Intermediate Fluid Mechanics	4
ME 410	Intermediate Gas Dynamics	3 or 4
Approved Courses		
AE 412	Viscous Flow & Heat Transfer	4
CEE 445	Air Quality Modeling	4
CEE 451	Environmental Fluid Mechanics	3
CEE 453	Urban Hydrology and Hydraulics	4
ECE 473	Fund of Engrg Acoustics	3 or 4
ME 412	Numerical Thermo-Fluid Mechs	2 to 4
TAM 499	Senior Thesis	3
TAM 497	Independent Study	1 to 3
Mechanics of Materials		
Required Courses		
TAM 424	Mechanics of Structural Metals	3 or 4
TAM 427	Mechanics of Polymers	3
or TAM 428	Mechanics of Composites	
TAM 428	Mechanics of Composites	3
Approved Courses		
CEE 310	Transportation Engineering	3
MSE 401	Thermodynamics of Materials	3
MSE 455	Macromolecular Solids	3
MSE 489	Matl Select for Sustainability	3 or 4
NPRE 431	Materials in Nuclear Engrg	3
TAM 499	Senior Thesis	3
TAM 497	Independent Study	1 to 3
Solid Mechanics		
Required Courses		
TAM 424	Mechanics of Structural Metals	3 or 4
TAM 451	Intermediate Solid Mechanics	4
Approved Courses		
CEE 360	Structural Engineering	3

CEE 460	Steel Structures I	3
CEE 461	Reinforced Concrete I	3
CS 357	Numerical Methods I	3
ECE 473	Fund of Engrg Acoustics	3 or 4
TAM 499	Senior Thesis	3
TAM 497	Independent Study	1 to 3

Electives

Code	Title	Hours
The Grainger College of Engineering Liberal Education course list, or additional courses from the campus General Education lists for Social and Behavioral Sciences or Humanities and the Arts[10]		6
Free electives. Additional unrestricted course work, subject to certain exceptions as noted by the College, so that there are at least 128 credit hours earned toward the degree.[11]		6
Total Hours of Curriculum to Graduate		**128**

1 *External transfer students take* ENG 300 *instead.*

2 CHEM 103 *(*http://catalog.illinois.edu/search/?P=CHEM%20103*)requirement waived for students who received test-based credit (AP, IB, or proficiency) for* CHEM 102 *(*http://catalog.illinois.edu/search/?P=CHEM%20102*), similarly* CHEM 105 *(*http://catalog.illinois.edu/search/?P=CHEM%20105*)requirement waived for students who received test-based credit for* CHEM 104 *(*http://catalog.illinois.edu/search/?P=CHEM%20104*). Students are still required to have 128 hours minimum to graduate.*

3 MATH 220 *may be substituted, with four of the five credit hours applying toward the degree.* MATH 220 *is appropriate for students with no background in calculus.*

4 MATH 415 *(*http://catalog.illinois.edu/search/?P=MATH%20415*)may be substituted for students entering prior to fall 2022.*

5 *Transfer or incoming students with credit upon admission to the Engineering Mechanics program may substitute* MATH 284 *(*http://catalog.illinois.edu/search/?P=MATH%20284*)or* MATH 285 *(*http://catalog.illinois.edu/search/?P=MATH%20285*)with a grade of B+ or higher.*

6 *CS 124 or* CS 125 *(*http://catalog.illinois.edu/search/?P=CS%20125*)or* ECE 220 *(*http://catalog.illinois.edu/search/?P=ECE%20220*)may be substituted.*

7 ECE 110 *(*http://catalog.illinois.edu/search/?P=ECE%20110*)and* ECE 210 *(*http://catalog.illinois.edu/search/?P=ECE%20210*)(or* ECE 211 *(*http://catalog.illinois.edu/search/?P=ECE%20211*)) combined may be substituted.*

8 *Advanced Composition satisfied by completing* TAM 324 *and* ME 470*.*

9 *Transfers and Physics minor/dual degree students may substitute* PHYS 325 *(*http://catalog.illinois.edu/search/?P=PHYS%20325*).*

10 *The Grainger College of Engineering approved liberal education course list can be found* here *(*https://wiki.illinois.edu/wiki/display/ugadvise/Degree+Requirements/#DegreeRequirements-GeneralEducationElectives*). Note that these credit hours could carry the required cultural studies designation required for campus general education requirements.*

11 *The Grainger College of Engineering restrictions to free electives can be found* here *(*https://wiki.illinois.edu/wiki/display/ugadvise/Degree+Requirements/#DegreeRequirements-FreeElectives*).*

EP Documentation

DMI Documentation

Banner/Codebook Name

BS:Engineering Mechanics -UIUC

Program Code:

10KP0118BS

Degree Code

BS

Major Code

0118

Program Reviewer Comments

Sanjiv Sinha (sanjiv) (Tue, 02 Feb 2021 19:54:03 GMT): Rollback: Change to starting term
Deb Forgacs (dforgacs) (Tue, 02 Feb 2021 20:01:36 GMT): Rollback: change to starting term
Brooke Newell (bsnewell) (Wed, 03 Feb 2021 17:16:53 GMT): Rollback: per email discussion
Kathy Martensen (kmartens) (Tue, 06 Apr 2021 21:51:38 GMT): Administrative approval: No change to total hours required.

Key: 121

Key

GREEN HIGHLIGHT = Course addition, updated hours, or revised footnote

RED HIGHLIGHT = Course has been removed

Current Requirement	Current Hours	Revised Requirements	Revised Hours
Orientation and Professional Development	**1**	**Orientation and Professional Development**	**1**
ENG 100: Engineering Orientation[1]	0	ENG 100: Engineering Orientation[1]	0
TAM 195: Mechanics in the Modern World	1	TAM 195: Mechanics in the Modern World	1
ME 290: Seminar	0	ME 290: Seminar	0
Foundational Mathematics and Science	**40**	**Foundational Mathematics and Science**	**40**
CHEM 102: General Chemistry I	3	CHEM 102: General Chemistry I	3
CHEM 103: General Chemistry Lab I[2]	1	CHEM 103: General Chemistry Lab I[2]	1
CHEM 104: General Chemistry II	3	CHEM 104: General Chemistry II	3
CHEM 105: General Chemistry Lab II[2]	1	CHEM 105: General Chemistry Lab II[2]	1
MATH 221: Calculus I[3]	4	MATH 221: Calculus I[3]	4
MATH 231: Calculus II	3	MATH 231: Calculus II	3
MATH 241: Calculus III	4	MATH 241: Calculus III	4
		MATH 257: Linear Algebra with Computational Applications[4]	3
MATH 415: Applied Linear Algebra	3		
MATH 441: Differential Equations[4]	3	MATH 441: Differential Equations[5]	3
PHYS 211: University Physics: Mechanics	4	PHYS 211: University Physics: Mechanics	4
PHYS 212: University Physics: Elec & Mag	4	PHYS 212: University Physics: Elec & Mag	4
PHYS 213: University Physics: Mechanics	2	PHYS 213: University Physics: Mechanics	2
PHYS 214: University Physics: Elec & Mag	2	PHYS 214: University Physics: Elec & Mag	2
Engineering Mechanics Technical Core	**47**	**Engineering Mechanics Technical Core**	**47**
CS 101: Intro Computing: Engrg & Sci[5]	3	CS 101: Intro Computing: Engrg & Sci[6]	3
ECE 205: Electrical and Electronic Circuits[6]	3	ECE 205: Electrical and Electronic Circuits[7]	3
ME 170: Computer-Aided Design	3	ME 170: Computer-Aided Design	3
ME 200: Thermodynamics	3	ME 200: Thermodynamics	3
ME 470: Senior Design Project[7]	3	ME 470: Senior Design Project[8]	3
TAM 211: Statics	3	TAM 211: Statics	3
TAM 212: Introductory Dynamics[8]	3	TAM 212: Introductory Dynamics[9]	3
TAM 251: Introductory Solid Mechanics	3	TAM 251: Introductory Solid Mechanics	3
TAM 252: Solid Mechanics Design	1	TAM 252: Solid Mechanics Design	1
TAM 270: Design for Manufacturability	3	TAM 270: Design for Manufacturability	3
TAM 324: Behavior of Materials[7]	4	TAM 324: Behavior of Materials[8]	4
TAM 335: Introductory Fluid Mechanics	4	TAM 335: Introductory Fluid Mechanics	4
TAM 412: Intermediate Dynamics	4	TAM 412: Intermediate Dynamics	4
TAM 445: Continuum Mechanics	4	TAM 445: Continuum Mechanics	4
TAM 470: Computational Mechanics	3	TAM 470: Computational Mechanics	3
Secondary Field Option Electives		**Secondary Field Option Electives**	
Secondary field electives selected from departmentally approved courses for Secondary Field Options. Each secondary field generally specifies two required courses and two additional courses from a list of approved elective courses. For each of the secondary fields, the required and approved elective courses specified for each are listed below. To add flexibility to the program and to accommodate particular interests, the student may fashion an individualized secondary field option. The only requirements are that the courses be related to mechanics, form a coherent and cohesive group, include at least two engineering courses, and total at least 12 hours of advanced-level coursework that are distinct from required courses in the Engineering Mechanics curriculum. This can include 500-level courses, if the student has the adequate preparation, for any of the secondary field elective courses. Each student must formally declare their choice of secondary field with a Mechanical Science and Engineering Undergraduate Programs Office advisor using a Secondary Field Options form.	**12**	Secondary field electives selected from departmentally approved courses for Secondary Field Options. Each secondary field generally specifies two required courses and two additional courses from a list of approved elective courses. For each of the secondary fields, the required and approved elective courses specified for each are listed below. To add flexibility to the program and to accommodate particular interests, the student may fashion an individualized secondary field option. The only requirements are that the courses be related to mechanics, form a coherent and cohesive group, include at least two engineering courses, and total at least 12 hours of advanced-level coursework that are distinct from required courses in the Engineering Mechanics curriculum. This can include 500-level courses, if the student has the adequate preparation, for any of the secondary field elective courses. Each student must formally declare their choice of secondary field with a Mechanical Science and Engineering Undergraduate Programs Office advisor using a Secondary Field Options form.	**12**
Biomechanics		**Biomechanics**	
Required Courses		Required Courses	
MCB 150: Molec & Cellular Basis of Life	4	MCB 150: Molec & Cellular Basis of Life	4
MCB 151: Molec & Cellular Laboratory	1	MCB 151: Molec & Cellular Laboratory	1
TAM 461: Cellular Biomechanics	4	TAM 461: Cellular Biomechanics	4
Approved Courses		Approved Courses	
ECE 473: Fund of Engrg Acoustics	3 or 4	ECE 473: Fund of Engrg Acoustics	3 or 4
ECE 380: Biomedical Imaging	3	ECE 380: Biomedical Imaging	3
ME 481: Whole-Body Musculoskel Biomech	3 or 4	ME 481: Whole-Body Musculoskel Biomech	3 or 4
ME 482: Musculoskel Tissue Mechanics	3 or 4	ME 482: Musculoskel Tissue Mechanics	3 or 4
ME 483: Mechanobiology	4	ME 483: Mechanobiology	4
BIOP 401: Introduction to Biophysics	3	BIOP 401: Introduction to Biophysics	3
		TAM 497: Independent Study	1 to 3
TAM 499: Senior Thesis	3		
Computational Mechanics		**Computational Mechanics**	
Required Courses		Required Courses	
CS 357: Numerical Methods I	3	CS 357: Numerical Methods I	3
ME 471: Finite Element Analysis	3 or 4	ME 471: Finite Element Analysis	3 or 4
Approved Courses		Approved Courses	
CS 450: Numerical Analysis	3 or 4	CS 450: Numerical Analysis	3 or 4
CS 457: Numerical Methods II	3	CS 457: Numerical Methods II	3
ME 412: Numerical Thermo-Fluid Mechs	2 to 4	ME 412: Numerical Thermo-Fluid Mechs	2 to 4
		TAM 497: Independent Study	1 to 3
TAM 499: Senior Thesis	3		
Engineering Science and Applied Mathematics		**Engineering Science and Applied Mathematics**	
Required Courses		Required Courses	
MATH 446: Applied Complex Variables or MATH 448: Complex Variables	3 or 4	MATH 446: Applied Complex Variables or MATH 448: Complex Variables	3 or 4
Any 400 level MATH course, excluding MATH 415, MATH 441, and MATH 442	3 or 4	Any 400 level MATH course, excluding MATH 415, MATH 441, and MATH 442	3 or 4
Approved Courses		Approved Courses	
AE 353: Aerospace Control Systems	3	AE 353: Aerospace Control Systems	3
AE 402: Orbital Mechanics	3 or 4	AE 402: Orbital Mechanics	3 or 4
CEE 491: Decision and Risk Analysis	3 or 4	CEE 491: Decision and Risk Analysis	3 or 4
ECE 329: Fields and Waves I	3	ECE 329: Fields and Waves I	3
ECE 330: Power Ckts & Electromechanics	3	ECE 330: Power Ckts & Electromechanics	3
ECE 473: Fund of Engrg Acoustics	3 or 4	ECE 473: Fund of Engrg Acoustics	3 or 4
MATH 423: Differential Geometry	3 or 4		
MATH 447: Real Variables	3 or 4		
MATH 482: Linear Programming	3 or 4		
MATH 484: Nonlinear Programming	3 or 4		
MATH 489: Dynamics & Differential Eqns	3 or 4		
MATH 490: Advanced Topics in Mathematics	1 to 4		
PHYS 402: Light	3 or 4	PHYS 402: Light	3 or 4
STAT 400: Statistics and Probability I	4		
STAT 410: Statistics and Probability II	3 or 4		
		TAM 497: Independent Study	1 to 3
TAM 499: Senior Thesis	3		
Experimental Mechanics		**Experimental Mechanics**	
Required Courses		Required Courses	
TAM 456: Experimental Stress Analysis	3	TAM 456: Experimental Stress Analysis	3
ECE 206: Electrical and Electronic Circuits Lab	1	ECE 206: Electrical and Electronic Circuits Lab	1
Approved Courses		Approved Courses	
CS 357: Numerical Methods I	3	CS 357: Numerical Methods I	3
ECE 473: Fund of Engrg Acoustics	3 or 4	ECE 473: Fund of Engrg Acoustics	3 or 4
ME 360: Signal Processing	3.5	ME 360: Signal Processing	3.5

PHYS 402: Light	3 or 4	PHYS 402: Light	3 or 4
		TAM 497: Independent Study	1 to 3
TAM 499: Senior Thesis	3		
Fluid Mechanics		**Fluid Mechanics**	
Required Courses		Required Courses	
TAM 435: Intermediate Fluid Mechanics	4	TAM 435: Intermediate Fluid Mechanics	4
ME 410: Intermediate Gas Dynamics	3 or 4	ME 410: Intermediate Gas Dynamics	3 or 4
Approved Courses		Approved Courses	
AE 412: Viscous Flow & Heat Transfer	4	AE 412: Viscous Flow & Heat Transfer	4
CEE 445: Air Quality Modeling	4	CEE 445: Air Quality Modeling	4
CEE 451: Environmental Fluid Mechanics	3	CEE 451: Environmental Fluid Mechanics	3
CEE 453: Urban Hydrology and Hydraulics	4	CEE 453: Urban Hydrology and Hydraulics	4
ECE 473: Fund of Engrg Acoustics	3 or 4	ECE 473: Fund of Engrg Acoustics	3 or 4
ME 412: Numerical Thermo-Fluid Mechs	2 to 4	ME 412: Numerical Thermo-Fluid Mechs	2 to 4
		TAM 497: Independent Study	1 to 3
TAM 499: Senior Thesis	3		
Mechanics of Materials		**Mechanics of Materials**	
Required Courses		Required Courses	
TAM 424: Mechanics of Structural Metals	3 or 4	TAM 424: Mechanics of Structural Metals	3 or 4
TAM 427: Mechanics of Polymers or TAM 428: Mechanics of Composites	3	TAM 428: Mechanics of Composites	3
Approved Courses		Approved Courses	
CEE 310: Transportation Engineering	3	CEE 310: Transportation Engineering	3
MSE 401: Thermodynamics of Materials	3	MSE 401: Thermodynamics of Materials	3
		MSE 455: Macromolecular Solids	3
MSE 489: Matl Select for Sustainability	3 or 4	MSE 489: Matl Select for Sustainability	3 or 4
NPRE 431: Materials in Nuclear Engrg	3	NPRE 431: Materials in Nuclear Engrg	3
		TAM 497: Independent Study	1 to 3
TAM 499: Senior Thesis	3		
Solid Mechanics		**Solid Mechanics**	
Required Courses		Required Courses	
TAM 424: Mechanics of Structural Metals	3 or 4	TAM 424: Mechanics of Structural Metals	3 or 4
TAM 451: Intermediate Solid Mechanics	4	TAM 451: Intermediate Solid Mechanics	4
Approved Courses		Approved Courses	
CEE 360: Structural Engineering	3	CEE 360: Structural Engineering	3
CEE 460: Steel Structures I	3	CEE 460: Steel Structures I	3
CEE 461: Reinforced Concrete I	3	CEE 461: Reinforced Concrete I	3
CS 357: Numerical Methods I	3	CS 357: Numerical Methods I	3
ECE 473: Fund of Engrg Acoustics	3 or 4	ECE 473: Fund of Engrg Acoustics	3 or 4
		TAM 497: Independent Study	1 to 3
TAM 499: Senior Thesis	3		3
Electives		**Electives**	
The Grainger College of Engineering Liberal Education course list, or additional courses from the campus General Education lists for Social and Behavioral Sciences or Humanities and the Arts [9]	6	The Grainger College of Engineering Liberal Education course list, or additional courses from the campus General Education lists for Social and Behavioral Sciences or Humanities and the Arts [10]	6
Free electives. Additional unrestricted course work, subject to certain exceptions as noted by the College, so that there are at least 128 credit hours earned toward the degree. [10]	6	Free electives. Additional unrestricted course work, subject to certain exceptions as noted by the College, so that there are at least 128 credit hours earned toward the degree. [11]	6
Total Hours of Curriculum to Graduate	**128**	**Total Hours of Curriculum to Graduate**	**128**
Footnotes		**Footnotes**	
[1] *External transfer students take ENG 300 instead*		[1] *External transfer students take ENG 300 instead*	
[2] *CHEM 103 requirement waived for students who received test-based credit (AP, IB, or proficiency) for CHEM 102, similarly CHEM 105 requirement wavied for students who received test-based credit for CHEM 104. Students are still required to have 128 hours minimum to graduate*		[2] *CHEM 103 requirement waived for students who received test-based credit (AP, IB, or proficiency) for CHEM 102, similarly CHEM 105 requirement wavied for students who received test-based credit for CHEM 104. Students are still required to have 128 hours minimum to graduate*	
[3] *MATH 220 may be substituted, with four of the five credit hours applying toward the degree. MATH 220 is appropriate for students with no backeround in calculus.*		[3] *MATH 220 may be substituted, with four of the five credit hours applying toward the degree. MATH 220 is appropriate for students with no backeround in calculus.*	
		[4] *MATH 415 may be substituted for students entering prior to fall 2022.*	
[4] *Transfer or incoming students with credit upon admission to the Engineering Mechanics program may substitute MATH 284 or MATH 285 with a grade of B+ or hieher.*		[5] *Transfer or incoming students with credit upon admission to the Engineering Mechanics program may substitute MATH 284 or MATH 285 with a grade of B+ or hieher.*	
[5] *CS 125 or ECE 220 may be substituted.*		[6] *CS 124 or CS 125 or ECE 220 may be substituted.*	
[6] *ECE 110 and ECE 210 (or ECE 211) combined may be substituted.*		[7] *ECE 110 and ECE 210 (or ECE 211) combined may be substituted.*	
[7] *Advanced Composition satisfied by completing TAM 324 and ME 470.*		[8] *Advanced Composition satisfied by completing TAM 324 and ME 470.*	
[8] *Transfers and Physics minor/dual degree students may substitute PHYS 325.*		[9] *Transfers and Physics minor/dual degree students may substitute PHYS 325.*	
[9] *The Grainger College of Engineering approved liberal education course list can be found here. Note that these credit hours could carry the required cultural studies designation required for campus general education requirements.*		[10] *The Grainger College of Engineering approved liberal education course list can be found here. Note that these credit hours could carry the required cultural studies designation required for campus general education requirements.*	
[10] *The Grainger College of Engineering restrictions to free electives can be found here.*		[11] *The Grainger College of Engineering restrictions to free electives can be found here.*	

From: Nagel, Laura <ljnagel@illinois.edu>
Sent: Thursday, March 18, 2021 9:53 AM
To: Ott-Monsivais, Stephanie <ottmonsi@illinois.edu>
Subject: RE: MSE 455 - capacity info

Hi Stephanie,

I don't anticipate any issue with accommodating a few EM or AE students in 455. It is a low-enrollment elective class primarily taken by grad students and seniors.

Best,
Laura

From: Ott-Monsivais, Stephanie <ottmonsi@illinois.edu>
Sent: Thursday, March 18, 2021 9:16 AM
To: Nagel, Laura <ljnagel@illinois.edu>
Subject: RE: MSE 455 - capacity info

Hi Laura,

Do you feel the accommodation of our anticipated 5 EM and/or AE students will be a problem?

Best,
Stephanie

From: Nagel, Laura <ljnagel@illinois.edu>
Sent: Monday, February 22, 2021 1:49 PM
To: Ott-Monsivais, Stephanie <ottmonsi@illinois.edu>
Subject: RE: TAM 427

Hi Stephanie,

Thanks for checking in with us. MatSE doesn't have any problem with deactivating TAM 427, and agree that MSE 455 is a good alternative.

Best,
Laura

From: Ott-Monsivais, Stephanie <ottmonsi@illinois.edu>
Sent: Sunday, February 21, 2021 1:54 PM
To: Nagel, Laura <ljnagel@illinois.edu>
Subject: TAM 427
Importance: High

Hi Laura,

I am writing you to let you know that MechSE has decided to formally deactivate TAM 427: Mechanics of Polymers, instead we will recommend students who are interested in taking a similar course take MSE 455: Macromolecular Solids.

MSE doesn't have a problem with this right? I just wanted to check as the TAM 427 is cross-listed with MSE 454, but hasn't been offered since SP12 and won't be offered for the foreseeable future as we have no instructors interested in teaching this course.

Best,
Stephanie

From: Gerhold, Laura Ann
Sent: Sunday, February 21, 2021 1:57 PM
To: Ott-Monsivais, Stephanie
Subject: Re: TAM 427

That will not be a problem for AE students. Thanks for the heads up.

Laura Gerhold

On Feb 21, 2021, at 1:53 PM, Ott-Monsivais, Stephanie <ottmonsi@illinois.edu> wrote:

Hi Laura,

I am writing you to let you know that MechSE has decided to formally deactivate TAM 427: Mechanics of Polymers, instead we will recommend students who are interested in taking a similar course take MSE 455: Macromolecular Solids.

AE won't have a problem with this right? I just wanted to check as the TAM 427 is cross-listed with AE 427, but hasn't been offered since SP12 and won't be offered for the foreseeable future as we have no instructors interested in teaching this course.

Best,
Stephanie

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Department of Mathematics

273 Altgeld Hall, MC-382
1409 West Green Street
Urbana, IL 61801

Re: Use of Math 257 in MechSE

The Mathematics Department, working with the Grainger College of Engineering, has recently created the course MATH 257, *Linear Algebra with Computational Applications*. Quoting from the justification of the approved proposal, "In the future, MATH 257 will replace the MATH 415 requirement in many science and engineering curricula." With this in mind, the department would be pleased to have MechSE add MATH 257 as an option to MATH 415 in their programs. As the Mathematics department is reallocating instructional resources from Math 415 to Math 257 as the need shifts, this will not cause any undue difficulties for Mathematics resources.

Sincerely

Randy McCarthy

Randy McCarthy
Professor of Mathematics
Dir of Undergraduate Studies in Math
rmccrthy@illinois.edu

telephone 217-333-3350 • *fax* 217-333-9576
email office@math.uiuc.edu • *url* http://www.math.uiuc.edu/

From: Gunter, Elsa <egunter@illinois.edu>
Sent: Wednesday, March 24, 2021 1:41 PM
To: Ott-Monsivais, Stephanie <ottmonsi@illinois.edu>
Subject: CS support for MechSE to use CS 124 as a substitute for CS 101

Dear Stephanie Ott-Monsivais,

CS is fully supportive of the Department of Mechanical Science and Engineering using CS 124 as an option in addition to CS 101 for the programming requirement in both their 10KP0133BS: Mechanical Engineering, BS and 10KP0118BS: Engineering Mechanics, BS undergraduate degree programs.

---Elsa

--
Elsa L Gunter
Research Professor
Director of Undergraduate Programs
Department of Computer Science
University of Illinois at Urbana - Champaign

On 3/24/21 11:17 AM, Ott-Monsivais, Stephanie wrote:
Hi Elsa,

I require a letter of support from CS to attach to our curricula updates allowing CS 124 to be substituted for CS 101, similar to our previous CS 125 allowance. This is generally taken by ME and EM students minoring in CS.

Best,
Stephanie

Stephanie Ott-Monsivais

Academic Advisor
Department of Mechanical Science and Engineering (MechSE)
University of Illinois at Urbana-Champaign
E-mail: ottmonsi@illinois.edu
Phone: 217-300-3102
Temporary Office Location: 152A Computing Applications Building; 605 E. Springfield Ave.; Champaign, IL 61820
Office Hours: 8:30 am – noon & 1pm – 4:30 pm M – F, except 11 – noon T

10KP0133BS: MECHANICAL ENGINEERING, BS

In Workflow

1. U Program Review (dforgacs@illinois.edu; eastuby@illinois.edu; aledward@illinois.edu)
2. 1917 Head (a-jacobi@illinois.edu; sanjiv@illinois.edu)
3. KP Committee Chair (bsnewell@illinois.edu; danko@illinois.edu; kcp@illinois.edu; jmakela@illinois.edu)
4. KP Dean (candyd@illinois.edu)
5. University Librarian (jpwilkin@illinois.edu)
6. Provost (kmartens@illinois.edu)
7. Senate EPC (bjlehman@illinois.edu; moorhouz@illinois.edu; kmartens@illinois.edu)
8. Senate (jtempel@illinois.edu)
9. U Senate Conf (none)
10. Board of Trustees (none)
11. IBHE (none)
12. DMI (eastuby@illinois.edu; aledward@illinois.edu; dforgacs@illinois.edu)

Approval Path

1. Wed, 24 Mar 2021 14:25:06 GMT
   Deb Forgacs (dforgacs): Approved for U Program Review
2. Wed, 24 Mar 2021 14:31:08 GMT
   Sanjiv Sinha (sanjiv): Approved for 1917 Head
3. Tue, 06 Apr 2021 19:04:01 GMT
   Brooke Newell (bsnewell): Approved for KP Committee Chair
4. Tue, 06 Apr 2021 19:05:48 GMT
   Candy Deaville (candyd): Approved for KP Dean
5. Tue, 06 Apr 2021 19:39:24 GMT
   John Wilkin (jpwilkin): Approved for University Librarian
6. Tue, 06 Apr 2021 21:59:51 GMT
   Kathy Martensen (kmartens): Approved for Provost

History

1. Dec 13, 2018 by Deb Forgacs (dforgacs)
2. Apr 25, 2019 by Deb Forgacs (dforgacs)
3. Aug 12, 2019 by Deb Forgacs (dforgacs)
4. Feb 26, 2020 by Brooke Newell (bsnewell)
5. Mar 31, 2020 by Deb Forgacs (dforgacs)
6. Apr 14, 2020 by Deb Forgacs (dforgacs)

Date Submitted:Tue, 23 Mar 2021 20:59:10 GMT

Viewing:10KP0133BS : Mechanical Engineering, BS

Changes proposed by: Stephanie Ott-Monsivais

Proposal Type

Proposal Type:

Major (ex. Special Education)

This proposal is for a:

Revision

Proposal Title:

If this proposal is one piece of a multi-element change please include the other impacted programs here.*example: A BS revision with multiple concentration revisions*

Administrative approval: A BS revision with several course changes.

EP Control Number

EP.21.115

Official Program Name

Mechanical Engineering, BS

Effective Catalog Term

Fall 2022

Sponsor College

Grainger College of Engineering

Sponsor Department

Mechanical Sci & Engineering

Sponsor Name

Stephanie Ott-Monsivais

Sponsor Email

ottmonsi@illinois.edu

College Contact

Brooke Newell

College Contact Email

bsnewell@illinois.edu

Program Description and Justification

Justification for proposal change:

1. Substitution of MATH 257 for MATH 415 due to recent addition of course FA21 and ultimate phase out of MATH 415 by the MATH department with added footnote and shift of previous footnotes. (SIIP led decision to enhance computational skills learned by our students throughout the program)
2. Removal of AE 427 and MSE 454 since will be deactivated FA22 (both are cross-listed with TAM 427)
3. Removal of "499" from TAM course exclusions in MechSE elective list since TAM 499 is being deactivated (e.g. All 400 level TAM courses, except potentially 497,498)

4. Update to include CS 124 as substitute for CS 125 requirement since CS 125 will be phased out by the CS department.
5. Addition of SE 400 to technical elective list as a professional technical elective option for ME students. The Grainger College of Engineering approves any courses listed within the College to be electives within a GCOE degree program.
6. Reordering of all technical electives and corresponding footnotes to be in alphabetical order by rubric.
7. Removal of CEE 480 due to deactivation of course.

Corresponding Degree

BS Bachelor of Science

Is this program interdisciplinary?

No

Academic Level

Undergraduate

Will you admit to the concentration directly?

No

Is a concentration required for graduation?

No

CIP Code

141901 - Mechanical Engineering.

Is This a Teacher Certification Program?

No

Will specialized accreditation be sought for this program?

No

Admission Requirements

Desired Effective Admissions Term

Fall 2022

Is this revision a change to the admission status of the program?

No

Provide a brief narrative description of the admission requirements for this program. Where relevant, include information about licensure requirements, student background checks, GRE and TOEFL scores, and admission requirements for transfer students.

Requirements will not change from previous admission requirements.

Describe how critical academic functions such as admissions and student advising are managed.

No changes. Admissions to ME is still handled by Illinois Admissions and student advising is handled at the college and departmental levels.

Enrollment

Describe how this revision will impact enrollment and degrees awarded.

No impact.

Estimated Annual Number of Degrees Awarded

What is the matriculation term for this program?

Fall

What is the typical time to completion of this program?

4 years

What are the minimum Total Credit Hours required for this program?

128

Delivery Method

Is this program available on campus and online?

No

This program is available:

On Campus

Budget

Are there budgetary implications for this revision?

No

Will the program or revision require staffing (faculty, advisors, etc.) beyond what is currently available?

No

Resource Implications

Facilities

Will the program require new or additional facilities or significant improvements to already existing facilities?

No

Technology

Will the program need additional technology beyond what is currently available for the unit?

No

Non-Technical Resources

Will the program require additional supplies, services or equipment (non-technical)?

No

Resources

For each of these items, be sure to include in the response if the proposed new program or change will result in replacement of another program(s). If so, which program(s), what is the anticipated impact on faculty, students, and instructional resources? Please attach any letters of support/ acknowledgement from faculty, students, and/or other impacted units as appropriate.

Attach File(s)

LetterofSupport_MSE.docx
LetterofSupport_AE.docx
MechSE_letter_Math_257.pdf
LetterofSupport_CEE_TAM427.docx
Mechanical Engineering Support Doc CS LOS.docx

Faculty Resources

Please address the impact on faculty resources including any changes in numbers of faculty, class size, teaching loads, student-faculty ratios, etc. Describe how the unit will support student advising, including job placement and/or admission to advanced studies.

No change.

Library Resources

Describe your proposal's impact on the University Library's resources, collections, and services. If necessary please consult with the appropriate disciplinary specialist within the University Library.

No change.

Instructional Resources

Will there be any reduction in other course offerings, programs or concentrations by your department as a result of this new program/proposed change?

No

Does the program include other courses/subjects impacted by the creation/revision of this program?

No

Financial Resources

Will the unit need to seek campus or other external resources?

No

Are you seeking a change in the tuition rate or differential for this program?

No

Program Regulation and Assessment

Briefly describe the plan to assess and improve student learning, including the program's learning objectives; when, how, and where these learning objectives will be assessed; what metrics will be used to signify student's achievement of the stated learning objectives; and the process to ensure assessment results are used to improve student learning. (Describe how the program is aligned with or meets licensure, certification, and/or entitlement requirements, if applicable).

Data is collected and evaluated every 3 years for key curricular courses, in coordination with the faculty teaching the course in the chosen semester. Courses to be evaluated are determined by the MechSE Undergraduate Programs Committee (UPC) to be necessary to evaluate program outcomes (listed below #1. through 7.). This process allows the program to make and assess changes, advising processes, and the assessment process itself during the 6-year ABET evaluation cycle.

Each instructor (to allow for separation of lecture section results) is asked to classify the outcome attainment of all of the students in one of the five categories: Unsatisfactory (0), Marginal (1), Satisfactory (2), Mastery (3), or did not complete the assignment according to the provided rubrics. To form a metric for each program outcome, we define a performance indicator assessment ratio as the sum of the students who attained "Satisfactory (2)" and "Mastery (3)" achievement of a given performance indicator divided by the number of students who were assessed.

The UPC will evaluate all direct outcomes assessment data and discuss opportunities for improvement according to the 3-year assessment cycle. If the performance indicator assessment ratio is less than 75% for a given outcome, for a given section of a course, for a given semester then the UPC must investigate. In such cases, the UPC would first determine if further action is deemed appropriate. An example of why further action is not deemed necessary includes, but is not limited to, that the assessment ratio for one particular section of the assessed course is slightly below 75% due to small sample sizes or other explainable statistical variation in the numbers. If further action is deemed appropriate, then the UPC or a UPC appointed ad-hoc subcommittee would evaluate the assessment material, identify opportunities to improve the program if the assessment appears accurate, or improve the assessment process if the method of assessment appears lacking or inappropriate in some regard. If an improvement to either the program, assessment process or both is implemented, the performance indicator for the given outcome is reassessed and then reevaluated. If the performance indicator assessment ratios are all equal or greater than 75%, then the level of attainment is considered satisfactory and investigation is not required for the given performance indicator of the given outcome.

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Program outcomes and learning objectives:
The Mechanical Engineering Program prepares graduates to achieve the following student outcomes by the time of graduation:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. an ability to communicate effectively with a range of audiences.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Is the career/profession for graduates of this program regulated by the State of Illinois?

No

Program of Study

"Baccalaureate degree requires at least 120 semester credit hours or 180 quarter credit hours and at least 40 semester credit hours (60 quarter credit hours) in upper division courses" (source: https://www.ibhe.org/assets/files/PrivateAdminRules2017.pdf). For proposals for new bachelor's degrees, if this minimum is not explicitly met by specifically-required 300- and/or 400-level courses, please provide information on how the upper-division hours requirement will be satisfied.

All proposals must attach the new or revised version of the Academic Catalog program of study entry. Contact your college office if you have questions.

Revised programs

Mechanical Engineering Side by Side.xlsx

Attach a side-by-side comparison with the existing program AND, if the revision references or adds "chose-from" lists of courses students can select from to fulfill requirements, a listing of these courses, including the course rubric, number, title, and number of credit hours.

Catalog Page Text

Catalog Page Text: Description of program for the catalog page. This is not official content, it is used to help build the catalog pages for the program. Can be edited in the catalog by the college or department.

The Mechanical Engineering program at Illinois (accredited by the Engineering Accreditation Commission of ABET, www.abet.org) is one of the most diverse engineering majors and plays a major role in advancing almost every industry. Students study physical principles behind how forces act on bodies of solids or fluids and the interaction of these bodies with their environments through exchanges of energy. Further, Mechanical Engineering students learn how to apply these basic principles in designing, manufacturing, and controlling machines and complex systems. Examples include systems that apply loads, transport matter and energy, and convert one form of energy to another. Mechanical Engineering is a broad major that is well suited for students interested in how the world around them moves and changes.

Statement for Programs of Study Catalog

Graduation Requirements

Minimum Technical GPA (https://wiki.illinois.edu/wiki/display/ugadvise/Degree+Requirements/#DegreeRequirements-TechnicalGPARequirement)**:2.0**

TGPA is required for required Engineering courses and any technical elective courses. SeeTechnical GPA (https://wiki.illinois.edu/wiki/display/ugadvise/Degree+Requirements/#DegreeRequirements-TechnicalGPARequirement)to clarify requirements.

Minimum Overall GPA:2.0
Minimum hours required for graduation:128 hours
General education:Students must complete the Campus General Education (https://courses.illinois.edu/gened/DEFAULT/DEFAULT/)**requirements including the campus general education language requirement. One of the SBS courses must be an introductory economics course (ECON 102 or ECON 103).Specific Advanced Composition courses required for this degree are listed below.**

Orientation and Professional Development

Code	Title	Hours
ENG 100	Engineering Orientation[1]	0
ME 290	Seminar	0
Total Hours		0

Foundational Mathematics and Science

Code	Title	Hours
CHEM 102	General Chemistry I	3
CHEM 103	General Chemistry Lab I[2]	1
MATH 221	Calculus I[3]	4
MATH 231	Calculus II	3
MATH 241	Calculus III	4
MATH 257	Linear Algebra with Computational Applications[4]	3
MATH 285	Intro Differential Equations[5]	3
MATH 415	Applied Linear Algebra	3
PHYS 211	University Physics: Mechanics	4
PHYS 212	University Physics: Elec & Mag	4
Total Hours		29

Mechanical Engineering Technical Core

Code	Title	Hours
CS 101	Intro Computing: Engrg & Sci[6]	3
ECE 205	Electrical and Electronic Circuits[7]	3
ECE 206	Electrical and Electronic Circuits Lab	1
ME 170	Computer-Aided Design	3
ME 270	Design for Manufacturability	3
ME 200	Thermodynamics	3
ME 310	Fundamentals of Fluid Dynamics	4
ME 320	Heat Transfer	4
ME 330	Engineering Materials	4
ME 340	Dynamics of Mechanical Systems	3.5
ME 360	Signal Processing	3.5
ME 370	Mechanical Design I	3
ME 371	Mechanical Design II	3
ME 470	Senior Design Project[8]	3
TAM 210	Introduction to Statics	2
TAM 212	Introductory Dynamics[9]	3
TAM 251	Introductory Solid Mechanics	3
Total Hours		52

Technical Electives

Code	Title	Hours
Science elective(s), chosen from one of the following:		4
CHEM 104 & CHEM 105	General Chemistry II and General Chemistry Lab II[2]	
MCB 150	Molec & Cellular Basis of Life	
PHYS 213 & PHYS 214	Univ Physics: Thermal Physics and Univ Physics: Quantum Physics	
Statistics elective, one course chosen from:[10]		3
IE 300	Analysis of Data	
STAT 400	Statistics and Probability I	
MechSE electives chosen from a departmentally approved list. See list below		6
Technical electives chosen from a departmentally approved list below.		6
ABE 430	Project Management[11]	2
ABE 436	Renewable Energy Systems	3 or 4
ABE 445	Statistical Methods	4
ABE 455	Erosion and Sediment Control	2
ABE 456	Land & Water Resources Engrg	3 or 4
ABE 459	Drainage and Water Management	3 or 4
ABE 463	Electrohydraulic Systems	3
ABE 466	Engineering Off-Road Vehicles	3
ABE 469	Industry-Linked Design Project	4
ABE 474	Indoor Environmental Control	3 or 4
ABE 476	Indoor Air Quality Engineering	4
ABE 483	Engineering Properties of Food Materials	3
ABE 488	Bioprocessing Biomass for Fuel	4
ABE 497	Independent Study[12]	1 to 4
ABE 498	Special Topics[13]	1 to 4
AE 352	Aerospace Dynamical Systems	3
AE 402	Orbital Mechanics	3 or 4
AE 403	Spacecraft Attitude Control	3 or 4
AE 410	Computational Aerodynamics	3 or 4
AE 412	Viscous Flow & Heat Transfer	4
AE 416	Applied Aerodynamics	3 or 4
AE 419	Aircraft Flight Mechanics	3 or 4
AE 420	Finite Element Analysis	3 or 4
AE 427	Mechanics of Polymers	3
AE 428	Mechanics of Composites	3
AE 433	Aerospace Propulsion	3 or 4
AE 434	Rocket Propulsion	3 or 4
AE 442	Aerospace Systems Design I	3
AE 443	Aerospace Systems Design II	3
AE 451	Aeroelasticity	3 or 4
AE 454	Systems Dynamics & Control	3 or 4
AE 456	Global Nav Satellite Systems	4
AE 460	Aerodynamics & Propulsion Lab	2
AE 461	Structures & Control Lab	2
AE 482	Introduction to Robotics	4
AE 483	Autonomous Systems Lab	2
AE 497	Independent Study[12]	1 to 4
AE 498	Special Topics (Depending on topic)[13]	1 to 4
ASRM 410	Investments and Financial Markets	3 or 4

ASRM 461	Loss Models	3
ASRM 469	Casualty Actuarial Mathematics	3 or 4
ASRM 471	Life Contingencies I	4
ASRM 472	Life Contingencies II	3
BIOC 406	Gene Expression & Regulation	3
BIOC 440	Physical Chemistry Principles	4
BIOC 446	Physical Biochemistry	3
BIOC 455	Technqs Biochem & Biotech	4
BIOE 380	Biomedical Imaging	3
BIOE 414	Biomedical Instrumentation	3
BIOE 415	Biomedical Instrumentation Lab	2
BIOE 416	Biosensors	3
BIOE 461	Cellular Biomechanics	4
BIOE 476	Tissue Engineering	3
BIOE 479	Cancer Nanotechnology	3
BIOE 481	Whole-Body Musculoskel Biomech	3 or 4
BIOE 482	Musculoskel Tissue Mechanics	3 or 4
BIOE 497	Individual Study[12]	1 to 4
BIOE 498	Special Topics[13]	1 to 4
BIOP 401	Introduction to Biophysics	3
BIOP 419	Brain, Behavior & Info Process	3
BIOP 432	Photosynthesis	3
CEE 310	Transportation Engineering	3
CEE 330	Environmental Engineering	3
CEE 340	Energy and Global Environment	3
CEE 350	Water Resources Engineering	3
CEE 360	Structural Engineering	3
CEE 380	Geotechnical Engineering	3
CEE 398	Special Topics[13]	0 to 4
CEE 401	Concrete Materials	4
CEE 405	Asphalt Materials I	3 or 4
CEE 406	Pavement Design I	3 or 4
CEE 407	Airport Design	3 or 4
CEE 408	Railroad Transportation Engrg	3 or 4
CEE 409	Railroad Track Engineering	3 or 4
CEE 410	Railway Signaling & Control	3 or 4
CEE 411	RR Project Design & Constr	3 or 4
CEE 412	High-Speed Rail Engineering	3 or 4
CEE 415	Geometric Design of Roads	4
CEE 416	Traffic Capacity Analysis	3 or 4
CEE 417	Urban Transportation Planning[11]	4
CEE 418	Public Transportation Systems	3 or 4
CEE 420	Construction Productivity	3 or 4
CEE 421	Construction Planning	3 or 4
CEE 422	Construction Cost Analysis	3 or 4
CEE 424	Sustainable Const Methods	4
CEE 430	Ecological Quality Engineering	2
CEE 434	Environmental Systems I	3
CEE 437	Water Quality Engineering	3
CEE 438	Science & Environmental Policy	3
CEE 440	Fate Cleanup Environ Pollutant	4
CEE 442	Environmental Engineering Principles, Physical	4

CEE 443	Env Eng Principles, Chemical	4
CEE 444	Env Eng Principles, Biological	4
CEE 445	Air Quality Modeling	4
CEE 446	Air Quality Engineering	4
CEE 447	Atmospheric Chemistry	4
CEE 449	Environmental Engineering Lab	3
CEE 450	Surface Hydrology	3
CEE 451	Environmental Fluid Mechanics	3
CEE 452	Hydraulic Analysis and Design	3
CEE 453	Urban Hydrology and Hydraulics	4
CEE 457	Groundwater	3
CEE 458	Water Resources Field Methods	4
CEE 460	Steel Structures I	3
CEE 461	Reinforced Concrete I	3
CEE 462	Steel Structures II	3 or 4
CEE 463	Reinforced Concrete II	3 or 4
CEE 465	Design of Structural Systems	3
CEE 467	Masonry Structures	3 or 4
CEE 468	Prestressed Concrete	3 or 4
CEE 469	Wood Structures	3 or 4
CEE 470	Structural Analysis	4
CEE 471	Structural Mechanics	3 or 4
CEE 472	Structural Dynamics I	3 or 4
CEE 480	Course CEE 480 Not Found	
CEE 483	Soil Mechanics and Behavior	4
CEE 484	Applied Soil Mechanics	3 or 4
CEE 491	Decision and Risk Analysis	3 or 4
CEE 497	Independent Study[12]	1 to 16
CEE 498	Special Topics[13]	1 to 4
CHBE 422	Mass Transfer Operations	4
CHBE 424	Chemical Reaction Engineering	3
CHBE 451	Transport Phenomena	3
CHBE 452	Chemical Kinetics & Catalysis	3
CHBE 453	Electrochemical Engineering	2 or 3
CHBE 456	Polymer Science & Engineering	3
CHBE 457	Microelectronics Processing	3
CHBE 471	Biochemical Engineering	3 or 4
CHBE 472	Techniques in Biomolecular Eng	3 or 4
CHBE 473	Biomolecular Engineering	3 or 4
CHBE 474	Metabolic Engineering	3 or 4
CHBE 475	Tissue Engineering	3
CHBE 476	Biotransport	3
CHEM 232	Elementary Organic Chemistry I	3 or 4
CHEM 233	Elementary Organic Chem Lab I	2
CHEM 236	Fundamental Organic Chem I	4
CHEM 237	Structure and Synthesis	2
CHEM 312	Inorganic Chemistry	3
CHEM 315	Instrumental Chem Systems Lab	2
CHEM 317	Inorganic Chemistry Lab	3
CHEM 332	Elementary Organic Chem II	4
CHEM 420	Instrumental Characterization	2
CHEM 436	Fundamental Organic Chem II	3

CHEM 437	Organic Chemistry Lab	3
CHEM 438	Advanced Organic Chemistry	3
CHEM 440	Physical Chemistry Principles	4
CHEM 442	Physical Chemistry I	4
CHEM 444	Physical Chemistry II	4
CHEM 445	Physical Principles Lab I	2
CHEM 447	Physical Principles Lab II	2
CHEM 450	Astrochemistry	4
CHEM 451	Astrochemistry Laboratory	3 or 4
CHEM 460	Green Chemistry	3 or 4
CHEM 472	Physical Biochemistry	3
CHEM 474	Drug Discovery & Development	3
CHEM 480	Polymer Chemistry	3 or 4
CHEM 482	Polymer Physics	3 or 4
CHEM 483	Solid State Structural Anlys	4
CHEM 488	Surfaces and Colloids	3 or 4
CHEM 497	Individual Study Senior[12]	1 to 3
CS 225	Data Structures	4
CS 233	Computer Architecture	4
CS 241	System Programming	4
CS 242	Programming Studio	3
CS 357	Numerical Methods I	3
CS 374	Introduction to Algorithms & Models of Computation	4
CS 410	Text Information Systems	3 or 4
CS 411	Database Systems	3 or 4
CS 412	Introduction to Data Mining	3 or 4
CS 413	Intro to Combinatorics	3 or 4
CS 414	Multimedia Systems	3 or 4
CS 418	Interactive Computer Graphics	3 or 4
CS 419	Production Computer Graphics	3 or 4
CS 420	Parallel Progrmg: Sci & Engrg	3 or 4
CS 421	Programming Languages & Compilers	3 or 4
CS 422	Programming Language Design	3 or 4
CS 423	Operating Systems Design	3 or 4
CS 424	Real-Time Systems	3 or 4
CS 425	Distributed Systems	3 or 4
CS 426	Compiler Construction	3 or 4
CS 427	Software Engineering I	3 or 4
CS 428	Software Engineering II	3 or 4
CS 429	Software Engineering II, ACP	3
CS 431	Embedded Systems	3 or 4
CS 433	Computer System Organization	3 or 4
CS 436	Computer Networking Laboratory	3 or 4
CS 438	Communication Networks	3 or 4
CS 439	Wireless Networks	3 or 4
CS 440	Artificial Intelligence	3 or 4
CS 445	Computational Photography	3 or 4
CS 446	Machine Learning	3 or 4
CS 447	Natural Language Processing	3 or 4
CS 450	Numerical Analysis	3 or 4
CS 457	Numerical Methods II	3
CS 460	Security Laboratory	3 or 4

CS 461	Computer Security I	4
CS 463	Computer Security II	3 or 4
CS 465	User Interface Design	3 or 4
CS 466	Introduction to Bioinformatics	3 or 4
CS 467	Social Visualization	3 or 4
CS 468	Tech and Advertising Campaigns	3
CS 473	Algorithms	4
CS 475	Formal Models of Computation	3 or 4
CS 476	Program Verification	3 or 4
CS 477	Formal Software Development Methods	3 or 4
CS 481	Advanced Topics in Stochastic Processes & Applications	3 or 4
CS 483	Applied Parallel Programming	4
CS 484	Parallel Programming	3 or 4
CS 498	Special Topics[13]	1 to 4
CSE 401	Numerical Analysis	3 or 4
CSE 402	Parallel Progrmg: Sci & Engrg	3 or 4
CSE 412	Numerical Thermo-Fluid Mechs	2 to 4
CSE 441	Introduction to Optimization	3 or 4
CSE 450	Computational Mechanics	3 or 4
CSE 451	Finite Element Analysis	3 or 4
CSE 461	Computational Aerodynamics	3 or 4
ECE 329	Fields and Waves I	3
ECE 330	Power Ckts & Electromechanics	3
ECE 333	Green Electric Energy	3
ECE 340	Semiconductor Electronics	3
ECE 342	Electronic Circuits	3
ECE 343	Electronic Circuits Laboratory	1
ECE 380	Biomedical Imaging	3
ECE 385	Digital Systems Laboratory	3
ECE 395	Advanced Digital Projects Lab	2 or 3
ECE 401	Signal and Image Analysis	4
ECE 402	Electronic Music Synthesis	3
ECE 403	Audio Engineering	3
ECE 408	Applied Parallel Programming	4
ECE 411	Computer Organization & Design	4
ECE 412	Microcomputer Laboratory	3
ECE 414	Biomedical Instrumentation	3
ECE 415	Biomedical Instrumentation Lab	2
ECE 416	Biosensors	3
ECE 417	Multimedia Signal Processing	4
ECE 418	Image & Video Processing	4
ECE 419	Security Laboratory	3 or 4
ECE 420	Embedded DSP Laboratory	2
ECE 422	Computer Security I	4
ECE 424	Computer Security II	3 or 4
ECE 425	Intro to VLSI System Design	3
ECE 428	Distributed Systems	3 or 4
ECE 431	Electric Machinery	4
ECE 432	Advanced Electric Machinery	3
ECE 435	Computer Networking Laboratory	3 or 4
ECE 437	Sensors and Instrumentation	3
ECE 438	Communication Networks	3 or 4

ECE 439	Wireless Networks	3 or 4
ECE 441	Physcs & Modeling Semicond Dev	3
ECE 444	IC Device Theory & Fabrication	4
ECE 447	Active Microwave Ckt Design	3
ECE 448	Artificial Intelligence	3 or 4
ECE 451	Adv Microwave Measurements	3
ECE 452	Electromagnetic Fields	3
ECE 453	Wireless Communication Systems	4
ECE 454	Antennas	3
ECE 455	Optical Electronics	3 or 4
ECE 456	Global Nav Satellite Systems	4
ECE 457	Microwave Devices & Circuits	3
ECE 458	Applic of Radio Wave Propag	3
ECE 459	Communications Systems	3
ECE 460	Optical Imaging	4
ECE 462	Logic Synthesis	3
ECE 463	Digital Communications Lab	2
ECE 464	Power Electronics	3
ECE 465	Optical Communications Systems	3
ECE 466	Optical Communications Lab	1
ECE 467	Biophotonics	3
ECE 468	Optical Remote Sensing	3
ECE 469	Power Electronics Laboratory	2
ECE 470	Introduction to Robotics	4
ECE 472	Biomedical Ultrasound Imaging	3
ECE 473	Fund of Engrg Acoustics	3 or 4
ECE 476	Power System Analysis	3
ECE 478	Formal Software Development Methods	3 or 4
ECE 480	Magnetic Resonance Imaging	3 or 4
ECE 481	Nanotechnology	4
ECE 482	Digital IC Design	3
ECE 483	Analog IC Design	3
ECE 485	MEMS Devices & Systems	3
ECE 486	Control Systems	4
ECE 487	Intro Quantum Electr for EEs	3
ECE 488	Compound Semicond & Devices	3
ECE 489	Robot Dynamics and Control	4
ECE 490	Introduction to Optimization	3 or 4
ECE 491	Numerical Analysis	3 or 4
ECE 492	Parallel Progrmg: Sci & Engrg	3 or 4
ECE 493	Advanced Engineering Math	3 or 4
ECE 495	Photonic Device Laboratory	3
ECE 498	Special Topics in ECE[13]	0 to 4
ECON 302	Inter Microeconomic Theory[11]	3
IE 310	Deterministic Models in Optimization	3
IE 311	Operations Research Lab	1
IE 330	Industrial Quality Control	3
IE 340	Human Factors	4
IE 360	Facilities Planning and Design	3
IE 410	Advanced Topics in Stochastic Processes & Applications	3 or 4
IE 411	Optimization of Large Systems	3 or 4
IE 412	OR Models for Mfg Systems	3 or 4

IE 413	Simulation	3 or 4
IE 420	Financial Engineering	3 or 4
IE 430	Economic Found of Quality Syst	3 or 4
IE 431	Design for Six Sigma	3
IE 445	Human Performance and Cognition in Context[11]	3 or 4
IE 497	Independent Study[12]	1 to 4
IE 498	Special Topics[13]	1 to 4
MATH 347	Fundamental Mathematics	3
MATH 357	Numerical Methods I	3
MATH 403	Euclidean Geometry	3 or 4
MATH 412	Graph Theory	3 or 4
MATH 413	Intro to Combinatorics	3 or 4
MATH 414	Mathematical Logic	3 or 4
MATH 417	Intro to Abstract Algebra	3 or 4
MATH 418	Intro to Abstract Algebra II	3 or 4
MATH 423	Differential Geometry	3 or 4
MATH 424	Honors Real Analysis	3
MATH 425	Honors Advanced Analysis	3
MATH 427	Honors Abstract Algebra	3
MATH 428	Honors Topics in Mathematics[13]	3
MATH 432	Set Theory and Topology	3 or 4
MATH 442	Intro Partial Diff Equations	3 or 4
MATH 444	Elementary Real Analysis	3 or 4
MATH 446	Applied Complex Variables	3 or 4
MATH 447	Real Variables	3 or 4
MATH 448	Complex Variables	3 or 4
MATH 450	Numerical Analysis	3 or 4
MATH 453	Elementary Theory of Numbers	3 or 4
MATH 464	Statistics and Probability II	3 or 4
MATH 473	Algorithms	4
MATH 475	Formal Models of Computation	3 or 4
MATH 481	Vector and Tensor Analysis	3 or 4
MATH 482	Linear Programming	3 or 4
MATH 484	Nonlinear Programming	3 or 4
MATH 487	Advanced Engineering Math	3 or 4
MATH 489	Dynamics & Differential Eqns	3 or 4
MATH 490	Advanced Topics in Mathematics[13]	1 to 4
MATH 492	Undergraduate Research in Math[12]	1 to 3
MCB 401	Cellular Physiology	3
MCB 402	Sys & Integrative Physiology	3
MCB 403	Cell & Membrane Physiology Lab	1 or 2
MCB 404	Sys & Integrative Physiol Lab	1 to 2
MCB 450	Introductory Biochemistry	3
MCB 493	Special Topics Mol Cell Biol[13]	1 to 4
All 400 level ME courses, except 470 and potentially 497, 498[12,13]		
MSE 304	Electronic Properties of Matls	3
MSE 307	Materials Laboratory I	3
MSE 308	Materials Laboratory II	3
MSE 401	Thermodynamics of Materials	3
MSE 402	Kinetic Processes in Materials	3
MSE 403	Synthesis of Materials	3
MSE 405	Microstructure Determination	3

MSE 406	Thermal-Mech Behavior of Matls	3
MSE 420	Ceramic Materials & Properties	3
MSE 421	Ceramic Processing	3 or 4
MSE 422	Electrical Ceramics	3
MSE 440	Mechanical Behavior of Metals	3
MSE 441	Metals Processing	3
MSE 443	Design of Engineering Alloys	3
MSE 445	Corrosion of Metals	3 or 4
MSE 450	Polymer Science & Engineering	3 or 4
MSE 453	Plastics Engineering	3
MSE 454	Mechanics of Polymers	3
MSE 455	Macromolecular Solids	3
MSE 456	Mechanics of Composites	3
MSE 457	Polymer Chemistry	3 or 4
MSE 458	Polymer Physics	3 or 4
MSE 460	Electronic Materials I	3
MSE 461	Electronic Materials II	3
MSE 466	Materials in Electrochem Syst	3
MSE 470	Design and Use of Biomaterials	3
MSE 473	Biomolecular Materials Science	3
MSE 474	Biomaterials and Nanomedicine	3
MSE 480	Surfaces and Colloids	3 or 4
MSE 481	Electron Microscopy	3 or 4
MSE 484	Composite Materials	3 or 4
MSE 485	Atomic Scale Simulations	3 or 4
MSE 487	Materials for Nanotechnology	3 or 4
MSE 488	Optical Materials	3 or 4
MSE 489	Matl Select for Sustainability	3 or 4
MSE 497	Independent Study[12]	1 to 4
MSE 498	Special Topics[13]	1 to 4
NPRE 402	Nuclear Power Engineering	3 or 4
NPRE 412	Nuclear Power Econ & Fuel Mgmt	3 or 4
NPRE 421	Plasma and Fusion Science	3
NPRE 423	Plasma Laboratory	2
NPRE 429	Plasma Engineering	3
NPRE 431	Materials in Nuclear Engrg	3
NPRE 435	Radiological Imaging	3
NPRE 441	Radiation Protection	4
NPRE 442	Radioactive Waste Management	3
NPRE 444	Nuclear Analytical Methods Lab	2 or 3
NPRE 446	Radiation Interact w/Matter I	3
NPRE 447	Radiation Interact w/Matter II	3
NPRE 448	Nuclear Syst Engrg & Design	4
NPRE 451	NPRE Laboratory	3
NPRE 455	Neutron Diffusion & Transport	4
NPRE 457	Safety Anlys Nucl Reactor Syst	3 or 4
NPRE 461	Probabilistic Risk Assessment	3 or 4
NPRE 470	Fuel Cells & Hydrogen Sources	3
NPRE 475	Wind Power Systems	3 or 4
NPRE 498	Special Topics[13]	1 to 4
PHYS 330	Atmospheric Dynamics II	3
PHYS 401	Classical Physics Lab	3

PHYS 402	Light	3 or 4
PHYS 403	Modern Experimental Physics	4 or 5
PHYS 404	Electronic Circuits	4 or 5
PHYS 406	Acoustical Physics of Music	4
PHYS 427	Thermal & Statistical Physics	4
PHYS 435	Electromagnetic Fields I	3
PHYS 436	Electromagnetic Fields II	3
PHYS 460	Condensed Matter Physics	4
PHYS 466	Atomic Scale Simulations	3 or 4
PHYS 470	Subatomic Physics	4
PHYS 475	Introduction to Biophysics	3 or 4
PHYS 485	Atomic Phys & Quantum Theory	3
PHYS 486	Quantum Physics I	4
PHYS 487	Quantum Physics II	4
PHYS 496	Intro to Physics Research[11]	3
PHYS 497	Individual Study[12]	1 to 4
PHYS 498	Special Topics in Physics[13]	1 to 4
SE 400	Engineering Law[11]	3 or 4
SE 402	Comp-Aided Product Realization	3 or 4
SE 411	Reliability Engineering	3 or 4
SE 412	Nondestructive Evaluation	3 or 4
SE 413	Engineering Design Optimization	3 or 4
SE 420	Digital Control Systems	4
SE 422	Robot Dynamics and Control	4
SE 423	Mechatronics	3
SE 424	State Space Design for Control	3
SE 450	Decision Analysis I[11]	3 or 4
SE 497	Independent Study[12]	0 to 4
SE 498	Special Topics[13]	1 to 4
STAT 409	Actuarial Statistics II	4
STAT 410	Statistics and Probability II	3 or 4
STAT 420	Methods of Applied Statistics	3 or 4
STAT 424	Analysis of Variance	3 or 4
STAT 425	Statistical Modeling I	3 or 4
STAT 426	Statistical Modeling II	3 or 4
STAT 428	Statistical Computing	3 or 4
STAT 429	Time Series Analysis	3 or 4
STAT 430	Topics in Applied Statistics[13]	3 or 4
STAT 440	Statistical Data Management	3 or 4
STAT 443	Professional Statistics[11]	3 or 4
STAT 448	Advanced Data Analysis	4
STAT 458	Math Modeling in Life Sciences	3 or 4
STAT 480	Data Science Foundations	3 or 4
All 400 level TAM courses, except 499 and potentially 497,498[10,11]		
All 400 level TAM courses, except potentially 497,498[12,13]		
TE 461	Technology Entrepreneurship[11]	3
TMGT 460	Business Process Modeling	3
TMGT 461	Tech, Eng, & Mgt Final Project	2

Electives

Code	Title	Hours
The Grainger College of Engineering Liberal Education course list, or additional courses from the campus General Education lists for Social and Behavioral Sciences or Humanities and the Arts[14]		6
Free electives. Additional unrestricted course work, subject to certain exceptions as noted by the College, so that there are at least 128 credit hours earned toward the degree.[15]		6
Total Hours of Curriculum to Graduate		**128**

1 *External transfer students take* ENG 300 *instead.*

2 CHEM 103 *(*http://catalog.illinois.edu/search/?P=CHEM%20103*)requirement waived for students who received test-based credit (AP, IB, or proficiency) for* CHEM 102 *(*http://catalog.illinois.edu/search/?P=CHEM%20102*), similarly* CHEM 105 *(*http://catalog.illinois.edu/search/?P=CHEM%20105*)requirement waived for students who received test-based credit for* CHEM 104 *(*http://catalog.illinois.edu/search/?P=CHEM%20104*). Students are still required to have 128 hours minimum to graduate.*

3 MATH 220 *may be substituted, with four of the five credit hours applying toward the degree.* MATH 220 *is appropriate for students with no background in calculus.*

4 MATH 415 *(*http://catalog.illinois.edu/search/?P=MATH%20415*)may be substituted for students entering prior to fall 2022.*

5 MATH 284 *(*http://catalog.illinois.edu/search/?P=MATH%20284*)may be substituted.*

6 CS 124 *(*http://catalog.illinois.edu/search/?P=CS%20124*)or* CS 125 *(*http://catalog.illinois.edu/search/?P=CS%20125*)or* ECE 220 *(*http://catalog.illinois.edu/search/?P=ECE%20220*)may be substituted.*

7 ECE 110 *(*http://catalog.illinois.edu/search/?P=ECE%20110*)and* ECE 210 *(*http://catalog.illinois.edu/search/?P=ECE%20210*)(or* ECE 211 *(*http://catalog.illinois.edu/search/?P=ECE%20211*)) combined may be substituted.*

8 *Advanced Composition satisfied by completing* ME 470.

9 *Transfers and Physics minor/dual degree students may substitute* PHYS 325 (http://catalog.illinois.edu/search/?P=PHYS%20325).

10 *Transfers and ECE minor/dual degree students may substitute* ECE 313 *(*http://catalog.illinois.edu/search/?P=ECE%20313*).*

11 *A maximum of 3 hours of independent/individual study courses may be used to satisfy the MechSE Elective or Technical Elective requirements.*

12 *Depending on the technical content, some Special Topics courses may not be approved for Technical Elective credit. Please provide a syllabus of the course to the Mechanical Science and Engineering Undergraduate Programs Office to request use of the course for Technical Elective credit prior to registering for the course.*

13 *Professional Elective course. No more than 3 hours of professional elective credit may be used to satisfy the Technical Electives requirements.*

14 *The Grainger College of Engineering approved liberal education course list can be found* here *(*https://wiki.illinois.edu/wiki/display/ugadvise/Degree+Requirements/#DegreeRequirements-GeneralEducationElectives*). Note that these credit hours could carry the required cultural studies designation required for campus general education requirements.*

15 *The Grainger College of Engineering restrictions to free electives can be found* here *(*https://wiki.illinois.edu/wiki/display/ugadvise/Degree+Requirements/#DegreeRequirements-FreeElectives*).*

EP Documentation

DMI Documentation

Banner/Codebook Name

BS:Mechanical Engineerng -UIUC

Program Code:

10KP0133BS

Degree Code

BS

Major Code

0133

Program Reviewer Comments

Stephanie Ott-Monsivais (ottmonsi) (Tue, 02 Feb 2021 19:10:14 GMT): Actually want Admission term to show FA22 (NOT SP22) - please roll back.
Sanjiv Sinha (sanjiv) (Tue, 02 Feb 2021 19:53:49 GMT): Rollback: Change to starting term
Sanjiv Sinha (sanjiv) (Tue, 02 Feb 2021 19:58:50 GMT): Rollback: Attachment missing?
Deb Forgacs (dforgacs) (Tue, 02 Feb 2021 20:01:48 GMT): Rollback: change to starting term.
Sanjiv Sinha (sanjiv) (Tue, 02 Feb 2021 22:23:18 GMT): Rollback: Add ME 200
Deb Forgacs (dforgacs) (Tue, 02 Feb 2021 22:25:04 GMT): Rollback: See note.
Brooke Newell (bsnewell) (Wed, 03 Feb 2021 17:21:43 GMT): Rollback: per email discussion
Brooke Newell (bsnewell) (Mon, 22 Mar 2021 13:16:52 GMT): Rollback: per dept request
Kathy Martensen (kmartens) (Tue, 06 Apr 2021 21:59:48 GMT): Admin approval: No change to total hours required, doesn't restrict options.

Key: 120

Key

GREEN HIGHLIGHT = Course addition, updated hours, or added/revised/reordered footnote

YELLOW HIGHLIGHT = Course has been reordered (to alphabetized list)

RED HIGHLIGHT = Course has been removed

Current Requirement	Current Hours	Revised Requirements	Revised Hours
Orientation and Professional Development	**0**	**Orientation and Professional Development**	**0**
ENG 100: Engineering Orientation[1]	0	ENG 100: Engineering Orientation[1]	0
ME 290: Seminar	0	ME 290: Seminar	0
Foundational Mathematics and Science	**29**	**Foundational Mathematics and Science**	**29**
CHEM 102: General Chemistry I	3	CHEM 102: General Chemistry I	3
CHEM 103: General Chemistry Lab I[2]	1	CHEM 103: General Chemistry Lab I[2]	1
MATH 221: Calculus I[3]	4	MATH 221: Calculus I[3]	4
MATH 231: Calculus II	3	MATH 231: Calculus II	3
MATH 241: Calculus III	4	MATH 241: Calculus III	4
		MATH 257: Linear Algebra with Computational Applications[4]	3
MATH 285: Intro Differential Equations[4]	3	MATH 285: Intro Differential Equations[5]	3
MATH 415: Applied Linear Algebra	3		
PHYS 211: University Physics: Mechanics	4	PHYS 211: University Physics: Mechanics	4
PHYS 212: University Physics: Elec & Mag	4	PHYS 212: University Physics: Elec & Mag	4
Mechanical Engineering Technical Core	**52**	**Mechanical Engineering Technical Core**	**52**
CS 101: Intro Computing: Engrg & Sci[5]	3	CS 101: Intro Computing: Engrg & Sci[6]	3
ECE 205: Electrical and Electronic Circuits[6]	3	ECE 205: Electrical and Electronic Circuits[7]	3
ECE 206: Electrical and Electronic Circuits Lab	1	ECE 206: Electrical and Electronic Circuits Lab	1
ME 170: Computer-Aided Design	3	ME 170: Computer-Aided Design	3
ME 200: Thermodynamics	3	ME 200: Thermodynamics	3
ME 270: Design for Manufacturability	3	ME 270: Design for Manufacturability	3
ME 310: Fundamentals of Fluid Dynamics	4	ME 310: Fundamentals of Fluid Dynamics	4
ME 320: Heat Transfer	4	ME 320: Heat Transfer	4
ME 330: Engineering Materials	4	ME 330: Engineering Materials	4
ME 340: Dynamics of Mechanical Systems	3.5	ME 340: Dynamics of Mechanical Systems	3.5
ME 360: Signal Processing	3.5	ME 360: Signal Processing	3.5
ME 370: Mechanical Design I	3	ME 370: Mechanical Design I	3
ME 371: Mechanical Design II	3	ME 371: Mechanical Design II	3
ME 470: Senior Design Project[7]	3	ME 470: Senior Design Project[8]	3
TAM 210: Introduction to Statics	2	TAM 210: Introduction to Statics	2
TAM 212: Introductory Dynamics[8]	3	TAM 212: Introductory Dynamics[9]	3
TAM 251: Introductory Solid Mechanics	3	TAM 251: Introductory Solid Mechanics	3
Technical Electives		**Technical Electives**	
Science elective, chosen from one of the following:	4	**Science elective, chosen from one of the following:**	4
CHEM 104: General Chemistry II & CHEM 105: General Chemistry Lab II[2]		CHEM 104: General Chemistry II & CHEM 105: General Chemistry Lab II[2]	
MCB 150: Molec & Cellular Basis of Life		MCB 150: Molec & Cellular Basis of Life	
PHYS 213: Univ Physics: Thermal Physics & PHYS 214: Univ Physics: Quantum Physics		PHYS 213: Univ Physics: Thermal Physics & PHYS 214: Univ Physics: Quantum Physics	
Statistics elective, one course chosen from:[9]	3	**Statistics elective, one course chosen from:**[10]	3
IE 300: Analysis of Data		IE 300: Analysis of Data	
STAT 400: Statistics and Probability I		STAT 400: Statistics and Probability I	
MechSE electives chosen from a departmentally approved list. See list below.	6	**MechSE electives chosen from a departmentally approved list. See list below.**	6
Technical electives chosen from a departmentally approved list below.	6	**Technical electives chosen from a departmentally approved list below.**	6
AE 352: Aerospace Dynamical Systems	3		
AE 402: Orbital Mechanics	3 or 4		
AE 403: Spacecraft Attitude Control	3 or 4		
AE 410: Computational Aerodynamics	3 or 4		
AE 412: Viscous Flow & Heat Transfer	4		
AE 416: Applied Aerodynamics	3 or 4		
AE 419: Aircraft Flight Mechanics	3 or 4		
AE 420: Finite Element Analysis	3 or 4		
AE 427: Mechanics of Polymers	3		
AE 428: Mechanics of Composites	3		
AE 433: Aerospace Propulsion	3 or 4		
AE 434: Rocket Propulsion	3 or 4		
AE 442: Aerospace Systems Design I	3		
AE 443: Aerospace Systems Design II	3		
AE 451: Aeroelasticity	3 or 4		
AE 454: Systems Dynamics & Control	3 or 4		
AE 456: Global Nav Satellite Systems	4		
AE 460: Aerodynamics & Propulsion Lab	2		
AE 461: Structures & Control Lab	2		
AE 482: Introduction to Robotics	4		
AE 483: Autonomous Systems Lab	2		
AE 497: Independent Study[10]	1 to 4		
AE 498: Special Topics (Depending on topic)[11]	1 to 4		
ABE 430: Project Management[12]	2	ABE 430: Project Management[11]	2
ABE 436: Renewable Energy Systems	3 or 4	ABE 436: Renewable Energy Systems	3 or 4
ABE 445: Statistical Methods	4	ABE 445: Statistical Methods	4
ABE 455: Erosion and Sediment Control	2	ABE 455: Erosion and Sediment Control	2
ABE 456: Land & Water Resources Engrg	3 or 4	ABE 456: Land & Water Resources Engrg	3 or 4
ABE 459: Drainage and Water Management	3 or 4	ABE 459: Drainage and Water Management	3 or 4
ABE 463: Electrohydraulic Systems	3	ABE 463: Electrohydraulic Systems	3
ABE 466: Engineering Off-Road Vehicles	3	ABE 466: Engineering Off-Road Vehicles	3
ABE 469: Industry-Linked Design Project	4	ABE 469: Industry-Linked Design Project	4
ABE 474: Indoor Environmental Control	3 or 4	ABE 474: Indoor Environmental Control	3 or 4
ABE 476: Indoor Air Quality Engineering	4	ABE 476: Indoor Air Quality Engineering	4
ABE 483: Engineering Properties of Food Materials	3	ABE 483: Engineering Properties of Food Materials	3
ABE 488: Bioprocessing Biomass for Fuel	4	ABE 488: Bioprocessing Biomass for Fuel	4
ABE 497: Independent Study[10]	1 to 4	ABE 497: Independent Study[12]	1 to 4
ABE 498: Special Topics[11]	1 to 4	ABE 498: Special Topics[13]	1 to 4
		AE 352: Aerospace Dynamical Systems	3
		AE 402: Orbital Mechanics	3 or 4
		AE 403: Spacecraft Attitude Control	3 or 4
		AE 410: Computational Aerodynamics	3 or 4
		AE 412: Viscous Flow & Heat Transfer	4
		AE 416: Applied Aerodynamics	3 or 4
		AE 419: Aircraft Flight Mechanics	3 or 4
		AE 420: Finite Element Analysis	3 or 4
		AE 428: Mechanics of Composites	3
		AE 433: Aerospace Propulsion	3 or 4
		AE 434: Rocket Propulsion	3 or 4
		AE 442: Aerospace Systems Design I	3
		AE 443: Aerospace Systems Design II	3
		AE 451: Aeroelasticity	3 or 4
		AE 454: Systems Dynamics & Control	3 or 4
		AE 456: Global Nav Satellite Systems	4
		AE 460: Aerodynamics & Propulsion Lab	2

		AE 461: Structures & Control Lab	2
		AE 482: Introduction to Robotics	4
		AE 483: Autonomous Systems Lab	2
		AE 497: Independent Study [12]	1 to 4
		AE 498: Special Topics (Depending on topic) [13]	1 to 4
ASRM 410: Investments and Financial Markets	3 or 4	ASRM 410: Investments and Financial Markets	3 or 4
ASRM 461: Loss Models	3	ASRM 461: Loss Models	3
ASRM 469: Casualty Actuarial Mathematics	3 or 4	ASRM 469: Casualty Actuarial Mathematics	3 or 4
ASRM 471: Life Contingencies I	4	ASRM 471: Life Contingencies I	4
ASRM 472: Life Contingencies II	3	ASRM 472: Life Contingencies II	3
BIOC 406: Gene Expression & Regulation	3	BIOC 406: Gene Expression & Regulation	3
BIOC 440: Physical Chemistry Principles	4	BIOC 440: Physical Chemistry Principles	4
BIOC 446: Physical Biochemistry	3	BIOC 446: Physical Biochemistry	3
BIOC 455: Technqs Biochem & Biotech	4	BIOC 455: Technqs Biochem & Biotech	4
BIOE 380: Biomedical Imaging	3	BIOE 380: Biomedical Imaging	3
BIOE 414: Biomedical Instrumentation	3	BIOE 414: Biomedical Instrumentation	3
BIOE 415: Biomedical Instrumentation Lab	2	BIOE 415: Biomedical Instrumentation Lab	2
BIOE 416: Biosensors	3	BIOE 416: Biosensors	3
BIOE 461: Cellular Biomechanics	4	BIOE 461: Cellular Biomechanics	4
BIOE 476: Tissue Engineering	3	BIOE 476: Tissue Engineering	3
BIOE 479: Cancer Nanotechnology	3	BIOE 479: Cancer Nanotechnology	3
BIOE 481: Whole-Body Musculoskel Biomech	3 or 4	BIOE 481: Whole-Body Musculoskel Biomech	3 or 4
BIOE 482: Musculoskel Tissue Mechanics	3 or 4	BIOE 482: Musculoskel Tissue Mechanics	3 or 4
BIOE 497: Individual Study [10]	1 to 4	BIOE 497: Individual Study [12]	1 to 4
BIOE 498: Special Topics [11]	1 to 4	BIOE 498: Special Topics [13]	1 to 4
BIOP 401: Introduction to Biophysics	3	BIOP 401: Introduction to Biophysics	3
BIOP 419: Brain, Behavior & Info Process	3	BIOP 419: Brain, Behavior & Info Process	3
BIOP 432: Photosynthesis	3	BIOP 432: Photosynthesis	3
		CEE 310: Transportation Engineering	3
		CEE 330: Environmental Engineering	3
		CEE 340: Energy and Global Environment	3
		CEE 350: Water Resources Engineering	3
		CEE 360: Structural Engineering	3
		CEE 380: Geotechnical Engineering	3
		CEE 398: Special Topics [13]	0 to 4
		CEE 401: Concrete Materials	4
		CEE 405: Asphalt Materials I	3 or 4
		CEE 406: Pavement Design I	3 or 4
		CEE 407: Airport Design	3 or 4
		CEE 408: Railroad Transportation Engrg	3 or 4
		CEE 409: Railroad Track Engineering	3 or 4
		CEE 410: Railway Signaling & Control	3 or 4
		CEE 411: RR Project Design & Constr	3 or 4
		CEE 412: High-Speed Rail Engineering	3 or 4
		CEE 415: Geometric Design of Roads	4
		CEE 416: Traffic Capacity Analysis	3 or 4
		CEE 417: Urban Transportation Planning [11]	4
		CEE 418: Public Transportation Systems	3 or 4
		CEE 420: Construction Productivity	3 or 4
		CEE 421: Construction Planning	3 or 4
		CEE 422: Construction Cost Analysis	3 or 4
		CEE 424: Sustainable Const Methods	4
		CEE 430: Ecological Quality Engineering	2
		CEE 434: Environmental Systems I	3
		CEE 437: Water Quality Engineering	3
		CEE 438: Science & Environmental Policy	3
		CEE 440: Fate Cleanup Environ Pollutant	4
		CEE 442: Environmental Engineering Principles, Physical	4
		CEE 443: Env Eng Principles, Chemical	4
		CEE 444: Env Eng Principles, Biological	4
		CEE 445: Air Quality Modeling	4
		CEE 446: Air Quality Engineering	4
		CEE 447: Atmospheric Chemistry	4
		CEE 449: Environmental Engineering Lab	3
		CEE 450: Surface Hydrology	3
		CEE 451: Environmental Fluid Mechanics	3
		CEE 452: Hydraulic Analysis and Design	3
		CEE 453: Urban Hydrology and Hydraulics	4
		CEE 457: Groundwater	3
		CEE 458: Water Resources Field Methods	4
		CEE 460: Steel Structures I	3
		CEE 461: Reinforced Concrete I	3
		CEE 462: Steel Structures II	3 or 4
		CEE 463: Reinforced Concrete II	3 or 4
		CEE 465: Design of Structural Systems	3
		CEE 467: Masonry Structures	3 or 4
		CEE 468: Prestressed Concrete	3 or 4
		CEE 469: Wood Structures	3 or 4
		CEE 470: Structural Analysis	4
		CEE 471: Structural Mechanics	3 or 4
		CEE 472: Structural Dynamics I	3 or 4
		CEE 483: Soil Mechanics and Behavior	4
		CEE 484: Applied Soil Mechanics	3 or 4
		CEE 491: Decision and Risk Analysis	3 or 4
		CEE 497: Independent Study [12]	1 to 16
		CEE 498: Special Topics [13]	1 to 4
CHBE 422: Mass Transfer Operations	4	CHBE 422: Mass Transfer Operations	4
CHBE 424: Chemical Reaction Engineering	3	CHBE 424: Chemical Reaction Engineering	3
CHBE 451: Transport Phenomena	3	CHBE 451: Transport Phenomena	3
CHBE 452: Chemical Kinetics & Catalysis	3	CHBE 452: Chemical Kinetics & Catalysis	3
CHBE 453: Electrochemical Engineering	2 or 3	CHBE 453: Electrochemical Engineering	2 or 3
CHBE 456: Polymer Science & Engineering	3	CHBE 456: Polymer Science & Engineering	3
CHBE 457: Microelectronics Processing	3	CHBE 457: Microelectronics Processing	3
CHBE 471: Biochemical Engineering	3 or 4	CHBE 471: Biochemical Engineering	3 or 4
CHBE 472: Techniques in Biomolecular Eng	3 or 4	CHBE 472: Techniques in Biomolecular Eng	3 or 4
CHBE 473: Biomolecular Engineering	3 or 4	CHBE 473: Biomolecular Engineering	3 or 4
CHBE 474: Metabolic Engineering	3 or 4	CHBE 474: Metabolic Engineering	3 or 4
CHBE 475: Tissue Engineering	3	CHBE 475: Tissue Engineering	3
CHBE 476: Biotransport	3	CHBE 476: Biotransport	3
CHEM 232: Elementary Organic Chemistry I	3 or 4	CHEM 232: Elementary Organic Chemistry I	3 or 4
CHEM 233: Elementary Organic Chem Lab I	2	CHEM 233: Elementary Organic Chem Lab I	2
CHEM 236: Fundamental Organic Chem I	4	CHEM 236: Fundamental Organic Chem I	4
CHEM 237: Structure and Synthesis	2	CHEM 237: Structure and Synthesis	2
CHEM 312: Inorganic Chemistry	3	CHEM 312: Inorganic Chemistry	3
CHEM 315: Instrumental Chem Systems Lab	2	CHEM 315: Instrumental Chem Systems Lab	2
CHEM 317: Inorganic Chemistry Lab	3	CHEM 317: Inorganic Chemistry Lab	3

CHEM 332: Elementary Organic Chem II	4	CHEM 332: Elementary Organic Chem II	4
CHEM 420: Instrumental Characterization	2	CHEM 420: Instrumental Characterization	2
CHEM 436: Fundamental Organic Chem II	3	CHEM 436: Fundamental Organic Chem II	3
CHEM 437: Organic Chemistry Lab	3	CHEM 437: Organic Chemistry Lab	3
CHEM 438: Advanced Organic Chemistry	3	CHEM 438: Advanced Organic Chemistry	3
CHEM 440: Physical Chemistry Principles	4	CHEM 440: Physical Chemistry Principles	4
CHEM 442: Physical Chemistry I	4	CHEM 442: Physical Chemistry I	4
CHEM 444: Physical Chemistry II	4	CHEM 444: Physical Chemistry II	4
CHEM 445: Physical Principles Lab I	2	CHEM 445: Physical Principles Lab I	2
CHEM 447: Physical Principles Lab II	2	CHEM 447: Physical Principles Lab II	2
CHEM 450: Astrochemistry	4	CHEM 450: Astrochemistry	4
CHEM 451: Astrochemistry Laboratory	3 or 4	CHEM 451: Astrochemistry Laboratory	3 or 4
CHEM 460: Green Chemistry	3 or 4	CHEM 460: Green Chemistry	3 or 4
CHEM 472: Physical Biochemistry	3	CHEM 472: Physical Biochemistry	3
CHEM 474: Drug Discovery & Development	3	CHEM 474: Drug Discovery & Development	3
CHEM 480: Polymer Chemistry	3 or 4	CHEM 480: Polymer Chemistry	3 or 4
CHEM 482: Polymer Physics	3 or 4	CHEM 482: Polymer Physics	3 or 4
CHEM 483: Solid State Structural Anlys	4	CHEM 483: Solid State Structural Anlys	4
CHEM 488: Surfaces and Colloids	3 or 4	CHEM 488: Surfaces and Colloids	3 or 4
CHEM 497: Individual Study Senior [10]	1 to 3	CHEM 497: Individual Study Senior [12]	1 to 3
CEE 310: Transportation Engineering	3		
CEE 330: Environmental Engineering	3		
CEE 340: Energy and Global Environment	3		
CEE 350: Water Resources Engineering	3		
CEE 360: Structural Engineering	3		
CEE 380: Geotechnical Engineering	3		
CEE 398: Special Topics [11]	0 to 4		
CEE 401: Concrete Materials	4		
CEE 405: Asphalt Materials I	3 or 4		
CEE 406: Pavement Design I	3 or 4		
CEE 407: Airport Design	3 or 4		
CEE 408: Railroad Transportation Engrg	3 or 4		
CEE 409: Railroad Track Engineering	3 or 4		
CEE 410: Railway Signaling & Control	3 or 4		
CEE 411: RR Project Design & Constr	3 or 4		
CEE 412: High-Speed Rail Engineering	3 or 4		
CEE 415: Geometric Design of Roads	4		
CEE 416: Traffic Capacity Analysis	3 or 4		
CEE 417: Urban Transportation Planning [12]	4		
CEE 418: Public Transportation Systems	3 or 4		
CEE 420: Construction Productivity	3 or 4		
CEE 421: Construction Planning	3 or 4		
CEE 422: Construction Cost Analysis	3 or 4		
CEE 424: Sustainable Const Methods	4		
CEE 430: Ecological Quality Engineering	2		
CEE 434: Environmental Systems I	3		
CEE 437: Water Quality Engineering	3		
CEE 438: Science & Environmental Policy	3		
CEE 440: Fate Cleanup Environ Pollutant	4		
CEE 442: Environmental Engineering Principles, Physical	4		
CEE 443: Env Eng Principles, Chemical	4		
CEE 444: Env Eng Principles, Biological	4		
CEE 445: Air Quality Modeling	4		
CEE 446: Air Quality Engineering	4		
CEE 447: Atmospheric Chemistry	4		
CEE 449: Environmental Engineering Lab	3		
CEE 450: Surface Hydrology	3		
CEE 451: Environmental Fluid Mechanics	3		
CEE 452: Hydraulic Analysis and Design	3		
CEE 453: Urban Hydrology and Hydraulics	4		
CEE 457: Groundwater	3		
CEE 458: Water Resources Field Methods	4		
CEE 460: Steel Structures I	3		
CEE 461: Reinforced Concrete I	3		
CEE 462: Steel Structures II	3 or 4		
CEE 463: Reinforced Concrete II	3 or 4		
CEE 465: Design of Structural Systems	3		
CEE 467: Masonry Structures	3 or 4		
CEE 468: Prestressed Concrete	3 or 4		
CEE 469: Wood Structures	3 or 4		
CEE 470: Structural Analysis	4		
CEE 471: Structural Mechanics	3 or 4		
CEE 472: Structural Dynamics I	3 or 4		
CEE 480: Foundation Engineering	3		
CEE 483: Soil Mechanics and Behavior	4		
CEE 484: Applied Soil Mechanics	3 or 4		
CEE 491: Decision and Risk Analysis	3 or 4		
CEE 497: Independent Study [10]	1 to 16		
CEE 498: Special Topics [11]	1 to 4		
CS 225: Data Structures	4	CS 225: Data Structures	4
CS 233: Computer Architecture	4	CS 233: Computer Architecture	4
CS 241: System Programming	4	CS 241: System Programming	4
CS 242: Programming Studio	3	CS 242: Programming Studio	3
CS 357: Numerical Methods I	3	CS 357: Numerical Methods I	3
CS 374: Introduction to Algorithms & Models of Computation	4	CS 374: Introduction to Algorithms & Models of Computation	4
CS 410: Text Information Systems	3 or 4	CS 410: Text Information Systems	3 or 4
CS 411: Database Systems	3 or 4	CS 411: Database Systems	3 or 4
CS 412: Introduction to Data Mining	3 or 4	CS 412: Introduction to Data Mining	3 or 4
CS 413: Intro to Combinatorics	3 or 4	CS 413: Intro to Combinatorics	3 or 4
CS 414: Multimedia Systems	3 or 4	CS 414: Multimedia Systems	3 or 4
CS 418: Interactive Computer Graphics	3 or 4	CS 418: Interactive Computer Graphics	3 or 4
CS 419: Production Computer Graphics	3 or 4	CS 419: Production Computer Graphics	3 or 4
CS 420: Parallel Progrmg: Sci & Engrg	3 or 4	CS 420: Parallel Progrmg: Sci & Engrg	3 or 4
CS 421: Programming Languages & Compilers	3 or 4	CS 421: Programming Languages & Compilers	3 or 4
CS 422: Programming Language Design	3 or 4	CS 422: Programming Language Design	3 or 4
CS 423: Operating Systems Design	3 or 4	CS 423: Operating Systems Design	3 or 4
CS 424: Real-Time Systems	3 or 4	CS 424: Real-Time Systems	3 or 4
CS 425: Distributed Systems	3 or 4	CS 425: Distributed Systems	3 or 4
CS 426: Compiler Construction	3 or 4	CS 426: Compiler Construction	3 or 4
CS 427: Software Engineering I	3 or 4	CS 427: Software Engineering I	3 or 4
CS 428: Software Engineering II	3 or 4	CS 428: Software Engineering II	3 or 4
CS 429: Software Engineering II, ACP	3	CS 429: Software Engineering II, ACP	3
CS 431: Embedded Systems	3 or 4	CS 431: Embedded Systems	3 or 4
CS 433: Computer System Organization	3 or 4	CS 433: Computer System Organization	3 or 4
CS 436: Computer Networking Laboratory	3 or 4	CS 436: Computer Networking Laboratory	3 or 4
CS 438: Communication Networks	3 or 4	CS 438: Communication Networks	3 or 4
CS 439: Wireless Networks	3 or 4	CS 439: Wireless Networks	3 or 4

CS 440: Artificial Intelligence	3 or 4	CS 440: Artificial Intelligence	3 or 4
CS 445: Computational Photography	3 or 4	CS 445: Computational Photography	3 or 4
CS 446: Machine Learning	3 or 4	CS 446: Machine Learning	3 or 4
CS 447: Natural Language Processing	3 or 4	CS 447: Natural Language Processing	3 or 4
CS 450: Numerical Analysis	3 or 4	CS 450: Numerical Analysis	3 or 4
CS 457: Numerical Methods II	3	CS 457: Numerical Methods II	3
CS 460: Security Laboratory	3 or 4	CS 460: Security Laboratory	3 or 4
CS 461: Computer Security I	4	CS 461: Computer Security I	4
CS 463: Computer Security II	3 or 4	CS 463: Computer Security II	3 or 4
CS 465: User Interface Design	3 or 4	CS 465: User Interface Design	3 or 4
CS 466: Introduction to Bioinformatics	3 or 4	CS 466: Introduction to Bioinformatics	3 or 4
CS 467: Social Visualization	3 or 4	CS 467: Social Visualization	3 or 4
CS 468: Tech and Advertising Campaigns	3	CS 468: Tech and Advertising Campaigns	3
CS 473: Algorithms	4	CS 473: Algorithms	4
CS 475: Formal Models of Computation	3 or 4	CS 475: Formal Models of Computation	3 or 4
CS 476: Program Verification	3 or 4	CS 476: Program Verification	3 or 4
CS 477: Formal Software Development Methods	3 or 4	CS 477: Formal Software Development Methods	3 or 4
CS 481: Advanced Topics in Stochastic Processes & Applications	3 or 4	CS 481: Advanced Topics in Stochastic Processes & Applications	3 or 4
CS 483: Applied Parallel Programming	4	CS 483: Applied Parallel Programming	4
CS 484: Parallel Programming	3 or 4	CS 484: Parallel Programming	3 or 4
CS 498: Special Topics [11]	1 to 4	CS 498: Special Topics [13]	1 to 4
CSE 401: Numerical Analysis	3 or 4	CSE 401: Numerical Analysis	3 or 4
CSE 402: Parallel Progrmg: Sci & Engrg	3 or 4	CSE 402: Parallel Progrmg: Sci & Engrg	3 or 4
CSE 412: Numerical Thermo-Fluid Mechs	2 to 4	CSE 412: Numerical Thermo-Fluid Mechs	2 to 4
CSE 441: Introduction to Optimization	3 or 4	CSE 441: Introduction to Optimization	3 or 4
CSE 450: Computational Mechanics	3 or 4	CSE 450: Computational Mechanics	3 or 4
CSE 451: Finite Element Analysis	3 or 4	CSE 451: Finite Element Analysis	3 or 4
CSE 461: Computational Aerodynamics	3 or 4	CSE 461: Computational Aerodynamics	3 or 4
ECE 329: Fields and Waves I	3	ECE 329: Fields and Waves I	3
ECE 330: Power Ckts & Electromechanics	3	ECE 330: Power Ckts & Electromechanics	3
ECE 333: Green Electric Energy	3	ECE 333: Green Electric Energy	3
ECE 340: Semiconductor Electronics	3	ECE 340: Semiconductor Electronics	3
ECE 342: Electronic Circuits	3	ECE 342: Electronic Circuits	3
ECE 343: Electronic Circuits Laboratory	1	ECE 343: Electronic Circuits Laboratory	1
ECE 380: Biomedical Imaging	3	ECE 380: Biomedical Imaging	3
ECE 385: Digital Systems Laboratory	3	ECE 385: Digital Systems Laboratory	3
ECE 395: Advanced Digital Projects Lab	2 or 3	ECE 395: Advanced Digital Projects Lab	2 or 3
ECE 401: Signal and Image Analysis	4	ECE 401: Signal and Image Analysis	4
ECE 402: Electronic Music Synthesis	3	ECE 402: Electronic Music Synthesis	3
ECE 403: Audio Engineering	3	ECE 403: Audio Engineering	3
ECE 408: Applied Parallel Programming	4	ECE 408: Applied Parallel Programming	4
ECE 411: Computer Organization & Design	4	ECE 411: Computer Organization & Design	4
ECE 412: Microcomputer Laboratory	3	ECE 412: Microcomputer Laboratory	3
ECE 414: Biomedical Instrumentation	3	ECE 414: Biomedical Instrumentation	3
ECE 415: Biomedical Instrumentation Lab	2	ECE 415: Biomedical Instrumentation Lab	2
ECE 416: Biosensors	3	ECE 416: Biosensors	3
ECE 417: Multimedia Signal Processing	4	ECE 417: Multimedia Signal Processing	4
ECE 418: Image & Video Processing	4	ECE 418: Image & Video Processing	4
ECE 419: Security Laboratory	3 or 4	ECE 419: Security Laboratory	3 or 4
ECE 420: Embedded DSP Laboratory	2	ECE 420: Embedded DSP Laboratory	2
ECE 422: Computer Security I	4	ECE 422: Computer Security I	4
ECE 424: Computer Security II	3 or 4	ECE 424: Computer Security II	3 or 4
ECE 425: Intro to VLSI System Design	3	ECE 425: Intro to VLSI System Design	3
ECE 428: Distributed Systems	3 or 4	ECE 428: Distributed Systems	3 or 4
ECE 431: Electric Machinery	4	ECE 431: Electric Machinery	4
ECE 432: Advanced Electric Machinery	3	ECE 432: Advanced Electric Machinery	3
ECE 435: Computer Networking Laboratory	3 or 4	ECE 435: Computer Networking Laboratory	3 or 4
ECE 437: Sensors and Instrumentation	3	ECE 437: Sensors and Instrumentation	3
ECE 438: Communication Networks	3 or 4	ECE 438: Communication Networks	3 or 4
ECE 439: Wireless Networks	3 or 4	ECE 439: Wireless Networks	3 or 4
ECE 441: Physcs & Modeling Semicond Dev	3	ECE 441: Physcs & Modeling Semicond Dev	3
ECE 444: IC Device Theory & Fabrication	4	ECE 444: IC Device Theory & Fabrication	4
ECE 447: Active Microwave Ckt Design	3	ECE 447: Active Microwave Ckt Design	3
ECE 448: Artificial Intelligence	3 or 4	ECE 448: Artificial Intelligence	3 or 4
ECE 451: Adv Microwave Measurements	3	ECE 451: Adv Microwave Measurements	3
ECE 452: Electromagnetic Fields	3	ECE 452: Electromagnetic Fields	3
ECE 453: Wireless Communication Systems	4	ECE 453: Wireless Communication Systems	4
ECE 454: Antennas	3	ECE 454: Antennas	3
ECE 455: Optical Electronics	3 or 4	ECE 455: Optical Electronics	3 or 4
ECE 456: Global Nav Satellite Systems	4	ECE 456: Global Nav Satellite Systems	4
ECE 457: Microwave Devices & Circuits	3	ECE 457: Microwave Devices & Circuits	3
ECE 458: Applic of Radio Wave Propag	3	ECE 458: Applic of Radio Wave Propag	3
ECE 459: Communications Systems	3	ECE 459: Communications Systems	3
ECE 460: Optical Imaging	4	ECE 460: Optical Imaging	4
ECE 462: Logic Synthesis	3	ECE 462: Logic Synthesis	3
ECE 463: Digital Communications Lab	2	ECE 463: Digital Communications Lab	2
ECE 464: Power Electronics	3	ECE 464: Power Electronics	3
ECE 465: Optical Communications Systems	3	ECE 465: Optical Communications Systems	3
ECE 466: Optical Communications Lab	1	ECE 466: Optical Communications Lab	1
ECE 467: Biophotonics	3	ECE 467: Biophotonics	3
ECE 468: Optical Remote Sensing	3	ECE 468: Optical Remote Sensing	3
ECE 469: Power Electronics Laboratory	2	ECE 469: Power Electronics Laboratory	2
ECE 470: Introduction to Robotics	4	ECE 470: Introduction to Robotics	4
ECE 472: Biomedical Ultrasound Imaging	3	ECE 472: Biomedical Ultrasound Imaging	3
ECE 473: Fund of Engrg Acoustics	3 or 4	ECE 473: Fund of Engrg Acoustics	3 or 4
ECE 476: Power System Analysis	3	ECE 476: Power System Analysis	3
ECE 478: Formal Software Development Methods	3 or 4	ECE 478: Formal Software Development Methods	3 or 4
ECE 480: Magnetic Resonance Imaging	3 or 4	ECE 480: Magnetic Resonance Imaging	3 or 4
ECE 481: Nanotechnology	4	ECE 481: Nanotechnology	4
ECE 482: Digital IC Design	3	ECE 482: Digital IC Design	3
ECE 483: Analog IC Design	3	ECE 483: Analog IC Design	3
ECE 485: MEMS Devices & Systems	3	ECE 485: MEMS Devices & Systems	3
ECE 486: Control Systems	4	ECE 486: Control Systems	4
ECE 487: Intro Quantum Electr for EEs	3	ECE 487: Intro Quantum Electr for EEs	3
ECE 488: Compound Semicond & Devices	3	ECE 488: Compound Semicond & Devices	3
ECE 489: Robot Dynamics and Control	4	ECE 489: Robot Dynamics and Control	4
ECE 490: Introduction to Optimization	3 or 4	ECE 490: Introduction to Optimization	3 or 4
ECE 491: Numerical Analysis	3 or 4	ECE 491: Numerical Analysis	3 or 4
ECE 492: Parallel Progrmg: Sci & Engrg	3 or 4	ECE 492: Parallel Progrmg: Sci & Engrg	3 or 4
ECE 493: Advanced Engineering Math	3 or 4	ECE 493: Advanced Engineering Math	3 or 4
ECE 495: Photonic Device Laboratory	3	ECE 495: Photonic Device Laboratory	3
ECE 498: Special Topics in ECE [11]	0 to 4	ECE 498: Special Topics in ECE [13]	0 to 4
ECON 302: Inter Microeconomic Theory [12]	3	ECON 302: Inter Microeconomic Theory [11]	3
SE 402: Comp-Aided Product Realization	3 or 4		
SE 411: Reliability Engineering	3 or 4		
SE 412: Nondestructive Evaluation	3 or 4		
SE 413: Engineering Design Optimization	3 or 4		

SE 420: Digital Control Systems	4		
SE 422: Robot Dynamics and Control	4		
SE 423: Mechatronics	3		
SE 424: State Space Design for Control	3		
SE 450: Decision Analysis I [12]	3 or 4		
SE 497: Independent Study [10]	0 to 4		
SE 498: Special Topics [11]	1 to 4		
IE 310: Deterministic Models in Optimization	3	IE 310: Deterministic Models in Optimization	3
IE 311: Operations Research Lab	1	IE 311: Operations Research Lab	1
IE 330: Industrial Quality Control	3	IE 330: Industrial Quality Control	3
IE 340: Human Factors	4	IE 340: Human Factors	4
IE 360: Facilities Planning and Design	3	IE 360: Facilities Planning and Design	3
IE 410: Advanced Topics in Stochastic Processes & Applications	3 or 4	IE 410: Advanced Topics in Stochastic Processes & Applications	3 or 4
IE 411: Optimization of Large Systems	3 or 4	IE 411: Optimization of Large Systems	3 or 4
IE 412: OR Models for Mfg Systems	3 or 4	IE 412: OR Models for Mfg Systems	3 or 4
IE 413: Simulation	3 or 4	IE 413: Simulation	3 or 4
IE 420: Financial Engineering	3 or 4	IE 420: Financial Engineering	3 or 4
IE 430: Economic Found of Quality Syst	3 or 4	IE 430: Economic Found of Quality Syst	3 or 4
IE 431: Design for Six Sigma	3	IE 431: Design for Six Sigma	3
IE 445: Human Performance and Cognition in Context [12]	3 or 4	IE 445: Human Performance and Cognition in Context [11]	3 or 4
IE 497: Independent Study [10]	1 to 4	IE 497: Independent Study [12]	1 to 4
IE 498: Special Topics [11]	1 to 4	IE 498: Special Topics [13]	1 to 4
MATH 347: Fundamental Mathematics	3	MATH 347: Fundamental Mathematics	3
MATH 357: Numerical Methods I	3	MATH 357: Numerical Methods I	3
MATH 403: Euclidean Geometry	3 or 4	MATH 403: Euclidean Geometry	3 or 4
MATH 412: Graph Theory	3 or 4	MATH 412: Graph Theory	3 or 4
MATH 413: Intro to Combinatorics	3 or 4	MATH 413: Intro to Combinatorics	3 or 4
MATH 414: Mathematical Logic	3 or 4	MATH 414: Mathematical Logic	3 or 4
MATH 417: Intro to Abstract Algebra	3 or 4	MATH 417: Intro to Abstract Algebra	3 or 4
MATH 418: Intro to Abstract Algebra II	3 or 4	MATH 418: Intro to Abstract Algebra II	3 or 4
MATH 423: Differential Geometry	3 or 4	MATH 423: Differential Geometry	3 or 4
MATH 424: Honors Real Analysis	3	MATH 424: Honors Real Analysis	3
MATH 425: Honors Advanced Analysis	3	MATH 425: Honors Advanced Analysis	3
MATH 427: Honors Abstract Algebra	3	MATH 427: Honors Abstract Algebra	3
MATH 428: Honors Topics in Mathematics [11]	3	MATH 428: Honors Topics in Mathematics [13]	3
MATH 432: Set Theory and Topology	3 or 4	MATH 432: Set Theory and Topology	3 or 4
MATH 442: Intro Partial Diff Equations	3 or 4	MATH 442: Intro Partial Diff Equations	3 or 4
MATH 444: Elementary Real Analysis	3 or 4	MATH 444: Elementary Real Analysis	3 or 4
MATH 446: Applied Complex Variables	3 or 4	MATH 446: Applied Complex Variables	3 or 4
MATH 447: Real Variables	3 or 4	MATH 447: Real Variables	3 or 4
MATH 448: Complex Variables	3 or 4	MATH 448: Complex Variables	3 or 4
MATH 450: Numerical Analysis	3 or 4	MATH 450: Numerical Analysis	3 or 4
MATH 453: Elementary Theory of Numbers	3 or 4	MATH 453: Elementary Theory of Numbers	3 or 4
MATH 464: Statistics and Probability II	3 or 4	MATH 464: Statistics and Probability II	3 or 4
MATH 473: Algorithms	4	MATH 473: Algorithms	4
MATH 475: Formal Models of Computation	3 or 4	MATH 475: Formal Models of Computation	3 or 4
MATH 481: Vector and Tensor Analysis	3 or 4	MATH 481: Vector and Tensor Analysis	3 or 4
MATH 482: Linear Programming	3 or 4	MATH 482: Linear Programming	3 or 4
MATH 484: Nonlinear Programming	3 or 4	MATH 484: Nonlinear Programming	3 or 4
MATH 487: Advanced Engineering Math	3 or 4	MATH 487: Advanced Engineering Math	3 or 4
MATH 489: Dynamics & Differential Eqns	3 or 4	MATH 489: Dynamics & Differential Eqns	3 or 4
MATH 490: Advanced Topics in Mathematics [11]	1 to 4	MATH 490: Advanced Topics in Mathematics [13]	1 to 4
MATH 492: Undergraduate Research in Math [10]	1 to 3	MATH 492: Undergraduate Research in Math [12]	1 to 3
MCB 401: Cell & Membrane Physiology	3	MCB 401: Cell & Membrane Physiology	3
MCB 402: Sys & Integrative Physiology	3	MCB 402: Sys & Integrative Physiology	3
MCB 403: Cell & Membrane Physiology Lab	1 or 2	MCB 403: Cell & Membrane Physiology Lab	1 or 2
MCB 404: Sys & Integrative Physiol Lab	1 to 2	MCB 404: Sys & Integrative Physiol Lab	1 to 2
MCB 450: Introductory Biochemistry	3	MCB 450: Introductory Biochemistry	3
MCB 493: Special Topics Mol Cell Biol [11]	1 to 4	MCB 493: Special Topics Mol Cell Biol [13]	1 to 4
All 400 level ME courses, except 470 and potentially 497, 498 [10,11]		ME All 400 level ME courses, except 470 and potentially 497, 498 [12,13]	
MSE 304: Electronic Properties of Matls	3	MSE 304: Electronic Properties of Matls	3
MSE 307: Materials Laboratory I	3	MSE 307: Materials Laboratory I	3
MSE 308: Materials Laboratory II	3	MSE 308: Materials Laboratory II	3
MSE 401: Thermodynamics of Materials	3	MSE 401: Thermodynamics of Materials	3
MSE 402: Kinetic Processes in Materials	3	MSE 402: Kinetic Processes in Materials	3
MSE 403: Synthesis of Materials	3	MSE 403: Synthesis of Materials	3
MSE 405: Microstructure Determination	3	MSE 405: Microstructure Determination	3
MSE 406: Thermal-Mech Behavior of Matls	3	MSE 406: Thermal-Mech Behavior of Matls	3
MSE 420: Ceramic Materials & Properties	3	MSE 420: Ceramic Materials & Properties	3
MSE 421: Ceramic Processing	3 or 4	MSE 421: Ceramic Processing	3 or 4
MSE 422: Electrical Ceramics	3	MSE 422: Electrical Ceramics	3
MSE 440: Mechanical Behavior of Metals	3	MSE 440: Mechanical Behavior of Metals	3
MSE 441: Metals Processing	3	MSE 441: Metals Processing	3
MSE 443: Design of Engineering Alloys	3	MSE 443: Design of Engineering Alloys	3
MSE 445: Corrosion of Metals	3 or 4	MSE 445: Corrosion of Metals	3 or 4
MSE 450: Polymer Science & Engineering	3 or 4	MSE 450: Polymer Science & Engineering	3 or 4
MSE 453: Plastics Engineering	3	MSE 453: Plastics Engineering	3
MSE 454: Mechanics of Polymers	3		
MSE 455: Macromolecular Solids	3	MSE 455: Macromolecular Solids	3
MSE 456: Mechanics of Composites	3	MSE 456: Mechanics of Composites	3
MSE 457: Polymer Chemistry	3 or 4	MSE 457: Polymer Chemistry	3 or 4
MSE 458: Polymer Physics	3 or 4	MSE 458: Polymer Physics	3 or 4
MSE 460: Electronic Materials I	3	MSE 460: Electronic Materials I	3
MSE 461: Electronic Materials II	3	MSE 461: Electronic Materials II	3
MSE 466: Materials in Electrochem Syst	3	MSE 466: Materials in Electrochem Syst	3
MSE 470: Design and Use of Biomaterials	3	MSE 470: Design and Use of Biomaterials	3
MSE 473: Biomolecular Materials Science	3	MSE 473: Biomolecular Materials Science	3
MSE 474: Biomaterials and Nanomedicine	3	MSE 474: Biomaterials and Nanomedicine	3
MSE 480: Surfaces and Colloids	3 or 4	MSE 480: Surfaces and Colloids	3 or 4
MSE 481: Electron Microscopy	3 or 4	MSE 481: Electron Microscopy	3 or 4
MSE 484: Composite Materials	3 or 4	MSE 484: Composite Materials	3 or 4
MSE 485: Atomic Scale Simulations	3 or 4	MSE 485: Atomic Scale Simulations	3 or 4
MSE 487: Materials for Nanotechnology	3 or 4	MSE 487: Materials for Nanotechnology	3 or 4
MSE 488: Optical Materials	3 or 4	MSE 488: Optical Materials	3 or 4
MSE 489: Matl Select for Sustainability	3 or 4	MSE 489: Matl Select for Sustainability	3 or 4
MSE 497: Independent Study [10]	1 to 4	MSE 497: Independent Study [12]	1 to 4
MSE 498: Special Topics [11]	1 to 4	MSE 498: Special Topics [13]	1 to 4
NPRE 402: Nuclear Power Engineering	3 or 4	NPRE 402: Nuclear Power Engineering	3 or 4
NPRE 412: Nuclear Power Econ & Fuel Mgmt	3 or 4	NPRE 412: Nuclear Power Econ & Fuel Mgmt	3 or 4
NPRE 421: Plasma and Fusion Science	3	NPRE 421: Plasma and Fusion Science	3
NPRE 423: Plasma Laboratory	2	NPRE 423: Plasma Laboratory	2
NPRE 429: Plasma Engineering	3	NPRE 429: Plasma Engineering	3
NPRE 431: Materials in Nuclear Engrg	3	NPRE 431: Materials in Nuclear Engrg	3
NPRE 435: Radiological Imaging	3	NPRE 435: Radiological Imaging	3
NPRE 441: Radiation Protection	4	NPRE 441: Radiation Protection	4
NPRE 442: Radioactive Waste Management	3	NPRE 442: Radioactive Waste Management	3

NPRE 444: Nuclear Analytical Methods Lab	2 or 3		NPRE 444: Nuclear Analytical Methods Lab	2 or 3
NPRE 446: Radiation Interact w/Matter I	3		NPRE 446: Radiation Interact w/Matter I	3
NPRE 447: Radiation Interact w/Matter II	3		NPRE 447: Radiation Interact w/Matter II	3
NPRE 448: Nuclear Syst Engrg & Design	4		NPRE 448: Nuclear Syst Engrg & Design	4
NPRE 451: NPRE Laboratory	3		NPRE 451: NPRE Laboratory	3
NPRE 455: Neutron Diffusion & Transport	4		NPRE 455: Neutron Diffusion & Transport	4
NPRE 457: Safety Anlys Nucl Reactor Syst	3 or 4		NPRE 457: Safety Anlys Nucl Reactor Syst	3 or 4
NPRE 461: Probabilistic Risk Assessment	3 or 4		NPRE 461: Probabilistic Risk Assessment	3 or 4
NPRE 470: Fuel Cells & Hydrogen Sources	3		NPRE 470: Fuel Cells & Hydrogen Sources	3
NPRE 475: Wind Power Systems	3 or 4		NPRE 475: Wind Power Systems	3 or 4
NPRE 498: Special Topics [11]	1 to 4		NPRE 498: Special Topics [13]	1 to 4
PHYS 330: Atmospheric Dynamics II	3		PHYS 330: Atmospheric Dynamics II	3
PHYS 401: Classical Physics Lab	3		PHYS 401: Classical Physics Lab	3
PHYS 402: Light	3 or 4		PHYS 402: Light	3 or 4
PHYS 403: Modern Experimental Physics	4 or 5		PHYS 403: Modern Experimental Physics	4 or 5
PHYS 404: Electronic Circuits	4 or 5		PHYS 404: Electronic Circuits	4 or 5
PHYS 406: Acoustical Physics of Music	4		PHYS 406: Acoustical Physics of Music	4
PHYS 427: Thermal & Statistical Physics	4		PHYS 427: Thermal & Statistical Physics	4
PHYS 435: Electromagnetic Fields I	3		PHYS 435: Electromagnetic Fields I	3
PHYS 436: Electromagnetic Fields II	3		PHYS 436: Electromagnetic Fields II	3
PHYS 460: Condensed Matter Physics	4		PHYS 460: Condensed Matter Physics	4
PHYS 466: Atomic Scale Simulations	3 or 4		PHYS 466: Atomic Scale Simulations	3 or 4
PHYS 470: Subatomic Physics	4		PHYS 470: Subatomic Physics	4
PHYS 475: Introduction to Biophysics	3 or 4		PHYS 475: Introduction to Biophysics	3 or 4
PHYS 485: Atomic Phys & Quantum Theory	3		PHYS 485: Atomic Phys & Quantum Theory	3
PHYS 486: Quantum Physics I	4		PHYS 486: Quantum Physics I	4
PHYS 487: Quantum Physics II	4		PHYS 487: Quantum Physics II	4
PHYS 496: Intro to Physics Research [12]	3		PHYS 496: Intro to Physics Research [13]	3
PHYS 497: Individual Study [10]	1 to 4		PHYS 497: Individual Study [12]	1 to 4
PHYS 498: Special Topics in Physics [11]	1 to 4		PHYS 498: Special Topics in Physics [13]	1 to 4
			SE 400: Engineering Law[11]	3 or 4
			SE 402: Comp-Aided Product Realization	3 or 4
			SE 411: Reliability Engineering	3 or 4
			SE 412: Nondestructive Evaluation	3 or 4
			SE 413: Engineering Design Optimization	3 or 4
			SE 420: Digital Control Systems	4
			SE 422: Robot Dynamics and Control	4
			SE 423: Mechatronics	3
			SE 424: State Space Design for Control	3
			SE 450: Decision Analysis I [11]	3 or 4
			SE 497: Independent Study [12]	0 to 4
			SE 498: Special Topics [13]	1 to 4
STAT 409: Actuarial Statistics II	4		STAT 409: Actuarial Statistics II	4
STAT 410: Statistics and Probability II	3 or 4		STAT 410: Statistics and Probability II	3 or 4
STAT 420: Methods of Applied Statistics	3 or 4		STAT 420: Methods of Applied Statistics	3 or 4
STAT 424: Analysis of Variance	3 or 4		STAT 424: Analysis of Variance	3 or 4
STAT 425: Applied Regression and Design	3 or 4		STAT 425: Applied Regression and Design	3 or 4
STAT 426: Sampling and Categorical Data	3 or 4		STAT 426: Sampling and Categorical Data	3 or 4
STAT 428: Statistical Computing	3 or 4		STAT 428: Statistical Computing	3 or 4
STAT 429: Time Series Analysis	3 or 4		STAT 429: Time Series Analysis	3 or 4
STAT 430: Topics in Applied Statistics [11]	3 or 4		STAT 430: Topics in Applied Statistics [13]	3 or 4
STAT 440: Statistical Data Management	3 or 4		STAT 440: Statistical Data Management	3 or 4
STAT 443: Professional Statistics [12]	3 or 4		STAT 443: Professional Statistics [11]	3 or 4
STAT 448: Advanced Data Analysis	4		STAT 448: Advanced Data Analysis	4
STAT 458: Math Modeling in Life Sciences	3 or 4		STAT 458: Math Modeling in Life Sciences	3 or 4
STAT 480: Data Science Foundations	3 or 4		STAT 480: Data Science Foundations	3 or 4
All 400 level TAM courses, except 499 and potentially 497,498 [10,11]			TAM All 400 level TAM courses, except potentially 497,498 [12,13]	
TE 461: Technology Entrepreneurship [12]	3		TE 461: Technology Entrepreneurship [11]	3
TMGT 460: Business Process Modeling	3		TMGT 460: Business Process Modeling	3
TMGT 461: Tech, Eng, & Mgt Final Project	2		TMGT 461: Tech, Eng, & Mgt Final Project	2
Electives			**Electives**	
The Grainger College of Engineering Liberal Education course list, or additional courses from the campus General Education lists for Social and Behavioral Sciences or Humanities and the Arts [13]	6		The Grainger College of Engineering Liberal Education course list, or additional courses from the campus General Education lists for Social and Behavioral Sciences or Humanities and the Arts [14]	6
Free electives. Additional unrestricted course work, subject to certain exceptions as noted by the College, so that there are at least 128 credit hours earned toward the degree. [14]	6		Free electives. Additional unrestricted course work, subject to certain exceptions as noted by the College, so that there are at least 128 credit hours earned toward the degree. [15]	6
Total Hours of Curriculum to Graduate	**128**		**Total Hours of Curriculum to Graduate**	**128**
Footnotes			**Footnotes**	
[1] *External transfer students take ENG 300 instead*			[1] *External transfer students take ENG 300 instead*	
[2] *CHEM 103 requirement waived for students who received test-based credit (AP, IB, or proficiency) for CHEM 102, similarly CHEM 105 requirement waived for students who received test-based credit for CHEM 104. Students are still required to have 128 hours minimum to graduate.*			[2] *CHEM 103 requirement waived for students who received test-based credit (AP, IB, or proficiency) for CHEM 102, similarly CHEM 105 requirement waived for students who received test-based credit for CHEM 104. Students are still reauired to have 128 hours minimum to graduate.*	
[3] *MATH 220 may be substituted, with four of the five credit hours applying toward the degree. MATH 220 is appropriate for students with no backeround in calculus.*			[3] *MATH 220 may be substituted, with four of the five credit hours applying toward the degree. MATH 220 is appropriate for students with no backeround in calculus.*	
[4] *MATH 284 may be substituted.*			[4] *MATH 415 may be substituted for students entering prior to fall 2022.*	
[5] *CS 125 or ECE 220 may be substituted.*			[5] *MATH 284 may be substituted.*	
[6] *ECE 110 and ECE 210 (or ECE 211) combined may be substituted.*			[6] *CS 124 or CS 125 or ECE 220 may be substituted.*	
[7] *Advanced Composition satisfied by completing ME 470.*			[7] *ECE 110 and ECE 210 (or ECE 211) combined may be substituted.*	
[8] *Transfers and Physics minor/dual degree students may substitute PHYS 325.*			[8] *Advanced Composition satisfied by completing ME 470.*	
[9] *Transfers and ECE minor/dual degree students may substitute ECE 313.*			[9] *Transfers and Physics minor/dual degree students may substitute PHYS 325.*	
[10] *A maximum of 3 hours of independent/individual study courses may be used to satisfy the MechSE Elective or Technical Elective reauirements.*			[10] *Transfers and ECE minor/dual degree students may substitute ECE 313.*	
[11] *Depending on the technical content, some Special Topics courses may not be approved for Technical Elective credit. Please provide a syllabus of the course to the Mechanical Science and Engineering Undergraduate Programs Office to request use of the course for Technical Elective credit prior to registering for the course.*			[11] *Professional Elective course. No more than 3 hours of professional elective credit may be used to satisfy the Technical Electives reauirements.*	
[12] *Professional Elective course. No more than 3 hours of professional elective credit may be used to satisfy the Technical Electives requirements.*			[12] *A maximum of 3 hours of independent/individual study courses may be used to satisfy the MechSE Elective or Technical Elective requirements.*	
[13] *The Grainger College of Engineering approved liberal education course list can be found here. Note that these credit hours could carry the required cultural studies designation required for campus general education requirements.*			[13] *Depending on the technical content, some Special Topics courses may not be approved for Technical Elective credit. Please provide a syllabus of the course to the Mechanical Science and Engineering Undergraduate Programs Office to request use of the course for Technical Elective credit prior to registering for the course.*	
[14] *The Grainger College of Engineering restrictions to free electives can be found here.*			[14] *The Grainger College of Engineering approved liberal education course list can be found here. Note that these credit hours could carry the required cultural studies designation required for campus general education reauirements.*	
			[15] *The Grainger College of Engineering restrictions to free electives can be found here.*	

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Department of Mathematics

273 Altgeld Hall, MC-382
1409 West Green Street
Urbana, IL 61801

Re: Use of Math 257 in MechSE

The Mathematics Department, working with the Grainger College of Engineering, has recently created the course MATH 257, *Linear Algebra with Computational Applications*. Quoting from the justification of the approved proposal, "In the future, MATH 257 will replace the MATH 415 requirement in many science and engineering curricula." With this in mind, the department would be pleased to have MechSE add MATH 257 as an option to MATH 415 in their programs. As the Mathematics department is reallocating instructional resources from Math 415 to Math 257 as the need shifts, this will not cause any undue difficulties for Mathematics resources.

Sincerely

Randy McCarthy

Randy McCarthy
Professor of Mathematics
Dir of Undergraduate Studies in Math
rmccrthy@illinois.edu

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email office@math.uiuc.edu • *url* http://www.math.uiuc.edu/

From: Gunter, Elsa <egunter@illinois.edu>
Sent: Wednesday, March 24, 2021 1:41 PM
To: Ott-Monsivais, Stephanie <ottmonsi@illinois.edu>
Subject: CS support for MechSE to use CS 124 as a substitute for CS 101

Dear Stephanie Ott-Monsivais,

CS is fully supportive of the Department of Mechanical Science and Engineering using CS 124 as an option in addition to CS 101 for the programming requirement in both their 10KP0133BS: Mechanical Engineering, BS and 10KP0118BS: Engineering Mechanics, BS undergraduate degree programs.

---Elsa

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Elsa L Gunter
Research Professor
Director of Undergraduate Programs
Department of Computer Science
University of Illinois at Urbana - Champaign

On 3/24/21 11:17 AM, Ott-Monsivais, Stephanie wrote:
Hi Elsa,

I require a letter of support from CS to attach to our curricula updates allowing CS 124 to be substituted for CS 101, similar to our previous CS 125 allowance. This is generally taken by ME and EM students minoring in CS.

Best,
Stephanie

Stephanie Ott-Monsivais

Academic Advisor
Department of Mechanical Science and Engineering (MechSE)
University of Illinois at Urbana-Champaign
E-mail: ottmonsi@illinois.edu
Phone: 217-300-3102
Temporary Office Location: 152A Computing Applications Building; 605 E. Springfield Ave.; Champaign, IL 61820
Office Hours: 8:30 am – noon & 1pm – 4:30 pm M – F, except 11 – noon T

From: Stillwell, Rebecca Leigh <rborden@illinois.edu>
Sent: Friday, March 19, 2021 5:02 PM
To: Ott-Monsivais, Stephanie <ottmonsi@illinois.edu>
Cc: Popovics, John S <johnpop@illinois.edu>; Coughlin, Greg <gcoughli@illinois.edu>
Subject: RE: TAM 427 course deactivation

Hi Stephanie,

Thank you for letting us know. I will make sure to take this course out of our curriculum where listed as an course option. Thanks!

Becky Stillwell
Senior Academic Advisor
Civil and Environmental Engineering
1102 Newmark Lab
205 N. Mathews Ave.
Urbana, IL 61801
217-333-3812
rborden@illinois.edu

From: Ott-Monsivais, Stephanie <ottmonsi@illinois.edu>
Sent: Friday, March 19, 2021 11:14 AM
To: Stillwell, Rebecca Leigh <rborden@illinois.edu>
Subject: TAM 427 course deactivation
Importance: High

Hi Becky,

MechSE is planning to deactivate TAM 427/MSE 454/AE 427 since it has not been offered since SP12 and we don't have instructors for this course in the near future. I just wanted to make sure this was ok with CEE and that you modified your curriculum accordingly to accommodate these changes. Please respond with CEE's departmental support of this change by Monday so I can provide it as a letter of support for our curriculum changes to Brooke by Monday.

If you have any questions feel free to email me back.

Thank you!
Stephanie

Stephanie Ott-Monsivais
Academic Advisor

Department of Mechanical Science and Engineering (MechSE)
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From: Gerhold, Laura Ann
Sent: Sunday, February 21, 2021 1:57 PM
To: Ott-Monsivais, Stephanie
Subject: Re: TAM 427

That will not be a problem for AE students. Thanks for the heads up.

Laura Gerhold

On Feb 21, 2021, at 1:53 PM, Ott-Monsivais, Stephanie <ottmonsi@illinois.edu> wrote:

Hi Laura,

I am writing you to let you know that MechSE has decided to formally deactivate TAM 427: Mechanics of Polymers, instead we will recommend students who are interested in taking a similar course take MSE 455: Macromolecular Solids.

AE won't have a problem with this right? I just wanted to check as the TAM 427 is cross-listed with AE 427, but hasn't been offered since SP12 and won't be offered for the foreseeable future as we have no instructors interested in teaching this course.

Best,
Stephanie

From: Nagel, Laura <ljnagel@illinois.edu>
Sent: Monday, February 22, 2021 1:49 PM
To: Ott-Monsivais, Stephanie <ottmonsi@illinois.edu>
Subject: RE: TAM 427

Hi Stephanie,

Thanks for checking in with us. MatSE doesn't have any problem with deactivating TAM 427, and agree that MSE 455 is a good alternative.

Best,
Laura

From: Ott-Monsivais, Stephanie <ottmonsi@illinois.edu>
Sent: Sunday, February 21, 2021 1:54 PM
To: Nagel, Laura <ljnagel@illinois.edu>
Subject: TAM 427
Importance: High

Hi Laura,

I am writing you to let you know that MechSE has decided to formally deactivate TAM 427: Mechanics of Polymers, instead we will recommend students who are interested in taking a similar course take MSE 455: Macromolecular Solids.

MSE doesn't have a problem with this right? I just wanted to check as the TAM 427 is cross-listed with MSE 454, but hasn't been offered since SP12 and won't be offered for the foreseeable future as we have no instructors interested in teaching this course.

Best,
Stephanie

10KL5864BS: COMPUTER SCIENCE & ANIMAL SCIENCES, BS

Completed Workflow

1. U Program Review (dforgacs@illinois.edu; eastuby@illinois.edu; aledward@illinois.edu)

Approval Path

1. Mon, 16 Sep 2019 13:43:39 GMT
   Deb Forgacs (dforgacs): Approved for U Program Review

History

1. Sep 16, 2019 by Brianna Gregg (bjgray2)

Date Submitted:Sun, 28 Mar 2021 14:50:56 GMT

Viewing:10KL5864BS : Computer Science & Animal Sciences, BS

Changes proposed by: Brianna Gregg

Proposal Type

Proposal Type:

Major (ex. Special Education)

This proposal is for a:

Revision

Proposal Title:

If this proposal is one piece of a multi-element change please include the other impacted programs here.*example: A BS revision with multiple concentration revisions*

Administrative approval: Revisions to change CS 125 and 126 to CS 124, 128, and 222, to add Math 257 as an option for linear algebra, in addition to Math 225, and to remove ANSC 510 (no longer offered).

EP Control Number

EP.21.115

Official Program Name

Computer Science & Animal Sciences, BS

Effective Catalog Term

Fall 2021

Sponsor College

Agr, Consumer, & Env Sciences

Sponsor Department

Animal Sciences

Sponsor Name

Anna Dilger

Sponsor Email

adilger2@illinois.edu

College Contact

Brianna Greer

College Contact Email

bjgray2@illinois.edu

Program Description and Justification

Justification for proposal change:

Revisions to change CS 125 and 126 to CS 124, 128, and 222, to add Math 257 as an option for linear algebra, in addition to Math 225, and to remove ANSC 510 (no longer offered)

This proposal presents changes to each of the ANSC and the CS components the CS & Animal Sciences degree program.

In the ANSC component, ANSC 510 is being removed the Basic Animal Sciences Courses (choose 3) section because the course has been retired, and as such is no longer offered.

In the CS component, the proposal involves changes to two aspects. The first is a reorganization of the material in the introductory course sequence. The second is to incorporate an option of a new linear algebra course, MATH 257, into the linear algebra requirement for the program. These changes are broadly shared, with some degree-specific modifications the suite of undergraduate programs including Computer Science:
10KP0112BS: Computer Science, BS
10KL5623BS: Computer Science + Crop Sciences, BS
10KL5864BS: Computer Science & Animal Sciences, BS
10KR5639BS: Computer Science + Music, BS
10KT5673BS: Computer Science & Advertising, BS
10KV0464BSLA: Statistics & Computer Science, BSLAS
10KV1438BSLA: Mathematics & Computer Science, BSLAS
10KV5348BSLA: Computer Science & Anthropology, BSLAS
10KV5349BSLA: Computer Science & Astronomy, BSLAS
10KV5350BSLA: Computer Science & Chemistry, BSLAS
10KV5351BSLA: Computer Science & Linguistics, BSLAS
10KV5667BSLA: Computer Science & Economics, BSLAS
10KV5676BSLA: Computer Science & Geography & Geographic Information Science, BSLAS
10KV5679BSLA: Computer Science & Philosophy, BSLAS
JP. 10KL5890BS & 1PKS5890MANS: JP. Computer Science & Animal Sciences, BS & Animal Science, MANSC
JP. 10KL5890BS & 1PKS5890MANS(MANU): JP. Computer Science & Animal Sciences, BS & Animal Science, MANSC
JP.10KL5903BS & 10KS5903MS: JP. Computer Science + Crop Sciences, BS & Crop Sciences, MS

In more detail,
1) (CS 125(4cr) Introduction to Computer Science + CS 126(3cr) Software Design Studio) -> (CS 124(3cr) Introduction to Computer Science I + CS 128(3cr) Introduction to Computer Science II + CS 222(1cr) Software Design Lab), CS 242(3cr) Programming Studio -> CS 222(1cr) Software Design Lab, the CS 225 Data Structures prerequisite of CS 125 is replaced with (CS 126 or CS 128) as the programming prerequisite, CS 128 is open to all, CS 222 is restricted to &CS+ programs. The programming prerequisite for CS 173 is changed from CS 125 to (CS 124 or CS 125).

Justification: CS 128 takes about 2/3 of the material from the old CS 126 and receives an hour from the old CS 125 topics, with the remaining topics remaining with CS 124. Replacing CS 126 with CS 128 makes the path to CS 225 uniform for all students (except ECE), including &CS+ majors, students wanting to transfer into one of the &CS+ programs, students doing minors and students needing CS 225 to complete a concentration. It also allows CS 225 to start with an assumption that all students know how to program in C++, and assures all students in the class have a common programming background. Further, the new CS 128 will provide an extended ability for general students to increase their skills in programming and structured program design and development, but without the more specialized material in Data Structures. Adding CS 222 and removing CS 242 eliminates the attempt to discriminate between how students entering as freshmen versus as transfers take the code review class.

2) Change the linear algebra requirement from MATH 225 to (Math 225 or Math 257).

Justification: The Math department is developing MATH 257 as the eventual replacement for MATH 415, with the same theoretical content, but with an emphasis on using programming to perform matrix operations instead of calculating them on paper. Students in CS+ANCS should have the option of a stronger linear algebra class with stronger ties to programming.

3) Update the description of the selection of two 400-level CS courses
from
& Two CS 400
Any two (2) 400-level CS courses except CS 491
to
& Two 400-level CS courses
Any two (2) 400-level CS courses above CS 403 except CS 421 and CS 491

Justification: The newly introduced courses CS 400, CS 401, CS 402 and CS 403 are only for non-degree students with a non-CS undergraduate degree. They are at a faster pace and contain forays into research, but are highly duplicative of required material in the CS core, and hence are not appropriate for students in the is program. CS 421 is already a required course in this programming, and excluding it here just says "no double dipping with CS 421".

Corresponding Degree

BS Bachelor of Science

Is this program interdisciplinary?

Yes

Interdisciplinary Colleges and Departments (list other colleges/departments which are involved other than the sponsor chose above)

College

Grainger College of Engineering

Department

Computer Science

Do you need to add an additional interdisciplinary relationship?

No

Academic Level

Undergraduate

Will you admit to the concentration directly?

No

Is a concentration required for graduation?

No

CIP Code

110199 - Computer and Information Sciences, Other.

Is This a Teacher Certification Program?

No

Will specialized accreditation be sought for this program?

No

Admission Requirements

Desired Effective Admissions Term

Summer 2020

Is this revision a change to the admission status of the program?

No

Enrollment

Describe how this revision will impact enrollment and degrees awarded.

This revision will not impact enrollment or degrees.

Estimated Annual Number of Degrees Awarded

Year One Estimate

see attached.

5th Year Estimate (or when fully implemented)

see attached.

What is the matriculation term for this program?

Fall

What is the typical time to completion of this program?

4 years

What are the minimum Total Credit Hours required for this program?

126 hours

Delivery Method

Is this program available on campus and online?

No

This program is available:

On Campus

Budget

Are there budgetary implications for this revision?

No

Will the program or revision require staffing (faculty, advisors, etc.) beyond what is currently available?

No

Resource Implications

Facilities

Will the program require new or additional facilities or significant improvements to already existing facilities?

No

Technology

Will the program need additional technology beyond what is currently available for the unit?

No

Non-Technical Resources

Will the program require additional supplies, services or equipment (non-technical)?

No

Resources

For each of these items, be sure to include in the response if the proposed new program or change will result in replacement of another program(s). If so, which program(s), what is the anticipated impact on faculty, students, and instructional resources? Please attach any letters of support/ acknowledgement from faculty, students, and/or other impacted units as appropriate.

Attach File(s)

CS_letter_Math_257.pdf

Faculty Resources

Please address the impact on faculty resources including any changes in numbers of faculty, class size, teaching loads, student-faculty ratios, etc. Describe how the unit will support student advising, including job placement and/or admission to advanced studies.

No impact.

Library Resources

Describe your proposal's impact on the University Library's resources, collections, and services. If necessary please consult with the appropriate disciplinary specialist within the University Library.

No impact.

Instructional Resources

Will there be any reduction in other course offerings, programs or concentrations by your department as a result of this new program/proposed change?

No

Does the program include other courses/subjects impacted by the creation/revision of this program?

Yes

Required courses

RHET 105 - Writing and Research
CMN 101 - Public Speaking
CMN 111 - Oral & Written Comm I
CMN 112 - Oral & Written Comm II
CHEM 102 - General Chemistry I
CHEM 103 - General Chemistry Lab I
CHEM 104 - General Chemistry II
CHEM 105 - General Chemistry Lab II
ECON 102 - Microeconomic Principles

ACE 100 - Intro to Applied Micro
MATH 220 - Calculus
MATH 221 - Calculus I
MATH 225 - Introductory Matrix Theory
MATH 231 - Calculus II
MATH 257 - Linear Algebra w Computat Appl

Explain how the inclusion or removal of the courses/subjects listed above impacts the offering departments.

Some students in CS+ANCS may shift their registration from Math 225 to Math 257. Including Math 257 as an option for linear algebra may require the Math department to reallocate teaching resources if the shift is big enough.

ANSC 510 is no longer offered.

Financial Resources

How does the unit intend to financially support this proposal?

No change

Will the unit need to seek campus or other external resources?

No

Are you seeking a change in the tuition rate or differential for this program?

Yes

Program Regulation and Assessment

Briefly describe the plan to assess and improve student learning, including the program's learning objectives; when, how, and where these learning objectives will be assessed; what metrics will be used to signify student's achievement of the stated learning objectives; and the process to ensure assessment results are used to improve student learning. (Describe how the program is aligned with or meets licensure, certification, and/or entitlement requirements, if applicable).

No change

Is the career/profession for graduates of this program regulated by the State of Illinois?

No

Program of Study

"Baccalaureate degree requires at least 120 semester credit hours or 180 quarter credit hours and at least 40 semester credit hours (60 quarter credit hours) in upper division courses" (source: https://www.ibhe.org/assets/files/PrivateAdminRules2017.pdf). For proposals for new bachelor's degrees, if this minimum is not explicitly met by specifically-required 300- and/or 400-level courses, please provide information on how the upper-division hours requirement will be satisfied.

All proposals must attach the new or revised version of the Academic Catalog program of study entry. Contact your college office if you have questions.

Revised programs

BS in Computer Science + Animal Sciences Curriculum side-by-side 2021-03-31.xlsx

Attach a side-by-side comparison with the existing program AND, if the revision references or adds "chose-from" lists of courses students can select from to fulfill requirements, a listing of these courses, including the course rubric, number, title, and number of credit hours.

Catalog Page Text

Statement for Programs of Study Catalog

Code	Title	Hours
Composition and Speech (choose 1 from):		**6-7**
RHET 105 & CMN 101	Writing and Research and Public Speaking	
CMN 111 & CMN 112	Oral & Written Comm I and Oral & Written Comm II	
Advanced Composition (students select from Gen Ed List)		**3-4**
Cultural Studies		
Western Culture (students select from Gen Ed List)		
Non-Western Culture (students select from Gen Ed List)		
US Minority Culture (students select from Gen Ed List)		
Language other than English (at or above 3rd level)		
Natural Sciences and Technology		**8**
CHEM 102 & CHEM 103	General Chemistry I and General Chemistry Lab I	
CHEM 104 & CHEM 105	General Chemistry II and General Chemistry Lab II	
Humanities and the Arts (students select from Gen Ed List)		**6**
Social and Behavioral Sciences		**6-7**
ECON 102	Microeconomic Principles	
or ACE 100	Introduction to Applied Microeconomics	
Students choice from Gen Ed List		
Mathematical Foundations (fulfills Quantitative Reasoning I & II)		
CS 361	Probability & Statistics for Computer Science	
MATH 220	Calculus	
or MATH 221	Calculus I	
MATH 225	Introductory Matrix Theory	
or MATH 257	Linear Algebra with Computational Applications	
MATH 231	Calculus II	
Computer Sciences Core		
CS 100	Freshman Orientation	
CS 125	Introduction to Computer Science	
CS 126	Software Design Studio	
CS 124	Introduction to Computer Science I	
CS 128	Introduction to Computer Science II	
CS 173	Discrete Structures	
CS 225	Data Structures	

CS 222	Software Design Lab	
CS 374	Introduction to Algorithms & Models of Computation	
CS 357	Numerical Methods I	
or CS 421	Programming Languages & Compilers	
Computer Science Technical Track (two options)		
CS 233 & CS 241	Computer Architecture and System Programming	
OR		
CS 240	Introduction to Computer Systems	
& Two 400-level CS courses	Any two (2) 400-level CS courses aboveCS 403exceptCS 421andCS 491	
Animal Sciences Core		
ANSC 100	Intro to Animal Sciences	
ANSC 221	Cells, Metabolism and Genetics	
ANSC 222	Anatomy and Physiology	
ANSC 223	Animal Nutrition	
ANSC 224	Animal Reproduction and Growth	
ANSC 398	UG Experiential Learning	
ANSC 498	Integrating Animal Sciences	
Applied Animal Sciences Courses (choose 3)		**9**
ANSC 201	Principles of Dairy Production	
ANSC 204	Intro Dairy Cattle Evaluation	
ANSC 205	World Animal Resources	
ANSC 206	Horse Management	
ANSC 211	Breeding Animal Evaluation	
ANSC 219	Meat Technology	
ANSC 250	Companion Animals in Society	
ANSC 301	Food Animal Production, Management, and Evaluation	
ANSC 305	Human Animal Interactions	
ANSC 307	Companion Animal Management	
ANSC 309	Meat Production and Marketing	
ANSC 310	Meat Selection and Grading	
ANSC 312	Advanced Livestock Evaluation	
ANSC 313	Horse Appraisal	
ANSC 314	Adv Dairy Cattle Evaluation	
ANSC 322	Livestock Feeds and Feeding	
ANSC 370	Companion Animal Policy	
ANSC 400	Dairy Herd Management	
ANSC 401	Beef Production	
ANSC 402	Sheep and Goat Production	
ANSC 403	Pork Production	
ANSC 404	Poultry Science	
ANSC 405	Advanced Dairy Management	
ANSC 407	Animal Shelter Management	
ANSC 424	Pet Food & Feed Manufacturing	
ANSC 435	Milk Quality and Udder Health	
ANSC 437	Adv Reproductive Management	
ANSC 471	ANSC Leaders & Entrepreneurs	
Basic Animal Sciences Courses (choose 3)		**9**
ANSC 251	Epidemics and Infectious Diseases	
ANSC 306	Equine Science	
ANSC 331	Biology of Reproduction	
ANSC 350	Cellular Metabolism in Animals	

ANSC 363	Behavior of Domestic Animals
ANSC 366	Animal Behavior
ANSC 406	Zoo Animal Conservation Sci
ANSC 409	Meat Science
ANSC 420	Ruminant Nutrition
ANSC 421	Minerals and Vitamins
ANSC 422	Companion Animal Nutrition
ANSC 431	Advanced Reproductive Biology
ANSC 438	Lactation Biology
ANSC 440	Applied Statistical Methods I
ANSC 441	Human Genetics
ANSC 444	Applied Animal Genetics
ANSC 445	Statistical Methods
ANSC 446	Population Genetics
ANSC 447	Advanced Genetics and Genomics
ANSC 448	Math Modeling in Life Sciences
ANSC 449	Biological Modeling
ANSC 450	Comparative Immunobiology
ANSC 451	Microbes and the Anim Indust
ANSC 452	Animal Growth and Development
ANSC 453	Stem Cell Biology
ANSC 467	Applied Animal Ecology
ANSC 509	Muscle Biology
ANSC 510	Course ANSC 510 Not Found
ANSC 520	Protein and Energy Nutrition
ANSC 521	Regulation of Metabolism
ANSC 522	Advanced Ruminant Nutrition
ANSC 523	Techniques in Animal Nutrition
ANSC 524	Nonruminant Nutrition Concepts
ANSC 525	Topics in Nutrition Research
ANSC 526	Adv Companion Animal Nutrition
ANSC 533	Repro Physiology Lab Methods
ANSC 541	Regression Analysis
ANSC 542	Applied Bioinformatics
ANSC 543	Bioinformatics
ANSC 545	Statistical Genomics
ANSC 554	Immunobiological Methods
ANSC 561	Animal Stress Physiology

EP Documentation

DMI Documentation

Banner/Codebook Name

BS:Comp Sci & Animal Sci -UIUC

Program Code:

10KL5864BS

Degree Code

BS

Major Code

5864

Program Reviewer Comments

Kathy Martensen (kmartens) (Wed, 07 Apr 2021 19:21:32 GMT): Rollback: admin approval
Kathy Martensen (kmartens) (Wed, 07 Apr 2021 19:23:04 GMT): Administrative approval: Does not change total hours required/restrict options.

Key: 880

Computer Science + Crop Sciences Curriculum Revision: Side-by-side Comparison

Key

GREEN HIGHLIGHT = Course addition, requirement replacement or updated hours

RED HIGHLIGHT = Course to be removed from listed requirements.

Current Requirement		Current Hours
Composition and Speech (choose 1 from):		**6 to 7**
RHET 105	Writing and Research	
& CMN 101	and Public Speaking	
CMN 111	Oral & Written Comm I	
& CMN 112	and Oral & Written Comm II	
Advanced Composition (students select from Gen Ed List)		**3 to 4**
Cultural Studies		
Western Culture (students select from Gen Ed List)		
Non-Western Culture (students select from Gen Ed List)		
US Minority Culture (students select from Gen Ed List)		
Language other than English (at or above 3rd level)		
Natural Sciences and Technology		**8**
CHEM 102	General Chemistry I	
& CHEM 103	and General Chemistry Lab I	
CHEM 104	General Chemistry II	
& CHEM 105	and General Chemistry Lab II	
Humanities and the Arts (students select from Gen Ed List)		**6**
Social and Behavioral Sciences		**6 to 7**
ECON 102	Microeconomic Principles	
or ACE 100	Introduction to Applied Microeconomics	
Students choice from Gen Ed List		
Mathematical Foundations (fulfills Quantitative Reasoning I & II)		
CS 361	Probability & Statistics for Computer Science	
MATH 220	Calculus	
or MATH 221	Calculus I	
MATH 225	Introductory Matrix Theory	
MATH 231	Calculus II	
Computer Sciences Core		
CS 100	Freshman Orientation	
CS 125	Introduction to Computer Science	
CS 126	Software Design Studio	
CS 173	Discrete Structures	
CS 225	Data Structures	
CS 374	Introduction to Algorithms & Models of Computation	
CS 357	Numerical Methods I	
or CS 421	Programming Languages & Compilers	
Computer Science Technical Track (two options)		
CS 233	Computer Architecture	
& CS 241	and System Programming	
OR		
CS 240	Introduction to Computer Systems	
& Two CS 400	Any two (2) 400-level CS courses except CS 491	
Animal Sciences Core		
ANSC 100	Intro to Animal Sciences	
ANSC 221	Cells, Metabolism and Genetics	
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Applied Animal Sciences Courses (choose 3)		**9**
ANSC 201	Principles of Dairy Production	
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ANSC 206	Horse Management	
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ANSC 314	Adv Dairy Cattle Evaluation	
ANSC 322	Livestock Feeds and Feeding	
ANSC 370	Companion Animal Policy	
ANSC 400	Dairy Herd Management	
ANSC 401	Beef Production	
ANSC 402	Sheep and Goat Production	
ANSC 403	Pork Production	
ANSC 404	Poultry Science	
ANSC 405	Advanced Dairy Management	
ANSC 407	Animal Shelter Management	
ANSC 424	Pet Food & Feed Manufacturing	
ANSC 435	Milk Quality and Udder Health	
ANSC 437	Adv Reproductive Management	
ANSC 471	ANSC Leaders & Entrepreneurs	
Basic Animal Sciences Courses (choose 3)		**9**
ANSC 251	Epidemics and Infectious Diseases	
ANSC 306	Equine Science	
ANSC 331	Biology of Reproduction	
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ANSC 314	Adv Dairy Cattle Evaluation	
ANSC 322	Livestock Feeds and Feeding	
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ANSC 400	Dairy Herd Management	
ANSC 401	Beef Production	
ANSC 402	Sheep and Goat Production	
ANSC 403	Pork Production	
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ANSC 409	Meat Science	
ANSC 420	Ruminant Nutrition	
ANSC 421	Minerals and Vitamins	
ANSC 422	Companion Animal Nutrition	
ANSC 431	Advanced Reproductive Biology	
ANSC 438	Lactation Biology	
ANSC 440	Applied Statistical Methods I	
ANSC 441	Human Genetics	
ANSC 444	Applied Animal Genetics	
ANSC 445	Statistical Methods	
ANSC 446	Population Genetics	
ANSC 447	Advanced Genetics and Genomics	
ANSC 448	Math Modeling in Life Sciences	
ANSC 449	Biological Modeling	
ANSC 450	Comparative Immunobiology	
ANSC 451	Microbes and the Anim Indust	
ANSC 452	Animal Growth and Development	

ANSC 453	Stem Cell Biology
ANSC 467	Applied Animal Ecology
ANSC 509	Muscle Biology
ANSC 510	
ANSC 520	Protein and Energy Nutrition
ANSC 521	Regulation of Metabolism
ANSC 522	Advanced Ruminant Nutrition
ANSC 523	Techniques in Animal Nutrition
ANSC 524	Nonruminant Nutrition Concepts
ANSC 525	Topics in Nutrition Research
ANSC 526	Adv Companion Animal Nutrition
ANSC 533	Repro Physiology Lab Methods
ANSC 541	Regression Analysis
ANSC 542	Applied Bioinformatics
ANSC 543	Bioinformatics
ANSC 545	Statistical Genomics
ANSC 554	Immunobiological Methods
ANSC 561	Animal Stress Physiology

ANSC 453	Stem Cell Biology
ANSC 467	Applied Animal Ecology
ANSC 509	Muscle Biology
ANSC 510	
ANSC 520	Protein and Energy Nutrition
ANSC 521	Regulation of Metabolism
ANSC 522	Advanced Ruminant Nutrition
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ANSC 541	Regression Analysis
ANSC 542	Applied Bioinformatics
ANSC 543	Bioinformatics
ANSC 545	Statistical Genomics
ANSC 554	Immunobiological Methods
ANSC 561	Animal Stress Physiology

ILLINOIS

Proposal to the Senate Educational Policy Committee

PROPOSAL TITLE: Establish a New Major in Computer Science and Animal Sciences for the Bachelor of Science in the Department of Animal Sciences in the College of Agricultural, Consumer and Environmental Sciences.

SPONSOR: David J. Miller, Professor and Undergraduate Teaching Coordinator, Department of Animal Sciences, 333-3408, djmille@illinois.edu, and Elsa Gunter, Research Professor and Director of Undergraduate Programs, Computer Science, 265-6118, egunter@illinois.edu

COLLEGE CONTACT: Mary Lowry, Assistant Dean, College of ACES Academic Programs, 333-9391, lowry@illinois.edu

BRIEF DESCRIPTION: This collaborative program in Computer Science and Animal Sciences is for undergraduate students who plan to pursue careers in the animal-related fields with a technology, data handling and management focus and/or a genomics focus. This degree will prepare students for advanced study at a graduate level, as well as immediate entry into the workforce.

JUSTIFICATION: The Department of Animal Sciences and the Department of Computer Science propose a new major that is a combination of Animal Sciences and Computer Science. This proposed new curriculum is in response to the growing demands in the animal industry for students who have a foundation in animal sciences combined with a background in computer science and data analysis and management. The Animal Sciences Department already has several faculty members who are conducting research in bioinformatics, microbiome analysis, and animal management and we believe that the demand for students with this combination of backgrounds will grow. The animal industry is eager to find students who have skills in precision animal agriculture, remote sensing, bioinformatics, web programming, and data analysis. Through cooperation between the Computer Science and Animal Sciences Departments, we plan to provide an innovative program for students who are interested in these career fields. This proposed curriculum follows the precedent already established through the CS + X programs offered in Computer Science + Crop Sciences, Computer Science + Advertising, Computer Science + Anthropology, Computer Science + Astronomy, Computer Science + Chemistry, Computer Science + Linguistics, and CS + Music. This program would provide students who are interested in computer applications applied to Animal Sciences with that opportunity. The program will give students knowledge in both fields that is complimentary so that they can generate, analyze, and interpret large datasets.

The CS + ANSC degree is rigorous and will be selective. The proposed curriculum is challenging so students will need to perform at a high academic level to be successful. The CS + ANSC degree is not intended for students who are unable to be admitted into Computer Science; the interdisciplinary requirements of CS + ANSC would be unsuitable for them. The program is designed for selected students with specific interests and career goals that include both areas of study.

The course requirements include core courses in both disciplines and meet the IBHE requirements that 40 hours of upper division courses must be completed. Upper division courses have been described as 300 and 400 level courses and some 200 level courses with multiple prerequisites. The 200 level courses included as upper division courses in the CS + ANSC proposal have already been approved in other CS + X programs. The requirements include a minimum of 43 hours of upper division or upper division-approved coursework.

BUDGETARY AND STAFF IMPLICATIONS: *(Please respond to each of the following questions.)*

1) Resources
    a. How does the unit intend to financially support this proposal?

As is the case for the existing CS + X majors, students enrolled in this program will pay the same differential tuition as the current College of Engineering Computer Science students. Differential tuition will be shared equally by the College of Engineering and the College of ACES.

    b. How will the unit create capacity or surplus to appropriately resource this program? If applicable, what functions or programs will the unit no longer support to create capacity?

The need for new resources is not anticipated as both the Computer Science and Animal Sciences degrees already exist on campus, and both departments are prepared with the resources needed for regular growth of the programs. No new courses are being proposed specifically for the CS + ANSC degree. We expect to enroll 10-15 students per year (15 maximum) so the size of this degree is limited. Any additional resources that are needed in the future can be covered by the use of the differential tuition. A request for a differential tuition rate will be submitted for BOT approval.

    c. Will the unit need to seek campus or other external resources? If so, please provide a summary of the sources and an indication of the approved support.

Additional support will not be requested. Letters of support from the Departments of Computer Science and Animal Sciences are attached.

d. Please provide a letter of acknowledgment from the college that outlines the financial arrangements for the proposed program.

A letter from the Colleges of ACES is attached.

2) Resource Implications

a. Please address the impact on faculty resources including the changes in numbers of faculty, class size, teaching loads, student-faculty ratios, etc.

The Computer Science and Animal Sciences courses that are required for the major have the capacity or can be expanded through the use of differential tuition to accommodate new students. The Departments will work jointly to advise students, and ensure a timely graduation rate. The Departments do not believe that an additional 10-15 students/year in this major will exceed capacity in courses in either Computer Science or Animal Sciences. The 100 and 200 level required courses in Animal Sciences can easily add this number of students and students have many choices for upper division courses so the number in any one course will not change significantly. The Departments will be working together to advertise the major and keep advising channels open so students receive the best education possible. The students in this major will be primarily advised in Animal Sciences, with advice from CS about the CS curriculum. The Department of Animal Sciences has capacity to advise additional students and specific appropriate faculty within Animal Sciences will be assigned as advisors. There is an open search for a new tenure-track faculty member in Digital Animal Sciences/Animal Bionomics and the holder of this position will be one of the advisors of these students.

b. Please address the impact on course enrollment in other units and provide an explanation of discussions with representatives of those units. *(A letter of acknowledgement from units impacted should be included.)*

It is not anticipated that an additional 10-15 students/year in the CS + ANSC major will impact course enrollment in classes outside of Computer Science or Animal Sciences Departments. No significant changes in class enrollment outside of the Departments are anticipated.

c. Please address the impact on the University Library *(A letter of estimated impact from the University Librarian must be included for all new program proposals. If the impact is above and beyond normal library business practices, describe provisions for how this will be resourced.)*

No impact is expected since both the Computer Science and Animal Sciences degrees already exist. A letter from the University Librarian is attached.

d. Please address the impact on technology and space (e.g. computer use, laboratory use, equipment, etc.)

No impact is expected on computer or teaching spaces. Most students will use their own computers and needed software is available for free download to students through the University. The classroom sizes for the 100 and 200 level required courses in Animal Sciences can easily add this number of students. If necessary, additional lab sections will be added. Animal Sciences students have many choices for upper division courses so the number in any one course will not change significantly.

LOGISTICS FOR TRANSFER STUDENTS

Transfer Students

A limited number of current UIUC students will be allowed to transfer into the CS + ANSC degree, provided they meet the following minimum criteria:

- Completion of MATH 220 or 221 with a grade of A- or higher or Credit (AP, IB, A-Level, Proficiency): If MATH 231 has been taken at the time of transfer, an A- or higher is required in this course as well.
- Completion of CS 173 and CS 225 with a grade of A- or above in both courses (and any additional CS courses taken at the time of transfer); at least two CS courses must be taken on the UIUC campus.
    - Students will receive overrides for CS "gateway" courses with approval from the ANSC advisor (ANSC advisor will contact CS advisor with approval)
- Completion of ANSC 100 with a grade of A- or above (and any additional ANSC courses taken at the time of transfer): at least one ANSC course must be taken on the UIUC campus.
- Overall GPA must be greater than 3.67 (both UIUC and Combined)

Students meeting these requirements will complete an ICT request form to transfer to the CS + ANSC program, available in Animal Sciences and submit it during the transfer period. Admission to the CS + ANSC program must be approved by the ANSC academic office. Such decisions will also consider the capacity of the program. Students falling beneath the minimum criteria may petition the ANSC department.

For new degree programs only:

3) Briefly describe how this program will support the University's mission, focus, and/or current priorities. Include specific objectives and measurable outcomes that demonstrate the program's consistency with and centrality to that mission.

The first of its kind in the U.S., the CS + ANSC degree will enhance the reputation of the University of Illinois as an innovator in applying technology to animal sciences. The generation of huge data sets in several areas of animal sciences, such as genomic selection and prediction through molecular genetics and data from remote sensors detecting animal behavior, physiology and health, and microbiome analysis are creating a

growing requirement for people with backgrounds and skills combining animal and computer science. These individuals are essential for management, analysis, and interpretation of the data generated. The proposed cooperative program between two departments in different colleges provides unique opportunities for students to obtain a background that will provide them with an exceptional blend of skills needed to meet this demand that already exists and is expected to grow significantly in the coming years. Students completing this program will possess a distinctive interdisciplinary education and skill set that will allow them to transform the management of food animals to feed a growing population and service/companion animals to make our lives easier and more pleasant. This program will serve the industry by educating students who will be highly sought and will promote economic development by educating highly qualified graduates. Outcome measurements will include the number and quality of the applicants, the nature and the number of student transfers in and out, the "technical GPA" in comparison to the stand-alone CS and ANSC programs, the average time to degree completion, the number of graduates (up to 15 per year), the placement rate and starting salary, and the percentage of graduates finding jobs in related industries.

4) Please provide an analysis of the market demand for this degree program. What market indicators are driving this proposal? What type of employment outlook should these graduates expect? What resources will be provided to assist students with job placement?

This proposed program is in response to the growing animal sciences and technology industries. Jobs are readily available to students with this distinctive combination of skills and backgrounds. Some of the job opportunities that have increased in availability in recent years include: precision animal science, bioinformatics, computational biology, and web programming for animal-related companies. These career opportunities are certain to continue growing as the agriculture companies continue to advance and bring more technology into their practices. According to projections from the U.S. Department of Agriculture, there will be 60,000 job openings annually in the agriculture industry through 2020 with only 35,000 students graduating each year to fill these positions. Of these available job opportunities in the next five years, it is estimated that 27% will be in the technology, science, engineering, and mathematics areas of agriculture. "Agriculture is going through a transformation itself into more of that digital space," said Melissa Harper, vice president of global talent acquisition at Monsanto. "Many of the roles that we need-and those in agriculture need - didn't exist just five years ago." Cargill has recently released a suite of digital tools across its animal nutrition business and is investing in computer vision technologies for animal health, such as animal facial recognition. AGCO just opened a center in the Research Park to advance data science, web and mobile development and machine learning for animal and crop sciences. As there are no other CS + ANSC degrees in the U.S., we expect graduates to be in high demand.

The students graduating from this program will receive support from both Computer Science and Animal Sciences advisors, as well as the career services resources provided by the College of ACES and by the University of Illinois.

5) If this is a proposed graduate program, please discuss the programs intended use of waivers. If the program is dependent on waivers, how will the unit compensate for lost tuition revenue?

Not applicable.

DESIRED EFFECTIVE DATE:

We are eager to admit students to this program for the term that is available, once we have received all the required approvals.

STATEMENT FOR PROGRAMS OF STUDY CATALOG:

Animal Sciences
www.ansc.illinois.edu/
Department Head: Rodney Johnson, Department Office: 116 Animal Sciences Laboratory, 1207 West Gregory Drive, Urbana, (217) 333-3131

Computer Science
http://www.cs.illinois.edu
Department Head: Vikram Adve, Department Office: 2232 Siebel Center, 201 N. Goodwin Avenue, Urbana, (217) 333-3373

Curriculum in Computer Science and Animal Sciences
www.cs.illinois.edu/ or www.ansc.illinois.edu/

This major is sponsored jointly by the Departments of Computer Science and Animal Sciences. The major in Computer Science and Animal Sciences is a program for undergraduate students who plan to pursue careers in the agricultural field that have a technology focus. The degree will prepare students for immediate entry into the workforce, as well as advanced study at the graduate level.

E-mail: academic@cs.illinois.edu or ansc@illinois.edu

Degree title: Bachelor of Science in Computer Science and Animal Sciences

This collaborative program in Computer Science and Animal Sciences is for undergraduate students who plan to pursue careers in the animal-related fields with a remote sensing technology, data handling and management focus and/or a genomics focus. This degree is unique in its integration of approached to collect and handle large data to animal science.

A Major Plan of Study Form must be completed and submitted to the Department of Computer Science Office of Undergraduate Affairs and to the Undergraduate Teaching

Office in Animal Sciences by the beginning of the fifth semester (60-75 hours). Students should contact the Computer Science advisor in 1210 Siebel Center, as well as the Animal Sciences Teaching Coordinator in the Animal Sciences Laboratory.

Students in the Computer Science + Animal Sciences degree will take core courses from each department to provide a foundation for each part of the degree. They will take specific Computer Science upper division courses, and can select from a variety of upper division Animal Sciences courses suited towards their career goals. This degree will prepare students for immediate entry into the workforce as well as advanced study at a graduate level. All Campus General Education and College of ACES foreign language requirements must be met. The minimum required major and supporting course work equates to 80 hours, including 33 in Computer Science and 38 in Animal Sciences. The minimum hours required for graduation is 126. At least forty hours of upper division (approved 200 or 300- and 400-level) coursework must be taken on this campus

To graduate from the Computer Science and Animal Sciences curriculum, a student must complete the following courses, all of which must be taken for a traditional letter grade.

(See Appendix A)

CLEARANCES: *(Clearances should include signatures and dates of approval.* ***These signatures must appear on a separate sheet.*** *If multiple departments or colleges are sponsoring the proposal, please add the appropriate signature lines below.)*

Signatures:

Animal Sciences Unit Representative: 12-19-18 Date:

College of ACES Representative: 12/19/18 Date:

see attached letter
Computer Sciences Unit Representative: Date:

Graduate College Representative: Date:

Council on Teacher Education Representative: Date:

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Department of Computer Science
201 North Goodwin Avenue
Urbana, IL 61801-2302 USA

November 14, 2018

Professor Rodney W. Johnson
Head, Dept. of Animal Sciences
University of Illinois

Dear Professor Johnson,

I am pleased to let you know that the Computer Science faculty enthusiastically approved the CS + Animal Sciences proposal that we have been jointly working on over the last several months, and is in full support of the new program. Based on the many overlaps outlined in the proposal we think that this is a very natural fit and an excellent opportunity for both departments, as well as for future students whose interests align with the program.

We have evaluated our current course offerings and how they might be affected by the influx of the anticipated CS+ANSC majors, and do not anticipate any problems in ensuring that they will have access. Moreover, the impact on course enrollments should be minimal, as these new majors will represent only a very small fraction relative to the current size of those courses. Finally, the CS Department is in a growth phase, having added seven new faculty (tenure track plus instructional) last year, and plans to hire additional this year. The addition of these faculty should allow us to grow our course offerings where most needed.

Sincerely,

Elsa L. Gunter

Elsa L Gunter
Research Professor
Director of Undergraduate Programs
Department of Computer Science
University of Illinois at Urbana – Champaign
Phone: 217-265-6118
Email: egunter@illinois.edu

ILLINOIS

COLLEGE OF AGRICULTURAL, CONSUMER AND ENVIRONMENTAL SCIENCES

Academic Programs
128 Mumford Hall, MC-710
1301 W. Gregory Drive
Urbana, IL 61801

November 21, 2018

To Whom it May Concern:

This letter serves as a support document for the proposal to Establish a New Major in Computer Science and Animal Sciences for the Bachelor of Science in the Department of Animal Sciences in the College of Agricultural, Consumer and Environmental Sciences. The Department of Animal Sciences will be applying for the standard CS+X tuition rate for this program at the next opportunity. The department is not requesting any additional funding from the College of ACES to implement this proposal. In addition, the College Courses and Curricula Committee has reviewed the proposal and agrees that no funding in excess of what the department will be able to provide is needed to support the program. If there are any questions, please contact me.

Sincerely,

David Rosch
Associate Dean

CC: R. Chappell

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

University Library
Office of University Librarian and Dean of Libraries
230 Main Library, MC-522
1408 West Gregory Drive
Urbana, IL 61801

December 3, 2018

Mary Lowry
Assistant Dean for Student Success
College of ACES
128 Mumford
1301 West Gregory Dr.
M/C 710

Dear Dean. Lowry:

The University Library recently received a proposal from you outlining the plans of the departments of Animal Sciences and Computer Science to Establish a New Major in Computer Science and Animal Sciences for the Bachelor of Science in the Department of Animal Sciences in the College of Agricultural, Consumer and Environmental Sciences.

Based upon the documents received and reviewed by Erin Kerby in the Funk ACES Library, it is our belief that there will be no impact on the University Library. We are already supporting services in this area and see no meaningful changes in our operations as a result of this move.

If additional services or materials are required as the program further develops, we will be happy to discuss those needs as they emerge.

Sincerely,

John P. Wilkin
Juanita J. and Robert E. Simpson
Dean of Libraries and University Librarian

e-c: Elsa Gunter, Research Professor and Director of Undergraduate Programs, Computer Science
Erin Kerby
David J. Miller, Professor and Undergraduate Teaching Coordinator, Department of Animal Sciences
Thomas Teper

phone 217-333-0790 • *fax* 217-244-4358

Appendix A:

Course Rubric and Number	Course Title	Credit hrs
Composition and Speech		
RHET 105 & CMN 101 OR CMN 111 & CMN 112	Writing and Public Speaking OR Oral & Written Communication I & II	6-7
Advanced Composition	Students select from approved list	3-4
Cultural Studies		
Western Culture	Students select from approved list	3
Non-Western Culture	Students select from approved list	3
US Minority Culture	Students select from approved list	3
Language other than English (at or above 3rd level)		
Natural Sciences and Technology		
Chem 102 and 103	General Chemistry I and Lab	4
Chem 104 and 105	General Chemistry II and Lab	4
Humanities and the Arts	Students select from approved list	6
Social and Behavioral Sciences		
ECON 102 or ACE 100		3-4
Student's Choice	Students select from approved list	3
Mathematical Foundations (fulfills Quantitative Reasoning I & II)		
CS 361	Probability & Statistics for Computer Science	3
MATH 220 or MATH 221	Calculus or Calculus I	4-5
MATH 225	Introductory Matrix Theory	2
MATH 231	Calculus II	3
Computer Sciences Core		
CS 100	Freshman Orientation (Recommended)	1
CS 125	Intro to Computer Science	4
CS 126	Software Design Studio	3
CS 173	Discrete Structures	3
CS 225*	Data Structures	4
CS 374	Introduction to Algorithms & Models of Computation	4
CS 357 **OR** CS 421	Numerical Methods I **OR** Programming Languages & Compilers	3
Computer Science Technical Track (two options)		8-9
CS 233* and 241*	Computer Architecture and System Programming	
OR CS 240* plus CS 400 level courses listed on CS website	Introduction to Computer Systems and 2 others	
Animal Sciences Core		
ANSC 100	Intro to Animal Sciences	4
ANSC 221	Cells, Metabolism and Genetics	3
ANSC 222	Anatomy and Physiology	3

ANSC 223	Animal Nutrition	3
ANSC 224	Animal Reproduction and Growth	4
ANSC 398**	UG Experiential Learning	1
ANSC 498	Integrating Animal Sciences	2
Three Applied ANSC Courses	Students select from approved list (see below)	9
Three Basic ANSC Courses	Students select from approved list (see below)	9
Electives to total 126 hours		3-5
Total hours		126

*Have been approved as upper division courses, based on the number of prerequisites.
** ANSC 398 only fulfills the degree requirements when taken for a standard letter grade.

Applied Animal Sciences Courses

ANSC 201	Principles of Dairy Production
ANSC 204	Intro Dairy Cattle Evaluation
ANSC 205	World Animal Resources
ANSC 206	Horse Management
ANSC 211	Breeding Animal Evaluation
ANSC 219	Meat Technology
ANSC 250	Companion Animals in Society
ANSC 301	Food Animal Production, Management, and Evaluation
ANSC 305	Human Animal Interactions
ANSC 307	Companion Animal Management
ANSC 309	Meat Production and Marketing
ANSC 310	Meat Selection and Grading
ANSC 312	Advanced Livestock Evaluation
ANSC 313	Horse Appraisal
ANSC 314	Adv Dairy Cattle Evaluation
ANSC 322	Livestock Feeds and Feeding
ANSC 370	Companion Animal Policy
ANSC 400	Dairy Herd Management
ANSC 401	Beef Production
ANSC 402	Sheep Production
ANSC 403	Pork Production
ANSC 404	Poultry Science
ANSC 405	Advanced Dairy Management
ANSC 407	Animal Shelter Management
ANSC 424	Pet Food & Feed Manufacturing

ANSC 435	Milk Quality and Udder Health
ANSC 437	Adv Reproductive Management
ANSC 471	ANSC Leaders & Entrepreneurs

Basic Animal Sciences Courses

ANSC 251	Epidemics and Infectious Diseases
ANSC 306	Equine Science
ANSC 331	Biology of Reproduction
ANSC 350	Cellular Metabolism in Animals
ANSC 363	Behavior of Domestic Animals
ANSC 366	Animal Behavior
ANSC 406	Zoo Animal Conservation Sci
ANSC 409	Meat Science
ANSC 420	Ruminant Nutrition
ANSC 421	Minerals and Vitamins
ANSC 422	Companion Animal Nutrition
ANSC 431	Advanced Reproductive Biology
ANSC 438	Lactation Biology
ANSC 440	Applied Statistical Methods I
ANSC 441	Human Genetics
ANSC 444	Applied Animal Genetics
ANSC 445	Statistical Methods
ANSC 446	Population Genetics
ANSC 447	Advanced Genetics and Genomics
ANSC 448	Math Modeling in Life Sciences
ANSC 449	Biological Modeling
ANSC 450	Comparative Immunobiology
ANSC 451	Microbes and the Anim Indust
ANSC 452	Animal Growth and Development
ANSC 453	Stem Cell Biology
ANSC 467	Applied Animal Ecology
ANSC 509	Muscle Biology
ANSC 510	Science of Animal Well-Being

ANSC 520	Protein and Energy Nutrition
ANSC 521	Regulation of Metabolism
ANSC 522	Advanced Ruminant Nutrition
ANSC 523	Techniques in Animal Nutrition
ANSC 524	Nonruminant Nutrition Concepts
ANSC 525	Topics in Nutrition Research
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ANSC 533	Repro Physiology Lab Methods
ANSC 541	Regression Analysis
ANSC 542	Applied Bioinformatics
ANSC 543	Bioinformatics
ANSC 545	Statistical Genomics
ANSC 554	Immunobiological Methods
ANSC 561	Animal Stress Physiology

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Department of Mathematics

273 Altgeld Hall, MC-382
1409 West Green Street
Urbana, IL 61801

Re: Use of Math 257 in Computer Science and related programs

The Mathematics Department, working with the Grainger College of Engineering, has recently created the course MATH 257, *Linear Algebra with Computational Applications*. Quoting from the justification of the approved proposal, "In the future, MATH 257 will replace the MATH 415 requirement in many science and engineering curricula." With this in mind, the department would be pleased to have Computer Science add MATH 257 as a linear algebra option in their programs, specifically in:

10KP0112BS: Computer Science, BS
10KV1438BSLA: Mathematics & Computer Science, BSLAS
10KV0464BSLA: Statistics & Computer Science, BSLAS
10KV5348BSLA: Computer Science & Anthropology, BSLAS
10KV5349BSLA: Computer Science & Astronomy, BSLAS
10KV5350BSLA: Computer Science & Chemistry, BSLAS
10KV5351BSLA: Computer Science & Linguistics, BSLAS
10KV5667BSLA: Computer Science & Economics, BSLAS
10KV5676BSLA: Computer Science & Geography & Geographic Information Science, BSLAS
10KV5679BSLA: Computer Science & Philosophy, BSLAS
10KR5639BS: Computer Science + Music, BS
10KT5673BS: Computer Science & Advertising, BS
10KL5864BS: Computer Science & Animal Sciences, BS
10KL5623BS: Computer Science + Crop Sciences, BS
JP: 10KL5890BS & 1PKS5890MANS: JP: Computer Science & Animal Sciences, BS & Animal Science, MANSC
JP: 10KL5890BS & 1PKS5890MANS(MANU): JP: Computer Science & Animal Sciences, BS & Animal Science, MANSC
JP:10KL5903BS & 10KS5903MS: JP: Computer Science + Crop Sciences, BS & Crop Sciences, MS

As the Mathematics department is reallocating instructional resources from Math 415 to Math 257 as the need shifts, this will not cause any undue difficulties for Mathematics resources.

Sincerely

Randy McCarthy

Randy McCarthy
Professor of Mathematics
Dir of Undergraduate Studies in Math
rmccrthy@illinois.edu

telephone 217-333-3350 • *fax* 217-333-9576
email office@math.uiuc.edu • *url* http://www.math.uiuc.edu/

10KL5623BS: COMPUTER SCIENCE + CROP SCIENCES, BS

Completed Workflow

1. U Program Review (dforgacs@illinois.edu; eastuby@illinois.edu; aledward@illinois.edu)
2. 1802 Committee Chair (arayburn@illinois.edu)
3. 1802 Head (asdavis1@illinois.edu)
4. 1434 Head (namato@illinois.edu; vmahesh@illinois.edu; egunter@illinois.edu)
5. KP Committee Chair (bsnewell@illinois.edu; danko@illinois.edu; kcp@illinois.edu; jmakela@illinois.edu)
6. KP Dean (candyd@illinois.edu)
7. KL Committee Chair (npaulson@illinois.edu)
8. KL Dean (aball@illinois.edu)
9. University Librarian (jpwilkin@illinois.edu)
10. Provost (kmartens@illinois.edu)
11. Senate EPC (bjlehman@illinois.edu; moorhouz@illinois.edu; kmartens@illinois.edu)
12. Senate (jtempel@illinois.edu)
13. U Senate Conf (none)
14. DMI (eastuby@illinois.edu; aledward@illinois.edu; dforgacs@illinois.edu)

Approval Path

1. Thu, 06 Feb 2020 17:44:48 GMT
   Deb Forgacs (dforgacs): Approved for U Program Review
2. Mon, 10 Feb 2020 17:44:04 GMT
   Lane Rayburn (arayburn): Approved for 1802 Committee Chair
3. Mon, 10 Feb 2020 19:20:29 GMT
   Adam Davis (asdavis1): Approved for 1802 Head
4. Tue, 11 Feb 2020 02:37:00 GMT
   Elsa Gunter (egunter): Approved for 1434 Head
5. Tue, 25 Feb 2020 20:12:46 GMT
   Brooke Newell (bsnewell): Approved for KP Committee Chair
6. Thu, 27 Feb 2020 13:50:16 GMT
   Candy Deaville (candyd): Approved for KP Dean
7. Thu, 27 Feb 2020 23:01:07 GMT
   Anthony Yannarell (acyann): Approved for KL Committee Chair
8. Fri, 28 Feb 2020 18:20:30 GMT
   Anna Ball (aball): Approved for KL Dean
9. Fri, 28 Feb 2020 18:38:10 GMT
   John Wilkin (jpwilkin): Approved for University Librarian
10. Tue, 03 Mar 2020 21:24:34 GMT
    Kathy Martensen (kmartens): Approved for Provost
11. Mon, 30 Mar 2020 22:27:05 GMT
    Barbara Lehman (bjlehman): Approved for Senate EPC
12. Fri, 01 May 2020 21:07:48 GMT
    Kathy Martensen (kmartens): Approved for Senate
13. Fri, 01 May 2020 21:13:48 GMT
    Kathy Martensen (kmartens): Approved for U Senate Conf
14. Wed, 06 May 2020 18:34:46 GMT
    Emily Stuby (eastuby): Approved for DMI

History

1. Mar 22, 2019 by Deb Forgacs (dforgacs)
2. Apr 10, 2019 by Deb Forgacs (dforgacs)
3. Dec 6, 2019 by Scott Bartlett (sbartlet)
4. Feb 3, 2020 by Deb Forgacs (dforgacs)
5. May 6, 2020 by Scott Bartlett (sbartlet)

Date Submitted:Wed, 17 Feb 2021 17:22:47 GMT

Viewing:10KL5623BS : Computer Science + Crop Sciences, BS

Changes proposed by: Scott Bartlett

Proposal Type

Proposal Type:

Major (ex. Special Education)

This proposal is for a:

Revision

Proposal Title:

If this proposal is one piece of a multi-element change please include the other impacted programs here.*example: A BS revision with multiple concentration revisions*

Administrative approval: Revision of the BS in Computer Science + Crop Sciences (College of Agricultural, Consumer and Environmental Sciences) program, centered on a modification of the introductory CS course sequence. Also, adding a new CPSC course that has replaced two deactivated courses.

EP Control Number

EP.21.115

Official Program Name

Computer Science + Crop Sciences, BS

Effective Catalog Term

Fall 2021

Sponsor College

Agr, Consumer, & Env Sciences

Sponsor Department

Crop Sciences

Sponsor Name

Dr. A. Lane Rayburn

Sponsor Email

arayburn@illinois.edu & harbourt@illinois.edu

College Contact

Brianna Gregg

College Contact Email

bjgray2@illinois.edu

Program Description and Justification

Justification for proposal change:

1) Revising the Computer Science Introductory Sequence, replacing CS 126 with CS 128 Intro to Computer Science II (proposed), adding a new one-hour CS 222 Software Design Studio (proposed), removing an hour from CS 125 (added to CS 128 to make up for the removal of the Code Reviews which make up CS 222) and removing CS 242 (a frequent substitute for CS 126 for transfer students).

Justification: Replacing CS 126 with CS 128 makes the path to CS 225 uniform for all students (except ECE), including &CS+ majors, students wanting to transfer into &CS+ programs, students doing minors and students needing CS 225 to complete a concentration. Adding CS 222 and removing CS 242 eliminates the attempt to discriminate between how freshmen and transfers take the code review class.

2) To the MATH 225 Matrix Theory requirement, adding MATH 257, MATH 415 and MATH 416 as alternate linear algebra options.

Justification: The Math department is developing MATH 257 as the eventual replacement for MATH 415, with the same theoretical content, but with an emphasis on using programming to perform matrix operations instead of calculating them on paper. (This justification (perhaps modified by Math) should be used for all of the &CS+ programs that currently have MATH 415 as a requirement or option.) Meanwhile, we have approved individual students wishing to take the more theoretical MATH 416 Abstract Algebra instead of MATH 415 in other CS programs; including it in this proposal eliminates the need for requesting individual exceptions.

3) Adding CPSC 212: Introduction to Plant Protection to the Crop Sciences Core Requirements. This new course is replacing two deactivated courses -- CPSC/HORT 226: Introduction to Weed Science and PLPA 204: Introductory Plant Pathology. CPSC 212 also touches on content from CPSC 270/IB 220/NRES 270: Applied Entomology.

Corresponding Degree

BS Bachelor of Science

Is this program interdisciplinary?

Yes

Interdisciplinary Colleges and Departments (list other colleges/departments which are involved other than the sponsor chose above)

administrative update.

College

Grainger College of Engineering

Department

Computer Science

Do you need to add an additional interdisciplinary relationship?

No

Academic Level

Undergraduate

Will you admit to the concentration directly?

No

Is a concentration required for graduation?

No

CIP Code

110199 - Computer and Information Sciences, Other.

Is This a Teacher Certification Program?

No

Will specialized accreditation be sought for this program?

No

Admission Requirements

Is this revision a change to the admission status of the program?

No

Enrollment

Describe how this revision will impact enrollment and degrees awarded.

There will be no impact.

Estimated Annual Number of Degrees Awarded

What is the matriculation term for this program?

Fall

What is the typical time to completion of this program?

8 semesters

What are the minimum Total Credit Hours required for this program?

126

Delivery Method

Is this program available on campus and online?

No

This program is available:

On Campus

Budget

Are there budgetary implications for this revision?

No

Will the program or revision require staffing (faculty, advisors, etc.) beyond what is currently available?

No

Resource Implications

Facilities

Will the program require new or additional facilities or significant improvements to already existing facilities?

No

Technology

Will the program need additional technology beyond what is currently available for the unit?

No

Non-Technical Resources

Will the program require additional supplies, services or equipment (non-technical)?

No

Resources

For each of these items, be sure to include in the response if the proposed new program or change will result in replacement of another program(s). If so, which program(s), what is the anticipated impact on faculty, students, and instructional resources? Please attach any letters of support/ acknowledgement from faculty, students, and/or other impacted units as appropriate.

Faculty Resources

Please address the impact on faculty resources including any changes in numbers of faculty, class size, teaching loads, student-faculty ratios, etc. Describe how the unit will support student advising, including job placement and/or admission to advanced studies.

None (no changes with these minor revisions).

Library Resources

Describe your proposal's impact on the University Library's resources, collections, and services. If necessary please consult with the appropriate disciplinary specialist within the University Library.

We expect the impact on the University Library to remain at the same level.

Instructional Resources

Will there be any reduction in other course offerings, programs or concentrations by your department as a result of this new program/proposed change?

No

Does the program include other courses/subjects impacted by the creation/revision of this program?

Yes

Explain how the inclusion or removal of the courses/subjects listed above impacts the offering departments.

None (no changes with these minor revisions).

Financial Resources

Will the unit need to seek campus or other external resources?

No

Are you seeking a change in the tuition rate or differential for this program?

Yes

Program Regulation and Assessment

Briefly describe the plan to assess and improve student learning, including the program's learning objectives; when, how, and where these learning objectives will be assessed; what metrics will be used to signify student's achievement of the stated learning objectives; and the process to ensure assessment results are used to improve student learning. (Describe how the program is aligned with or meets licensure, certification, and/or entitlement requirements, if applicable).

The Computer Science component of the CS + X Curricula learning objectives are in two categories: Program Educational Objectives and Student Outcomes. Each of these are described in the following two sections.
==========
PROGRAM EDUCATIONAL OBJECTIVES REVIEW AND UPDATE PROCESS FOR CS COMPONENT
In this section, we describe the current Program Educational Objectives for the CS component of the CS + X degrees, together with the process used by the Department of Computer Science for their periodic review and update. This process is managed by the Undergraduate Studies Committee, under the direction of the Director of Undergraduate Programs.
The University of Illinois Computer Science Undergraduate Program Educational Objectives are to prepare graduates who:
• 1. For years after graduation are highly sought-after by employers and accepted at top graduate schools, obtain positions in industry, government, not-for-profits and academia.
• 2. Pursue education through lifelong learning either through self-directed study or in leading graduate programs.
• 3. Emerge as leaders in the field through the creation of new knowledge and systems in the rapidly changing world.
• 4. Provide leadership with their high ethical and technical standards.
The Program Educational Objectives (PEOs) are reviewed roughly every three years by the Undergraduate Studies Committee to decide whether revision is appropriate based on trends in the field, informal input from alumni and other program constituents, and data from student attainment of relevant job positions and entrance into graduate school.
Every six years, or at any point where revision is deemed appropriate, the revised PEOs are put before the Advisory Board and their approval is solicited. The Advisory Board contains representatives from our alumni and from industry partners who are potential employers of your graduates.
If the Advisory Board suggests revisions, these revisions are reviewed by the Undergraduate Studies Committees and new PEOs are generated consistent with these revisions, and then the PEOs are again put to the Advisory Board for their approval.
Once the PEO's have been approved by the Undergraduate Studies Committees and the Advisory Board, they are brought before the faculty of the Department of Computer Science for their discussion and acceptance. If the faculty recommend substantive changes to the PEOs, then the results are sent back to the Undergraduate Studies Committee and the Advisory Board for re-approval. If the recommendations are minor and non-substantive, they are made by the Director of Undergraduate Programs. The website maintained by the Department of Computer Science for publishing the PEOs is updated with the final revision.
At the beginning of each round of review and revision, input is collected from sources such as informal surveys of our program constituents, reports on employment outcomes for our recent graduates and feedback on success rates for our students applying to graduate school. Information indicating that the PEOs should be revised, or that they are not being highly attained is incorporated into the assessment of the program and the courses therein.

==========
STUDENT OUTCOMES ASSESSMENT PROCESS FOR THE CS COMPONENT
This section describes the expected student outcomes of the BS in CS program. It details the process for monitoring themá -- including how data is collected -- and for assessing when and what revisions to courses and the program seem desirable to better meet the student outcomes. The CS + X program prepares students to achieve the following student outcomes by the completion of their degree:
1. Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Apply computer science theory and software development fundamentals to produce computing-based solutions.
In order to track student progress in achieving the student outcomes of the CS component of the CS + X program, the Department of Computer Science has identified a set of "core courses" that ensure student outcomes are being reached. These include the following courses that all students must take:
CS 128, CS 173, CS 210, CS 225, CS 222, One of 240 or (CS 233 and CS 241), CS 374, and (CS 357 or CS 421).

Is the career/profession for graduates of this program regulated by the State of Illinois?

No

Program of Study

“Baccalaureate degree requires at least 120 semester credit hours or 180 quarter credit hours and at least 40 semester credit hours (60 quarter credit hours) in upper division courses” (source: https://www.ibhe.org/assets/files/PrivateAdminRules2017.pdf). For proposals for new bachelor’s degrees, if this minimum is not explicitly met by specifically-required 300- and/or 400-level courses, please provide information on how the upper-division hours requirement will be satisfied.

All proposals must attach the new or revised version of the Academic Catalog program of study entry. Contact your college office if you have questions.

Revised programs

BS Computer Science + CPSC side-by-side (2-17-21) (1).xlsx

Attach a side-by-side comparison with the existing program AND, if the revision references or adds “chose-from” lists of courses students can select from to fulfill requirements, a listing of these courses, including the course rubric, number, title, and number of credit hours.

Catalog Page Text

Statement for Programs of Study Catalog

Code	Title	Hours
Composition I and Speech		**6-7**
RHET 105 & CMN 101	Writing and Research and Public Speaking	
OR		
CMN 111 & CMN 112	Oral & Written Comm I and Oral & Written Comm II	
Advanced Composition		
Select from campus-approved list.		3-4
Cultural Studies		
Select one course from Western culture, one from non-Western culture, and one from U.S. minority culture from campus approved lists.		9
Foreign Language		
Coursework at or above the third level is required for graduation.		0-15
Quantitative Reasoning I		
See Mathematical Foundations for specific requirement.		3
Quantitative Reasoning II		
See Mathematical Foundations for specific requirement.		3
Natural Sciences and Technology		
See Crop Sciences Core for specific requirement.		6
Humanities and the Arts		
Select from campus-approved list.		6
Social and Behavioral Sciences		
Select from campus-approved list.		6
ACES Required		
ACES 101	Contemporary Issues in ACES	2
Computer Science Core		**22**
CS 100	Freshman Orientation (recommended)	1
CS 125	Introduction to Computer Science	4

CS 126	Software Design Studio	3
CS 124	Introduction to Computer Science I	3
CS 128	Introduction to Computer Science II	3
CS 173	Discrete Structures	3
CS 222	Software Design Lab	1
CS 225	Data Structures	4
CS 374	Introduction to Algorithms & Models of Computation	4
CS 421	Programming Languages & Compilers	3
Computer Science Technical Track		**8-11**
Choose from the following options:		
CS 233 & CS 241	Computer Architecture and System Programming	
OR		
CS 240	Introduction to Computer Systems	
& Two CS 4XX	Any two (2) 400-level CS courses exceptCS 491	
Mathematical Foundations (fulfills Quantitative Reasoning I and II)		**12-15**
CS 361	Probability & Statistics for Computer Science	3
MATH 220	Calculus	4-5
or MATH 221	Calculus I	
MATH 225	Introductory Matrix Theory	2-4
or MATH 257	Linear Algebra with Computational Applications	
or MATH 415	Applied Linear Algebra	
or MATH 416	Abstract Linear Algebra	
MATH 231	Calculus II	3
Crop Sciences Core		**14**
CPSC 102	Foundational Skills in Crop Sciences	2
CPSC 112	Introduction to Crop Sciences	4
CPSC 212	Introduction to Plant Protection	4
CPSC 393	Crop Sciences Internship	3
or CPSC 395	Undergrad Research or Thesis	
CPSC 498	Crop Sci Professional Develpmt	1
Select two of the following:		6
CPSC 226	Course CPSC 226 Not Found	
CPSC 270	Applied Entomology	
PLPA 204	Course PLPA 204 Not Found	
Foundational Data Analytics		**6-8**
CPSC 440	Applied Statistical Methods I	4
And select one of the following:		
CPSC 441	Introduction to R Programming	
CPSC 444	Introduction to Spatial Analytics	
Crop Sciences Electives		**6**
CPSC/HORT/PLPA 4XX	At least one (1) 400-level CPSC/HORT/PLPA course	
CPSC/HORT/PLPA XXX	Any CPSC/HORT/PLPA course exceptCPSC 241	
Total Hours		**126**

EP Documentation

DMI Documentation

Banner/Codebook Name

BS: Comp Sci & Crop Sci - UIUC

Program Code:

10KL5623BS

Degree Code

BS

Major Code

5623

Program Reviewer Comments

Deb Forgacs (dforgacs) (Wed, 17 Feb 2021 16:51:26 GMT): Rollback: requested.
Kathy Martensen (kmartens) (Wed, 07 Apr 2021 19:21:21 GMT): Rollback: admin approval
Kathy Martensen (kmartens) (Wed, 07 Apr 2021 19:31:59 GMT): Admin approval: No change to total hours required/restriction of options.

Key: 79

Computer Science + Crop Sciences Curriculum Revision: Side-by-side Comparison

Key

GREEN HIGHLIGHT = Course addition, requirement replacement or updated hours

RED HIGHLIGHT = Course to be removed from listed requirements.

Current Requirement	Current Hours	Revised Requirements	Revised Hours
Composition I and Speech	**6-7**	**Composition I and Speech**	**6-7**
RHET 105: Writing and Research		RHET 105: Writing and Research	
& CMN 101: Public Speaking		& CMN 101: Public Speaking	
OR		OR	
CMN 111: Oral & Written Comm I		CMN 111: Oral & Written Comm I	
& CMN 112 Oral & Written Comm II		& CMN 112 Oral & Written Comm II	
Advanced Composition		**Advanced Composition**	
Select from campus-approved list.	**3-4**	Select from campus-approved list.	**3-4**
Cultural Studies		**Cultural Studies**	
Select from Western culture, one from from non-Western culture, and one from U.S. minority culture from campus approved lists.	9	Select from Western culture, one from from non-Western culture, and one from U.S. minority culture from campus approved lists.	9
Select from Western culture, one from from non-Western culture, and one from U.S. minority culture from campus approved lists.		**Foreign Language**	
Coursework at or above the third level is required for graduation.	0-15	Coursework at or above the third level is required for graduation.	0-15
Quantitative Reasoning I		**Quantitative Reasoning I**	
See Mathematical Foundations for specific requirement.	3	See Mathematical Foundations for specific requirement.	3
Natural Sciences and Technology		**Natural Sciences and Technology**	
See Crop Sciences Core for specific requirement.	6	See Crop Sciences Core for specific requirement.	6
Humanities and the Arts		**Humanities and the Arts**	
Select from campus-approved list.	6	Select from campus-approved list.	6
Social and Behavioral Sciences		**Social and Behavioral Sciences**	
Select from campus-approved list.	6	Select from campus-approved list.	6
ACES Required		**ACES Required**	
ACES 101: Contemporary Issues in ACES	2	ACES 101: Contemporary Issues in ACES	2
Computer Science Core	**22**	**Computer Science Core**	**22**
CS 100 Freshman Orientation (recommended)	0-1	CS 100 Freshman Orientation (recommended)	1
CS 125: Intro to Computer Science	4		
		CS 124: Intro to Computer Science I	3
CS 126: Software Design Studio	3		
		CS 128: Intro to Computer Science II	3
CS 173: Discrete Structures	3	CS 173: Discrete Structures	3
		CS 222: Software Design Lab	1
CS 225: Data Structures	4	CS 225: Data Structures	4
CS 374: Introduction to Algorithms & Models of Computation	4	CS 374: Introduction to Algorithms & Models of Computation	4
CS 421: Programming Languages & Compilers	3	CS 421: Programming Languages & Compilers	3
Computer Science Technical Track	8-11	**Computer Science Technical Track**	8-11
Choose one of the following options:		**Choose one of the following options:**	
CS 233: Computer Architecture		CS 233: Computer Architecture	
& CS 241: System Programming		& CS 241: System Programming	
OR		OR	
CS 240: Introduction to Computer Systems		CS 240: Introduction to Computer Systems	
& Two CS 4xx: Any two (2) 400-level CS courses except CS 491		& Two CS 4xx: Any two (2) 400-level CS courses except CS 491	
Mathematical Foundations (fulfills Quantitative Reasoning I and II)	**12-13**	**Mathematical Foundations (fulfills Quantitative Reasoning I and II)**	**12-15**
CS 361: Probability & Statistics for Computer Science	3	CS 361: Probability & Statistics for Computer Science	3
MATH 220: Calculus	4-5	MATH 220: Calculus	4-5
or MATH 221: Calculus I		or MATH 221: Calculus I	
MATH 225 Introductory Matrix Theory	2	**Linear Algebra Option (choose one):**	2-4
		MATH 225 Introductory Matrix Theory	
		or MATH 257: Computational Linear Algebra	
		or MATH 415: Applied Linear Algebra	
		or MATH 416: Abstract Linear Algebra	
MATH 231 Calculus II	3	MATH 231 Calculus II	3
Crop Sciences Core	**16**	**Crop Sciences Core**	**14**
CPSC 102: Foundational Skills in Crop Sciences	**2**	CPSC 102: Foundational Skills in Crop Sciences	2
CPSC 112: Introduction to Crop Sciences	4	CPSC 112: Introduction to Crop Sciences	4
		CPSC 212: Introduction to Plant Protection	4
CPSC 393: Crop Sciences Internship	3	CPSC 393: Crop Sciences Internship	3
or CPSC 395: Undergrad Research or Thesis		or CPSC 395: Undergrad Research or Thesis	
CPSC 498: Crop Sciences Professional Development	1	CPSC 498: Crop Sciences Professional Development	1
Select two of the following:	6		
CPSC 226: Introduction to Weed Science			
CPSC 270: Applied Entomology			
PLPA 204: Introductory Plant Pathology			
Foundational Data Analytics	**6-8**	**Foundational Data Analytics**	**6-8**
CPSC 440: Applied Statistical Methods I	4	CPSC 440: Applied Statistical Methods I	4
And select one of the following:		And select one of the following:	
CPSC 441: Introduction to R Programming		CPSC 441: Introduction to R Programming	
CPSC 444: Introduction to Spatial Analytics		CPSC 444: Introduction to Spatial Analytics	
Crop Sciences Electives	**6**	**Crop Sciences Electives**	**6**
CPSC/HORT/PLPA 4XX: At least one (1) 400-level CPSC/HORT/PLPA course		CPSC/HORT/PLPA 4XX: At least one (1) 400-level CPSC/HORT/PLPA course	
CPSC/HORT/PLPA 4XX: Any CPSC/HORT/PLPA course except CPSC 241		CPSC/HORT/PLPA 4XX: Any CPSC/HORT/PLPA course except CPSC 241	
Total Hours	**126**	**Total Hours**	**126**

10KV5348BSLA: COMPUTER SCIENCE & ANTHROPOLOGY, BSLAS

In Workflow

1. U Program Review (dforgacs@illinois.edu; eastuby@illinois.edu; aledward@illinois.edu)
2. 1241 Head (bfarnell@illinois.edu)
3. 1434 Head (namato@illinois.edu; vmahesh@illinois.edu; egunter@illinois.edu)
4. KP Committee Chair (bsnewell@illinois.edu; danko@illinois.edu; kcp@illinois.edu; jmakela@illinois.edu)
5. KP Dean (candyd@illinois.edu)
6. KV Dean (las-catalog@illinois.edu)
7. University Librarian (jpwilkin@illinois.edu)
8. Provost (kmartens@illinois.edu)
9. Senate EPC (bjlehman@illinois.edu; moorhouz@illinois.edu; kmartens@illinois.edu)
10. Senate (jtempel@illinois.edu)
11. U Senate Conf (none)
12. Board of Trustees (none)
13. IBHE (none)
14. DMI (eastuby@illinois.edu; aledward@illinois.edu; dforgacs@illinois.edu)

Approval Path

1. Wed, 07 Apr 2021 16:38:35 GMT
   Deb Forgacs (dforgacs): Approved for U Program Review
2. Wed, 07 Apr 2021 18:45:17 GMT
   Brenda Farnell (bfarnell): Approved for 1241 Head
3. Wed, 07 Apr 2021 19:12:34 GMT
   Elsa Gunter (egunter): Approved for 1434 Head
4. Wed, 07 Apr 2021 19:29:55 GMT
   Brooke Newell (bsnewell): Approved for KP Committee Chair
5. Wed, 07 Apr 2021 19:32:07 GMT
   Candy Deaville (candyd): Approved for KP Dean
6. Wed, 07 Apr 2021 19:36:04 GMT
   Kelly Ritter (ritterk): Approved for KV Dean
7. Wed, 07 Apr 2021 19:40:16 GMT
   John Wilkin (jpwilkin): Approved for University Librarian
8. Wed, 07 Apr 2021 20:53:55 GMT
   Kathy Martensen (kmartens): Approved for Provost

History

1. Feb 1, 2019 by Deb Forgacs (dforgacs)

Date Submitted:Wed, 07 Apr 2021 12:53:27 GMT

Viewing:10KV5348BSLA : Computer Science & Anthropology, BSLAS

Changes proposed by: Amy Elli

Proposal Type

Proposal Type:

Major (ex. Special Education)

This proposal is for a:

Revision

Proposal Title:

If this proposal is one piece of a multi-element change please include the other impacted programs here.*example: A BS revision with multiple concentration revisions*

Administrative approval: Revisions to BSLAS in Computer Science & Anthropology, College of Liberal Arts & Sciences

EP Control Number

EP.21.115

Official Program Name

Computer Science & Anthropology, BSLAS

Effective Catalog Term

Fall 2021

Sponsor College

Liberal Arts & Sciences

Sponsor Department

Anthropology

Sponsor Name

Ripan Mahli, Professor Anthropology

Sponsor Email

malhi@illinois.edu

College Contact

Kelly Ritter

College Contact Email

ritterk@illinois.edu

Program Description and Justification

Justification for proposal change:

In the CS component, the proposal involves changes to three aspects. The first is a reorganization of the material in the introductory course sequence. The second is adding an alternative to the require systems programming courses, allowing for the flexibility to choose two elective courses in computer science at the senior level. The third is to incorporate an option of a new linear algebra course, MATH 257, into the linear algebra requirement for the program.
These changes are broadly shared, with some degree-specific modifications the suite of undergraduate programs including Computer Science:
10KP0112BS: Computer Science, BS
10KL5623BS: Computer Science + Crop Sciences, BS
10KL5864BS: Computer Science & Animal Sciences, BS
10KR5639BS: Computer Science + Music, BS
10KT5673BS: Computer Science & Advertising, BS
10KV0464BSLA: Statistics & Computer Science, BSLAS
10KV1438BSLA: Mathematics & Computer Science, BSLAS
10KV5348BSLA: Computer Science & Anthropology, BSLAS
10KV5349BSLA: Computer Science & Astronomy, BSLAS
10KV5350BSLA: Computer Science & Chemistry, BSLAS
10KV5351BSLA: Computer Science & Linguistics, BSLAS
10KV5667BSLA: Computer Science & Economics, BSLAS
10KV5676BSLA: Computer Science & Geography & Geographic Information Science, BSLAS
10KV5679BSLA: Computer Science & Philosophy, BSLAS
JP. 10KL5890BS & 1PKS5890MANS: JP. Computer Science & Animal Sciences, BS & Animal Science, MANSC
JP. 10KL5890BS & 1PKS5890MANS(MANU): JP. Computer Science & Animal Sciences, BS & Animal Science, MANSC
JP.10KL5903BS & 10KS5903MS: JP. Computer Science + Crop Sciences, BS & Crop Sciences, MS
In more detail,
1) (CS 125(4cr) Introduction to Computer Science + CS 126(3cr) Software Design Studio) -> (CS 124(3cr) Introduction to Computer Science I + CS 128(3cr) Introduction to Computer Science II + CS 222(1cr) Software Design Lab), CS 242(3cr) Programming Studio -> CS 222(1cr) Software Design Lab, the CS 225 Data Structures prerequisite of CS 125 is replaced with (CS 126 or CS 128) as the programming prerequisite, CS 128 is open to all, CS 222 is restricted to &CS+ programs. The programming prerequisite for CS 173 is changed from CS 125 to (CS 124 or CS 125).
Justification: CS 128 takes about 2/3 of the material from old CS 126 and receives an hour from the old CS 125 topics, with the remaining topics remaining with CS 124. Replacing CS 126 with CS 128 makes the path to CS 225 uniform for all students (except ECE), including &CS+ majors, students wanting to transfer into one of the &CS+, students doing minors and students needing CS 225 to complete a concentration. It also allows CS 225 to start with an assumption that all students know how to program in C++, and assures all students in the class have a common programming background. Further, the new CS 128 will provide an extended ability for general students to increase their skills in programming and structured program design and development, but without the more specialized material in Data Structures. Adding CS 222 and removing CS 242 eliminates the attempt to discriminate between how students entering as freshmen versus as transfers take the code review class.
2) Change the requirements of CS 233(4cr) Computer Architecture and CS 241(4 cr) System Programming to the student's choice or (CS 233 and CS 241) or (CS 240(3 cr) Introduction to Computer Systems and two 400-level CS courses (not including CS 491))
Justification: This option is already a possibility in several of the CS+X degree programs and it allows students in Computer Science + Anthropology to customize their program to better focus on the aspects of CS that impact the areas of Anthropology most in line with their interests.

3) Change the linear algebra requirement from MATH 225 to (Math 225 or Math 257).

Justification: The Math department is developing MATH 257 as the eventual replacement for MATH 415, with the same theoretical content, but with an emphasis on using programming to perform matrix operations instead of calculating them on paper. Students in Anthropology and Computer Science should have the option of a stronger linear algebra class with stronger ties to programming.

In the required Anthropology coursework, two courses that no longer exist have been removed from the listing: ANTH 271 and ANTH 362.
ANTH 110 Humanizing Science is added as an option for students to choose from for the 12-18 hours of Foundation courses. ANTH 110 places science and technology as a way of knowing and producing tools in society along with other ways of knowing. This does not effect the required hours of Anthropology courses.

Corresponding Degree

BSLAS Bachelor of Science in Liberal Arts and Sciences

Is this program interdisciplinary?

Yes

Interdisciplinary Colleges and Departments (list other colleges/departments which are involved other than the sponsor chose above)

College

Grainger College of Engineering

Department

Computer Science

Do you need to add an additional interdisciplinary relationship?

No

Academic Level

Undergraduate

Will you admit to the concentration directly?

No

Is a concentration required for graduation?

No

CIP Code

110199 - Computer and Information Sciences, Other.

Is This a Teacher Certification Program?

No

Will specialized accreditation be sought for this program?

No

Admission Requirements

Desired Effective Admissions Term

Fall 2021

Is this revision a change to the admission status of the program?

No

Provide a brief narrative description of the admission requirements for this program. Where relevant, include information about licensure requirements, student background checks, GRE and TOEFL scores, and admission requirements for transfer students.

N/A

Describe how critical academic functions such as admissions and student advising are managed.

N/A

Enrollment

Describe how this revision will impact enrollment and degrees awarded.

The department does not anticipate any impact to enrollment or degrees awarded.

Estimated Annual Number of Degrees Awarded

What is the matriculation term for this program?

Fall

What is the typical time to completion of this program?

4 years

What are the minimum Total Credit Hours required for this program?

120

Delivery Method

Is this program available on campus and online?

No

This program is available:

On Campus

Budget

Are there budgetary implications for this revision?

No

Will the program or revision require staffing (faculty, advisors, etc.) beyond what is currently available?

No

Resource Implications

Facilities

Will the program require new or additional facilities or significant improvements to already existing facilities?

No

Technology

Will the program need additional technology beyond what is currently available for the unit?

No

Non-Technical Resources

Will the program require additional supplies, services or equipment (non-technical)?

No

Resources

For each of these items, be sure to include in the response if the proposed new program or change will result in replacement of another program(s). If so, which program(s), what is the anticipated impact on faculty, students, and instructional resources? Please attach any letters of support/ acknowledgement from faculty, students, and/or other impacted units as appropriate.

Attach File(s)

CS_letter_Math_257.pdf

Faculty Resources

Please address the impact on faculty resources including any changes in numbers of faculty, class size, teaching loads, student-faculty ratios, etc. Describe how the unit will support student advising, including job placement and/or admission to advanced studies.

N/A

Library Resources

Describe your proposal's impact on the University Library's resources, collections, and services. If necessary please consult with the appropriate disciplinary specialist within the University Library.

Current collections and services are adequate for the proposed program.

Instructional Resources

Will there be any reduction in other course offerings, programs or concentrations by your department as a result of this new program/proposed change?

No

Does the program include other courses/subjects impacted by the creation/revision of this program?

No

Financial Resources

How does the unit intend to financially support this proposal?

No change in support.

Will the unit need to seek campus or other external resources?

No

Are you seeking a change in the tuition rate or differential for this program?

No

Program Regulation and Assessment

Briefly describe the plan to assess and improve student learning, including the program's learning objectives; when, how, and where these learning objectives will be assessed; what metrics will be used to signify student's achievement of the stated learning objectives; and the process to ensure assessment results are used to improve student learning. (Describe how the program is aligned with or meets licensure, certification, and/or entitlement requirements, if applicable).

N/A

Is the career/profession for graduates of this program regulated by the State of Illinois?

No

Program of Study

"Baccalaureate degree requires at least 120 semester credit hours or 180 quarter credit hours and at least 40 semester credit hours (60 quarter credit hours) in upper division courses" (source: https://www.ibhe.org/assets/files/PrivateAdminRules2017.pdf). For proposals for new bachelor's degrees,

if this minimum is not explicitly met by specifically-required 300- and/or 400-level courses, please provide information on how the upper-division hours requirement will be satisfied.

All proposals must attach the new or revised version of the Academic Catalog program of study entry. Contact your college office if you have questions.

Revised programs

MATH 257 option to 225.pdf
CS + ANTH revisions side-by-side comparative table April2021.xlsx

Attach a side-by-side comparison with the existing program AND, if the revision references or adds "chose-from" lists of courses students can select from to fulfill requirements, a listing of these courses, including the course rubric, number, title, and number of credit hours.

Catalog Page Text

Statement for Programs of Study Catalog

General education:Students must complete the Campus General Education **(**https://courses.illinois.edu/**)requirements including the campus general education language requirement.**
Minimum required major and supporting course work:Normally equates to 66 hours. Twelve hours of 300- and 400-level Anthropology courses must be taken on this campus.
Minimum hours required for graduation:120 hours

Code	Title	Hours
Required Computer Science Coursework		
CS 100	Freshman Orientation (recommended)[1]	1
CS 125	Introduction to Computer Science	4
CS 126	Software Design Studio	3
CS 124	Introduction to Computer Science I	3
CS 128	Introduction to Computer Science II	3
CS 173	Discrete Structures	3
CS 225	Data Structures	4
CS 222	Software Design Lab	1
Choose one of the following combinations		8-11
CS 233 & CS 241	Computer Architecture and System Programming	
CS 241	System Programming	4
OR		
CS 240	Introduction to Computer Systems	
& two CS courses at the 400 level aboveCS 403, excludingCS 421andCS 491		
Choose one of the following:		
STAT 200	Statistical Analysis	
STAT 212	Biostatistics	
CS 361	Probability & Statistics for Computer Science	
CS 374	Introduction to Algorithms & Models of Computation	4
CS 421	Programming Languages & Compilers	3
Mathematics (may also fulfill the General Education Quantitative Reasoning I and II requirements)		
MATH 221	Calculus I	4-5
or MATH 220	Calculus	
MATH 225	Introductory Matrix Theory	2 or 3
or MATH 257	Linear Algebra with Computational Applications	

MATH 231	Calculus II	3
Required Anthropology Coursework - Minimum of 24 hours		
Required Foundation Courses. Select at least 4 courses from the following. Students may make one course substitution for one of the required foundation courses, choosing from the option listed.		**12-18**
ANTH 101	Introduction to Anthropology	
ANTH 110	Humanizing Science	
ANTH 220	Introduction to Archaeology	
or ANTH 105	World Archaeology	
ANTH 230	Sociocultural Anthropology	
or ANTH 103	Anthro in a Changing World	
ANTH 240	Biological Anthropology	
or ANTH 102	Human Origins and Culture	
ANTH 270	Language in Culture	
or ANTH 104	Talking Culture	
ANTH 374	Anth of Science and Technology	
or ANTH 372	Topics in Lang & Culture	
Electives (Substitutions with permission of advisor)		**6-9**
ANTH 241	Human Biological Variation	
ANTH 268	Images of the Other	
ANTH 362	Course ANTH 362 Not Found	
ANTH 368	'America' in the World	
ANTH 375	The Culture of Nature	
ANTH 399	Special Topics (check with advisor for appropriate topics)	
ANTH 411	Research Methods in Socio-Cultural Anthropology	
ANTH 423	Economic Anthropology	
ANTH 453	Landscape Archaeology	
ANTH 499	Topics in Anthropology (check with advisor for appropriate topics)	
Optional Senior Capstone Project (See advisor for details)		

[1] CS 100 is an orientation course aimed at first-year students, so students who declare the major after the freshman year are not required to complete it.

EP Documentation

DMI Documentation

Banner/Codebook Name

BSLAS: Comp Sci & Anth-UIUC

Program Code:

10KV5348BSLA

Degree Code

BSLAS

Major Code

5348

Program Reviewer Comments

Kathy Martensen (kmartens) (Wed, 07 Apr 2021 20:53:52 GMT): Administrative approval: No change to total hours required/restriction of options.

Key: 281

Key

GREEN HIGHLIGHT = Course addition, requirement replacement or updated hours

RED HIGHLIGHT = Course to be removed from listed requirements.

Current Requirement	Current Hours	
CS 100	Freshman Orientation (recommended) 1	1
CS 125	Introduction to Computer Science	4
CS 126	Software Design Studio	3
CS 173	Discrete Structures	3
CS 225	Data Structures	4
CS 233	Computer Architecture	4
CS 241	System Programming	4
Choose one of the following:		3
STAT 200	Statistical Analysis	
STAT 212	Biostatistics	
CS 361	Probability & Statistics for Computer Science (recommended)	
CS 374	Introduction to Algorithms & Models of Computation	4
CS 421	Programming Languages & Compilers	3 or 4
Mathematics (may also fulfill the General Education QR I and II requirements)		
MATH 220 or MATH 221	Calculus Calculus I	5
MATH 225	Introductory Matrix Theory	2
MATH 231	Calculus II	

Revised Requirements	Revised Hours	
CS 100	Freshman Orientation (recommended) 1	1
CS 124	Introduction to Computer Science I	3
CS 128	Introduction to Computer Science II	3
CS 173	Discrete Structures	3
CS 225	Data Structures	4
CS 222	Software Design Lab	1
Choose one of the following combinations:		8 to 11
CS 233 & CS 241 OR CS 240 & Two CS 4XX	Computer Architecture System Programming Introduction to Computer Systems Any two (2) 400-level CS courses above CS 403, excluding CS 421 and CS 491	
Choose one of the following:		3
STAT 200	Statistical Analysis	
STAT 212	Biostatistics	
CS 361	Probability & Statistics for Computer Science (recommended)	
CS 374	Introduction to Algorithms & Models of Computation	4
CS 421	Programming Languages & Compilers	3 or 4
Mathematics (may also fulfill the General Education QR I and II requirements)		
MATH 220 or MATH 221	Calculus Calculus I	5
MATH 225 or MATH 257	Introductory Matrix Theory Linear Algebra with Computational Applications	2 or 3
MATH 231	Calculus II	

Required Anthropology Coursework - Minimum of 24 hours

	Required Foundation Courses. Select at least 4 courses from the following. Students may make one course substitution for one of the required foundation courses, choosing from the option listed.	12-18
ANTH 101	Introduction to Anthropology	
ANTH 220 or ANTH 105	Introduction to Archaeology World Archaeology	
ANTH 230 OR ANTH 103	Sociocultural Anthropology Anthro in a Changing World	
ANTH 240 or ANTH 102	Biological Anthropology Human Origins and Culture	
ANTH 270/271 OR ANTH 104	Language in Culture Talking Culture	
ANTH 374 OR ANTH 372	Anth of Science and Technology Topics in Lang & Culture	
	Electives (Substitutions with permission of advisor)	6-9
ANTH 241	Human Biological Variation	
ANTH 268	Images of the Other	
ANTH 362		
ANTH 368	'America' in the World	
ANTH 375	The Culture of Nature	
ANTH 399	Special Topics (check with advisor for appropriate topics)	
ANTH 411	Research Methods in Socio-Cultural Anthropology	
ANTH 423	Economic Anthropology	
ANTH 453	Landscape Archaeology	
ANTH 499	Topics in Anthropology (check with advisor for appropriate topics)	

Optional Senior Capstone Project (See advisor for details)

Required Anthropology Coursework - Minimum of 24 hours

	Required Foundation Courses. Select at least 4 courses from the following. Students may make one course substitution for one of the required foundation courses, choosing from the option listed.	12-18
ANTH 10	Introduction to Anthropology	
ANTH	Humanizing Science	
ANTH 22 0 or	Introduction to Archaeology World Archaeology	
ANTH 23 0 OR ANTH	Sociocultural Anthropology Anthro in a Changing World	
ANTH 24 0 or ANTH	Biological Anthropology Human Origins and Culture	
ANTH 270 OR ANTH	Language in Culture Talking Culture	
ANTH 37 4 OR ANTH	Anth of Science and Technology Topics in Lang & Culture	
	Electives (Substitutions with permission of advisor)	6-9
ANTH 24	Human Biological Variation	
ANTH 26	Images of the Other	
ANTH 36	'America' in the World	
ANTH 37	The Culture of Nature	
ANTH 39	Special Topics (check with advisor for appropriate topics)	
ANTH 41	Research Methods in Socio-Cultural Anthropology	
ANTH 42	Economic Anthropology	
ANTH 45	Landscape Archaeology	
ANTH 49	Topics in Anthropology (check with advisor for appropriate topics)	

Optional Senior Capstone Project (See advisor for details)

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Department of Mathematics

273 Altgeld Hall, MC-382
1409 West Green Street
Urbana, IL 61801

Re: Use of Math 257 in Computer Science and related programs

The Mathematics Department, working with the Grainger College of Engineering, has recently created the course MATH 257, *Linear Algebra with Computational Applications*. Quoting from the justification of the approved proposal, "In the future, MATH 257 will replace the MATH 415 requirement in many science and engineering curricula." With this in mind, the department would be pleased to have Computer Science add MATH 257 as a linear algebra option in their programs, specifically in:

10KP0112BS: Computer Science, BS
10KV1438BSLA: Mathematics & Computer Science, BSLAS
10KV0464BSLA: Statistics & Computer Science, BSLAS
10KV5348BSLA: Computer Science & Anthropology, BSLAS
10KV5349BSLA: Computer Science & Astronomy, BSLAS
10KV5350BSLA: Computer Science & Chemistry, BSLAS
10KV5351BSLA: Computer Science & Linguistics, BSLAS
10KV5667BSLA: Computer Science & Economics, BSLAS
10KV5676BSLA: Computer Science & Geography & Geographic Information Science, BSLAS
10KV5679BSLA: Computer Science & Philosophy, BSLAS
10KR5639BS: Computer Science + Music, BS
10KT5673BS: Computer Science & Advertising, BS
10KL5864BS: Computer Science & Animal Sciences, BS
10KL5623BS: Computer Science + Crop Sciences, BS
JP: 10KL5890BS & 1PKS5890MANS: JP: Computer Science & Animal Sciences, BS & Animal Science, MANSC
JP: 10KL5890BS & 1PKS5890MANS(MANU): JP: Computer Science & Animal Sciences, BS & Animal Science, MANSC
JP:10KL5903BS & 10KS5903MS: JP: Computer Science + Crop Sciences, BS & Crop Sciences, MS

As the Mathematics department is reallocating instructional resources from Math 415 to Math 257 as the need shifts, this will not cause any undue difficulties for Mathematics resources.

Sincerely

Randy McCarthy

Randy McCarthy
Professor of Mathematics
Dir of Undergraduate Studies in Math
rmccrthy@illinois.edu

telephone 217-333-3350 • *fax* 217-333-9576
email office@math.uiuc.edu • *url* http://www.math.uiuc.edu/

10KV5349BSLA: COMPUTER SCIENCE & ASTRONOMY, BSLAS

Completed Workflow

1. U Program Review (dforgacs@illinois.edu; eastuby@illinois.edu; aledward@illinois.edu)
2. 1430 Head (lwl@illinois.edu; bdunne@illinois.edu)
3. 1434 Head (namato@illinois.edu; vmahesh@illinois.edu; egunter@illinois.edu)
4. KP Dean (candyd@illinois.edu)
5. KV Dean (las-catalog@illinois.edu)
6. University Librarian (jpwilkin@illinois.edu)
7. Provost (kmartens@illinois.edu)
8. Senate EPC (bjlehman@illinois.edu; moorhouz@illinois.edu; kmartens@illinois.edu)
9. Senate (jtempel@illinois.edu)
10. U Senate Conf (none)

Approval Path

1. Fri, 17 Jan 2020 16:10:20 GMT
   Deb Forgacs (dforgacs): Approved for U Program Review
2. Sat, 18 Jan 2020 01:28:53 GMT
   Bryan C. Dunne (bdunne): Approved for 1430 Head
3. Sat, 18 Jan 2020 21:05:55 GMT
   Elsa Gunter (egunter): Approved for 1434 Head
4. Tue, 21 Jan 2020 14:51:31 GMT
   Candy Deaville (candyd): Approved for KP Dean
5. Tue, 21 Jan 2020 15:59:16 GMT
   Kelly Ritter (ritterk): Approved for KV Dean
6. Tue, 21 Jan 2020 16:19:17 GMT
   John Wilkin (jpwilkin): Approved for University Librarian
7. Tue, 21 Jan 2020 16:45:30 GMT
   Kathy Martensen (kmartens): Approved for Provost
8. Wed, 29 Jan 2020 17:00:23 GMT
   Barbara Lehman (bjlehman): Approved for Senate EPC
9. Wed, 12 Feb 2020 22:25:59 GMT
   Jennifer Roether (jtempel): Approved for Senate
10. Wed, 26 Feb 2020 23:57:36 GMT
    Kathy Martensen (kmartens): Approved for U Senate Conf

History

1. Feb 22, 2019 by Deb Forgacs (dforgacs)
2. Feb 26, 2020 by Kelly Ritter (ritterk)

Date Submitted:Wed, 07 Apr 2021 12:55:05 GMT

Viewing:10KV5349BSLA : Computer Science & Astronomy, BSLAS

Changes proposed by: Kelly Ritter

Proposal Type

Proposal Type:

Major (ex. Special Education)

This proposal is for a:

Revision

Proposal Title:

If this proposal is one piece of a multi-element change please include the other impacted programs here.*example: A BS revision with multiple concentration revisions*

Administrative approval: Revision to the BSLAS in Computer Science & Astronomy, College of Liberal Arts and Sciences

EP Control Number

EP.21.115

Official Program Name

Computer Science & Astronomy, BSLAS

Effective Catalog Term

Fall 2021

Sponsor College

Liberal Arts & Sciences

Sponsor Department

Astronomy

Sponsor Name

Tony Wong

Sponsor Email

wongt@illinois.edu

College Contact

Kelly Ritter

College Contact Email

ritterk@illinois.edu

Program Description and Justification

Justification for proposal change:

In the CS component, the proposal involves changes to three aspects. The first is a reorganization of the material in the introductory course sequence. The second is adding an alternative to the require systems programming courses, allowing for the flexibility to choose two elective

courses in computer science at the senior level. The third is to incorporate an option of a new linear algebra course, MATH 257, into the linear algebra requirement for the program.
These changes are broadly shared, with some degree-specific modifications the suite of undergraduate programs including Computer Science:
10KP0112BS: Computer Science, BS
10KL5623BS: Computer Science + Crop Sciences, BS
10KL5864BS: Computer Science & Animal Sciences, BS
10KR5639BS: Computer Science + Music, BS
10KT5673BS: Computer Science & Advertising, BS
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JP.10KL5903BS & 10KS5903MS: JP. Computer Science + Crop Sciences, BS & Crop Sciences, MS
In more detail,
1) (CS 125(4cr) Introduction to Computer Science + CS 126(3cr) Software Design Studio) -> (CS 124(3cr) Introduction to Computer Science I + CS 128(3cr) Introduction to Computer Science II + CS 222(1cr) Software Design Lab), CS 242(3cr) Programming Studio -> CS 222(1cr) Software Design Lab, the CS 225 Data Structures prerequisite of CS 125 is replaced with (CS 126 or CS 128) as the programming prerequisite, CS 128 is open to all, CS 222 is restricted to &CS+ programs. The programming prerequisite for CS 173 is changed from CS 125 to (CS 124 or CS 125).
Justification: CS 128 takes about 2/3 of the material from old CS 126 and receives an hour from the old CS 125 topics, with the remaining topics remaining with CS 124. Replacing CS 126 with CS 128 makes the path to CS 225 uniform for all students (except ECE), including &CS+ majors, students wanting to transfer into one of the &CS+, students doing minors and students needing CS 225 to complete a concentration. It also allows CS 225 to start with an assumption that all students know how to program in C++, and assures all students in the class have a common programming background. Further, the new CS 128 will provide an extended ability for general students to increase their skills in programming and structured program design and development, but without the more specialized material in Data Structures. Adding CS 222 and removing CS 242 eliminates the attempt to discriminate between how students entering as freshmen versus as transfers take the code review class.
2) Change the requirements of CS 233(4cr) Computer Architecture and CS 241(4 cr) System Programming to the student's choice or (CS 233 and CS 241) or (CS 240(3 cr) Introduction to Computer Systems and two 400-level CS courses (not including CS 491))
Justification: This option is already a possibility in several of the CS+X degree programs and it allows students in Computer Science + Astronomy to customize their program to better focus on the aspects of CS that impact the areas of Astronomy most in line with their interests.

3) Change the linear algebra requirement from MATH 225 to (Math 225 or Math 257).

Justification: The Math department is developing MATH 257 as the eventual replacement for MATH 415, with the same theoretical content, but with an emphasis on using programming to perform matrix operations instead of calculating them on paper. Students in Astronomy and Computer Science should have the option of a stronger linear algebra class with stronger ties to programming.

Corresponding Degree

BSLAS Bachelor of Science in Liberal Arts and Sciences

Is this program interdisciplinary?

Yes

Interdisciplinary Colleges and Departments (list other colleges/departments which are involved other than the sponsor chose above)

College

Grainger College of Engineering

Department

Computer Science

Do you need to add an additional interdisciplinary relationship?

No

Academic Level

Undergraduate

Will you admit to the concentration directly?

No

Is a concentration required for graduation?

No

CIP Code

110199 - Computer and Information Sciences, Other.

Is This a Teacher Certification Program?

No

Will specialized accreditation be sought for this program?

No

Admission Requirements

Desired Effective Admissions Term

Fall 2021

Is this revision a change to the admission status of the program?

No

Provide a brief narrative description of the admission requirements for this program. Where relevant, include information about licensure requirements, student background checks, GRE and TOEFL scores, and admission requirements for transfer students.

N/A

Describe how critical academic functions such as admissions and student advising are managed.

N/A

Enrollment

Describe how this revision will impact enrollment and degrees awarded.

The department does not anticipate any impact to enrollment or degrees awarded.

Estimated Annual Number of Degrees Awarded

What is the matriculation term for this program?

Fall

What is the typical time to completion of this program?

4 years

What are the minimum Total Credit Hours required for this program?

120

Delivery Method

Is this program available on campus and online?

No

This program is available:

On Campus

Budget

Are there budgetary implications for this revision?

No

Will the program or revision require staffing (faculty, advisors, etc.) beyond what is currently available?

No

Resource Implications

Facilities

Will the program require new or additional facilities or significant improvements to already existing facilities?

No

Technology

Will the program need additional technology beyond what is currently available for the unit?

No

Non-Technical Resources

Will the program require additional supplies, services or equipment (non-technical)?

No

Resources

For each of these items, be sure to include in the response if the proposed new program or change will result in replacement of another program(s). If so, which program(s), what is the anticipated impact on faculty, students, and instructional resources? Please attach any letters of support/ acknowledgement from faculty, students, and/or other impacted units as appropriate.

Attach File(s)

CS_letter_Math_257.pdf

Faculty Resources

Please address the impact on faculty resources including any changes in numbers of faculty, class size, teaching loads, student-faculty ratios, etc. Describe how the unit will support student advising, including job placement and/or admission to advanced studies.

N/A

Library Resources

Describe your proposal's impact on the University Library's resources, collections, and services. If necessary please consult with the appropriate disciplinary specialist within the University Library.

Current collections and services are adequate for the proposed program.

Instructional Resources

Will there be any reduction in other course offerings, programs or concentrations by your department as a result of this new program/proposed change?

No

Does the program include other courses/subjects impacted by the creation/revision of this program?

No

Financial Resources

How does the unit intend to financially support this proposal?

No financial impact is anticipated.

Will the unit need to seek campus or other external resources?

No

Are you seeking a change in the tuition rate or differential for this program?

No

Program Regulation and Assessment

Briefly describe the plan to assess and improve student learning, including the program's learning objectives; when, how, and where these learning objectives will be assessed; what metrics will be used to signify student's achievement of the stated learning objectives; and the process to ensure assessment results are used to improve student learning. (Describe how the program is aligned with or meets licensure, certification, and/or entitlement requirements, if applicable).

N/A

Is the career/profession for graduates of this program regulated by the State of Illinois?

No

Program of Study

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All proposals must attach the new or revised version of the Academic Catalog program of study entry. Contact your college office if you have questions.

Revised programs

CS ASTR revisions side-by-side comparative table April2021.xlsx
MATH 257 option to 225.pdf

Attach a side-by-side comparison with the existing program AND, if the revision references or adds "chose-from" lists of courses students can select from to fulfill requirements, a listing of these courses, including the course rubric, number, title, and number of credit hours.

Catalog Page Text

Statement for Programs of Study Catalog

General education:Students must complete the Campus General Education **(**https://courses.illinois.edu/**)requirements including the campus general education language requirement.**
Minimum required major and supporting course work:Normally equates to 68-71 hours. Twelve hours of 300- and 400-level in the major must be taken on this campus.
A Major Plan of Study form must be completed and submitted to the LAS Student Affairs office by the beginning of the fifth semester (60-75 hours). Please see the Computer Science advisor as well as the Astronomy advisor.

Minimum hours required for graduation:120 hours.

Code	Title	Hours
Required Computer Science Coursework		
CS 100	Freshman Orientation (recommended)[1]	1
CS 125	Introduction to Computer Science	4
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CS 421	Programming Languages & Compilers	3
Mathematics (may also fulfill the General Education Quantitative Reasoning I and II requirements)		
MATH 221	Calculus I	4-5
or MATH 220	Calculus	
MATH 225	Introductory Matrix Theory	2 or 3
or MATH 257	Linear Algebra with Computational Applications	
MATH 231	Calculus II	3
Required Astronomy Coursework - Minimum of 27 Hours		
Physics, Mathematics, and Astronomy Foundations		**15**
Physics, Mathematics, and Astronomy Foundations (15 hours)		
PHYS 211	University Physics: Mechanics	4
PHYS 212	University Physics: Elec & Mag	4
MATH 241	Calculus III	4
ASTR 210	Introduction to Astrophysics	3
Advanced Astronomy Courses		**12-13**
Advanced Astronomy Courses (12-13 hours)		
ASTR 310	Computing in Astronomy	3
Select 2 courses from the following list:		6-7

ASTR 404	Stellar Astrophysics	
ASTR 405	Planetary Systems	
ASTR 406	Galaxies and the Universe	
ASTR 414	Astronomical Techniques	
Additional ASTR course(s) at the 300 level or higher (2-3 hours)	Minimum 12 total advanced ASTR hours required	2-3

[1] CS 100 is an orientation course aimed at first-year students, so students who declare the major after the freshman year are not required to complete it.

EP Documentation

DMI Documentation

Banner/Codebook Name

BSLAS: Comp Sci & Astr-UIUC

Program Code:

10KV5349BSLA

Degree Code

BSLAS

Major Code

5349

Program Reviewer Comments

Kathy Martensen (kmartens) (Wed, 07 Apr 2021 20:57:12 GMT): Administrative approval: No change to total hours required/restriction on options.

Key: 282

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Department of Mathematics

273 Altgeld Hall, MC-382
1409 West Green Street
Urbana, IL 61801

Re: Use of Math 257 in Computer Science and related programs

The Mathematics Department, working with the Grainger College of Engineering, has recently created the course MATH 257, *Linear Algebra with Computational Applications*. Quoting from the justification of the approved proposal, "In the future, MATH 257 will replace the MATH 415 requirement in many science and engineering curricula." With this in mind, the department would be pleased to have Computer Science add MATH 257 as a linear algebra option in their programs, specifically in:

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10KV5348BSLA: Computer Science & Anthropology, BSLAS
10KV5349BSLA: Computer Science & Astronomy, BSLAS
10KV5350BSLA: Computer Science & Chemistry, BSLAS
10KV5351BSLA: Computer Science & Linguistics, BSLAS
10KV5667BSLA: Computer Science & Economics, BSLAS
10KV5676BSLA: Computer Science & Geography & Geographic Information Science, BSLAS
10KV5679BSLA: Computer Science & Philosophy, BSLAS
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JP: 10KL5890BS & 1PKS5890MANS: JP: Computer Science & Animal Sciences, BS & Animal Science, MANSC
JP: 10KL5890BS & 1PKS5890MANS(MANU): JP: Computer Science & Animal Sciences, BS & Animal Science, MANSC
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As the Mathematics department is reallocating instructional resources from Math 415 to Math 257 as the need shifts, this will not cause any undue difficulties for Mathematics resources.

Sincerely

Randy McCarthy

Randy McCarthy
Professor of Mathematics
Dir of Undergraduate Studies in Math
rmccrthy@illinois.edu

telephone 217-333-3350 • *fax* 217-333-9576
email office@math.uiuc.edu • *url* http://www.math.uiuc.edu/

MATH 257: LINEAR ALGEBRA WITH COMPUTATIONAL APPLICATIONS

Completed Workflow

1. 1257 Head (tyson@illinois.edu)
2. KV Dean (las-catalog@illinois.edu)
3. COTE (bmclvngr@illinois.edu)
4. Provost (kmartens@illinois.edu)
5. Registrar (fms-catalog@illinois.edu)
6. Banner (fms-catalog@illinois.edu)

Approval Path

1. Fri, 11 Sep 2020 16:06:49 GMT
   Jeremy Tyson (tyson): Approved for 1257 Head
2. Wed, 07 Oct 2020 15:10:03 GMT
   Kelly Ritter (ritterk): Approved for KV Dean
3. Wed, 07 Oct 2020 15:20:34 GMT
   Brenda Clevenger (bmclvngr): Approved for COTE
4. Wed, 07 Oct 2020 15:26:44 GMT
   Kathy Martensen (kmartens): Approved for Provost
5. Wed, 07 Oct 2020 20:32:52 GMT
   Deb Forgacs (dforgacs): Approved for Registrar
6. Sat, 10 Oct 2020 08:53:17 GMT
   system: Approved for Banner

History

1. Oct 10, 2020 by Alison Champion (abc)

Viewing:MATH 257 : Linear Algebra with Computational Applications

Changes proposed by: Alison Champion

General Information
Effective Term:

Fall 2021

College:

Liberal Arts & Sciences

Department/Unit Name (ORG Code):

Mathematics (1257)

Course Subject:

Mathematics (MATH)

Course Number:

257

Course Title:

Linear Algebra with Computational Applications

Abbreviated Title:

Linear Algebra w Computat Appl

Course Description:

Introductory course incorporating linear algebra concepts with computational tools, with real world applications to science, engineering and data science. Topics include linear equations, matrix operations, vector spaces, linear transformations, eigenvalues, eigenvectors, inner products and norms, orthogonality, linear regression, equilibrium, linear dynamical systems and the singular value decomposition.

Justification

Justification for change:

This course was developed in cooperation with Grainger College of Engineering to allow undergraduates to use linear algebra at an earlier stage in their studies and also to incorporate modern computational tools. It contains much of the material from MATH 415 but with computational tools and data science topics. It covers applications and topics not included in MATH 225.

In the future, MATH 257 will replace the MATH 415 requirement in many science and engineering curricula, and it will become a second choice or a replacement in curricula which currently require MATH 225, including most CS+X curricula.

Please Note: a syllabus is required for General Education review:

MATH257 Syllabus.pdf

Course Information

Course Credit

Undergraduate:

3

Registrar Use Only:

Banner Credit:

3

Billable Hours:

3

Grading Type

Letter Grade

Available for DFR:

No

Repeatability
No

Credit Restrictions
Credit Restrictions:

Credit is not given for both MATH 257 and any of MATH 125, MATH 225, MATH 227, MATH 415 or ASRM 406.

Advisory Statements
MATH 220 or MATH 221; CS 101 or equivalent programming experience.

Cross-listing

Class Schedule Information

Fees
No

Course Description in the Catalog Entry
This is how the above information will be represented in the Catalog:

Introductory course incorporating linear algebra concepts with computational tools, with real world applications to science, engineering and data science. Topics include linear equations, matrix operations, vector spaces, linear transformations, eigenvalues, eigenvectors, inner products and norms, orthogonality, linear regression, equilibrium, linear dynamical systems and the singular value decomposition. Course Information: Credit is not given for both MATH 257 and any of MATH 125, MATH 225, MATH 227, MATH 415 or ASRM 406. Students must register for a lecture, a lab, and a discussion section. Prerequisite: MATH 220 or MATH 221; CS 101 or equivalent programming experience.

Additional Course Notes
Students must register for a lecture, a lab, and a discussion section.

Course Detail
Frequency of course:

Every Fall
Every Spring
Every Summer

Duration of the course

Full

Anticipated Enrollment:

800

Expected distribution of student registration:

Freshman:
30 %

Sophomore:
50 %

Junior:
10 %

Senior:
10 %

General Education

Additional Course Information

Does this course replace an existing course?

No

Does this course impact other courses?

Yes

Specify the courses affected:

MATH 125, MATH 225, MATH 415, ASRM 406 credit restrictions. This course may also serve as prerequisite for courses currently listing MATH 415 as a prerequisite, both within and outside of MATH rubric courses.

Does the addition of this course impact the departmental curriculum?

No

Has this course been offered as a special topics or other type of experimental course?

Yes

Please indicate the Banner subject, course number, section ID, term and enrollment for each offering:

MATH 299 E1 add-on to Math 415 in Spring 2020, 24;
MATH 415 PL1, Fall 2020, 280.

Will this course be offered on-line?

Face-to-Face

Faculty members who will teach this course:

Philipp Hieronymi

Course ID:

1012152

Course Edits Proposed by:

Philipp Hieronymi

Key: 12299

From: "Gunter, Elsa" <egunter@illinois.edu>
Subject: Re: CS+Astronomy revision
Date: April 18, 2019 at 1:12:22 AM CDT
To: "Wong, Tony" <wongt@illinois.edu>

Dear Tony,

I have reviewed the proposed changes to the CS+ ASTR degree program and found them to be sensible and an improvement, and as such I approve them, both the addition of ASTR 210 at the beginning of the program to give the students a more solid foundation, and the revision to the category "Intermediate and Advanced Astronomy" to make it more focused and more tightly fitting the purpose of the CS+ASTR degree.

---Elsa

--
Elsa L Gunter
Research Professor
Director of Undergraduate Programs
Department of Computer Science
University of Illinois at Urbana - Champaign

Key

GREEN HIGHLIGHT = Course addition, requirement replacement or updated hours

RED HIGHLIGHT = Course to be removed from listed requirements.

Current Requirc	Current Hours	
CS 100	Freshman Orientation (recommended) 1	1
CS 125	Introduction to Computer Science	4
CS 126	Software Design Studio	3
CS 173	Discrete Structures	3
CS 225	Data Structures	4
CS 233	Computer Architecture	4
CS 241	System Programming	4
Choose one of the following:		3
STAT 200	Statistical Analysis	
STAT 212	Biostatistics	
CS 361	Probability & Statistics for Computer Science (recommended)	
CS 374	Introduction to Algorithms & Models of Computation	4
CS 421	Programming Languages & Compilers	3 or 4
Mathematics (may also fulfill the General Education QR I and II requirements)		
MATH 220	Calculus	
or MATH 221	Calculus I	5
MATH 225	Introductory Matrix Theory	3
MATH 231	Calculus II	

Revised Requir	Revised Hours	
CS 100	Freshman Orientation (recommended) 1	1
CS 124	Introduction to Computer Science I	3
CS 128	Introduction to Computer Science II	3
CS 173	Discrete Structures	3
CS 225	Data Structures	4
CS 222	Software Design Lab	1
Choose one of the following combinations:		8 to 11
CS 233 & CS 241	Computer Architecture & System Programming	
OR		
CS 240 & Two CS 4XX	Introduction to Computer Systems & Any two (2) 400-level CS courses above CS 403, excluding CS 421 and CS 491	
Choose one of the following:		3
STAT 200	Statistical Analysis	
STAT 212	Biostatistics	
CS 361	Probability & Statistics for Computer Science (recommended)	
CS 374	Introduction to Algorithms & Models of Computation	4
CS 421	Programming Languages & Compilers	3 or 4
Mathematics (may also fulfill the General Education QR I and II requirements)		
MATH 220	Calculus	
or MATH 221	Calculus I	5
MATH 225	Introductory Matrix Theory	
or MATH 257	Linear Algebra with Computational Applications	2 or 3
MATH 231	Calculus II	

No change in the Astronomy coursework

10KV5676BSLA: COMPUTER SCIENCE & GEOGRAPHY & GEOGRAPHIC INFORMATION SCIENCE, BSLAS

Completed Workflow

1. U Program Review (dforgacs@illinois.edu; eastuby@illinois.edu; aledward@illinois.edu)
2. Provost (kmartens@illinois.edu)

Approval Path

1. Tue, 27 Aug 2019 21:56:13 GMT
   Deb Forgacs (dforgacs): Approved for U Program Review
2. Wed, 28 Aug 2019 18:47:03 GMT
   Kathy Martensen (kmartens): Approved for Provost

History

1. Feb 22, 2019 by Deb Forgacs (dforgacs)
2. Aug 28, 2019 by Amy Elli (amyelli)

Date Submitted:Wed, 07 Apr 2021 13:06:38 GMT

Viewing:10KV5676BSLA : Computer Science & Geography & Geographic Information Science, BSLAS

Changes proposed by: Amy Elli

Proposal Type

Proposal Type:

Major (ex. Special Education)

This proposal is for a:

Revision

Proposal Title:

If this proposal is one piece of a multi-element change please include the other impacted programs here.*example: A BS revision with multiple concentration revisions*

Administrative approval: Revision to BSLAS Computer Science and GGIS, GGIS concentration, College of Liberal Arts & Sciences

EP Control Number

EP.21.115

Official Program Name

Computer Science & Geography & Geographic Information Science, BSLAS

Effective Catalog Term

Fall 2021

Sponsor College

Liberal Arts & Sciences

Sponsor Department

Geography and Geographic Information Science

Sponsor Name

Shaowen Wang, Professor and Department Head

Sponsor Email

shaowen@illinois.edu

College Contact

Kelly Ritter

College Contact Email

ritterk@illinois.edu

Program Description and Justification

Justification for proposal change:

This proposal presents changes to both the GGIS component and the CS component of the undergraduate program:
10KV5676BSLA : Computer Science & Geography & Geographic Information Science, BSLAS

In the GGIS component, this proposal is to add GEOG 407 – Foundations of CyberGIS & Geospatial Data Science to the "additional GIS courses" and move GEOG 224 – Environmental Data Science from the "human/physical courses" list to the "additional GIS courses" list. NOTE- for some reason in the CIMP GEOG 224 already appears in the GIS section, but in the AY 20-21 academic catalog GEOG 224 is in the human/physical section.

GEOG 407 provides an introduction to state of the art high-performance computing applications and will be of interest to students who want to pursue research and careers in geospatial technology.

GEOG 224 will introduce CS+GGIS students to data science concepts and techniques including the capturing, processing, storage, analysis, communication, and interpretation of geospatial information. The course will prepare students for their upper-level coursework as they will learn to utilize cutting-edge environmental data science and critical thinking skills to solve real-world spatial problems.

In the CS component, the proposal involves changes to three aspects. The first is a reorganization of the material in the introductory course sequence. The second is adding an alternative to the require systems programming courses, allowing for the flexibility to choose two elective courses in computer science at the senior level. The third is to incorporate an option of a new linear algebra course, MATH 257, into the linear algebra requirement for the program. These changes are broadly shared, with some degree-specific modifications the suite of undergraduate programs including Computer Science:
10KP0112BS: Computer Science, BS
10KL5623BS: Computer Science + Crop Sciences, BS
10KL5864BS: Computer Science & Animal Sciences, BS
10KR5639BS: Computer Science + Music, BS
10KT5673BS: Computer Science & Advertising, BS
10KV0464BSLA: Statistics & Computer Science, BSLAS
10KV1438BSLA: Mathematics & Computer Science, BSLAS
10KV5348BSLA: Computer Science & Anthropology, BSLAS
10KV5349BSLA: Computer Science & Astronomy, BSLAS

10KV5350BSLA: Computer Science & Chemistry, BSLAS
10KV5351BSLA: Computer Science & Linguistics, BSLAS
10KV5667BSLA: Computer Science & Economics, BSLAS
10KV5676BSLA: Computer Science & Geography & Geographic Information Science, BSLAS
10KV5679BSLA: Computer Science & Philosophy, BSLAS
JP. 10KL5890BS & 1PKS5890MANS: JP. Computer Science & Animal Sciences, BS & Animal Science, MANSC
JP. 10KL5890BS & 1PKS5890MANS(MANU): JP. Computer Science & Animal Sciences, BS & Animal Science, MANSC
JP.10KL5903BS & 10KS5903MS: JP. Computer Science + Crop Sciences, BS & Crop Sciences, MS

In more detail,
1) (CS 125(4cr) Introduction to Computer Science + CS 126(3cr) Software Design Studio) -> (CS 124(3cr) Introduction to Computer Science I + CS 128(3cr) Introduction to Computer Science II + CS 222(1cr) Software Design Lab), CS 242(3cr) Programming Studio -> CS 222(1cr) Software Design Lab, the CS 225 Data Structures prerequisite of CS 125 is replaced with (CS 126 or CS 128) as the programming prerequisite, CS 128 is open to all, CS 222 is restricted to &CS+ programs. The programming prerequisite for CS 173 is changed from CS 125 to (CS 124 or CS 125).

Justification: CS 128 takes about 2/3 of the material from old CS 126 and receives an hour from the old CS 125 topics, with the remaining topics remaining with CS 124. Replacing CS 126 with CS 128 makes the path to CS 225 uniform for all students (except ECE), including &CS+ majors, students wanting to transfer into one of the &CS+, students doing minors and students needing CS 225 to complete a concentration. It also allows CS 225 to start with an assumption that all students know how to program in C++, and assures all students in the class have a common programming background. Further, the new CS 128 will provide an extended ability for general students to increase their skills in programming and structured program design and development, but without the more specialized material in Data Structures. Adding CS 222 and removing CS 242 eliminates the attempt to discriminate between how students entering as freshmen versus as transfers take the code review class.

2) Change the requirements of CS 233(4cr) Computer Architecture and CS 241(4 cr) System Programming to the student's choice or (CS 233 and CS 241) or (CS 240(3 cr) Introduction to Computer Systems and two 400-level CS courses (not including CS 491))

Justification: This option is already a possibility in several of the CS+X degree programs and it allows students in CS+GGIS to customize their program to better focus on the aspects of CS that impact the areas of Geography & Geographic Information Science most in line with their interests.

3) Change the linear algebra requirement from MATH 225 to (Math 225 or Math 257).

Justification: The Math department is developing MATH 257 as the eventual replacement for MATH 415, with the same theoretical content, but with an emphasis on using programming to perform matrix operations instead of calculating them on paper. Students in CS+GGIS should have the option of a stronger linear algebra class with stronger ties to programming.

Corresponding Degree

BSLAS Bachelor of Science in Liberal Arts and Sciences

Is this program interdisciplinary?

Yes

Interdisciplinary Colleges and Departments (list other colleges/departments which are involved other than the sponsor chose above)

College

Grainger College of Engineering

Department

Computer Science

Do you need to add an additional interdisciplinary relationship?

No

Academic Level

Undergraduate

Will you admit to the concentration directly?

No

Is a concentration required for graduation?

No

CIP Code

110199 - Computer and Information Sciences, Other.

Is This a Teacher Certification Program?

No

Will specialized accreditation be sought for this program?

No

Admission Requirements

Desired Effective Admissions Term

Fall 2021

Is this revision a change to the admission status of the program?

No

Provide a brief narrative description of the admission requirements for this program. Where relevant, include information about licensure requirements, student background checks, GRE and TOEFL scores, and admission requirements for transfer students.

N/A

Describe how critical academic functions such as admissions and student advising are managed.

N/A

Enrollment

Describe how this revision will impact enrollment and degrees awarded.

The department does not anticipate any impact to enrollment or degrees awarded

Estimated Annual Number of Degrees Awarded

What is the matriculation term for this program?

Fall

What is the typical time to completion of this program?

4 years

What are the minimum Total Credit Hours required for this program?

120

Delivery Method

Is this program available on campus and online?

No

This program is available:

On Campus

Budget

Are there budgetary implications for this revision?

No

Will the program or revision require staffing (faculty, advisors, etc.) beyond what is currently available?

No

Resource Implications

Facilities

Will the program require new or additional facilities or significant improvements to already existing facilities?

No

Technology

Will the program need additional technology beyond what is currently available for the unit?

No

Non-Technical Resources

Will the program require additional supplies, services or equipment (non-technical)?

No

Resources

For each of these items, be sure to include in the response if the proposed new program or change will result in replacement of another program(s). If so, which program(s), what is the anticipated impact on faculty, students, and instructional resources? Please attach any letters of support/ acknowledgement from faculty, students, and/or other impacted units as appropriate.

Attach File(s)

CS_letter_Math_257.pdf

Faculty Resources

Please address the impact on faculty resources including any changes in numbers of faculty, class size, teaching loads, student-faculty ratios, etc. Describe how the unit will support student advising, including job placement and/or admission to advanced studies.

N/A

Library Resources

Describe your proposal's impact on the University Library's resources, collections, and services. If necessary please consult with the appropriate disciplinary specialist within the University Library.

Current collections and services are adequate for the proposed program.

Instructional Resources

Will there be any reduction in other course offerings, programs or concentrations by your department as a result of this new program/proposed change?

No

Does the program include other courses/subjects impacted by the creation/revision of this program?

No

Financial Resources

How does the unit intend to financially support this proposal?

No impact

Will the unit need to seek campus or other external resources?

No

Are you seeking a change in the tuition rate or differential for this program?

No

Program Regulation and Assessment

Briefly describe the plan to assess and improve student learning, including the program's learning objectives; when, how, and where these learning objectives will be assessed; what metrics will be used to signify student's achievement of the stated learning objectives; and the process to ensure assessment results are used to improve student learning. (Describe how the program is aligned with or meets licensure, certification, and/or entitlement requirements, if applicable).

N/A

Is the career/profession for graduates of this program regulated by the State of Illinois?

No

Program of Study

"Baccalaureate degree requires at least 120 semester credit hours or 180 quarter credit hours and at least 40 semester credit hours (60 quarter credit hours) in upper division courses" (source: https://www.ibhe.org/assets/files/PrivateAdminRules2017.pdf). For proposals for new bachelor's degrees, if this minimum is not explicitly met by specifically-required 300- and/or 400-level courses, please provide information on how the upper-division hours requirement will be satisfied.

All proposals must attach the new or revised version of the Academic Catalog program of study entry. Contact your college office if you have questions.

Revised programs

GEOG 407 proposal - Add to electives.doc
BS in CS-GGIS Curriculum side-by-side 2021-03-21.xlsx

Attach a side-by-side comparison with the existing program AND, if the revision references or adds "chose-from" lists of courses students can select from to fulfill requirements, a listing of these courses, including the course rubric, number, title, and number of credit hours.

Catalog Page Text

Statement for Programs of Study Catalog

General education:Students must complete the Campus General Education (https://courses.illinois.edu/)**requirements including the campus general education language requirement.**
Minimum required major and supporting course work:Normally equates to 66 hours. Twelve hours of 300- and 400-level in the major must be taken on this campus.
Minimum hours required for graduation:120 hours.

Code	Title	Hours
Required Computer Science Courses:		
CS 100	Freshman Orientation (recommended)[1]	1
CS 125	Introduction to Computer Science	4
CS 126	Software Design Studio	3
CS 124	Introduction to Computer Science I	3
CS 128	Introduction to Computer Science II	3
CS 173	Discrete Structures	3
CS 225	Data Structures	4
CS 222	Software Design Lab	1
Choose one of the following combinations		8-11
CS 233 & CS 241	Computer Architecture and System Programming	
CS 241	System Programming	4
OR		
CS 240	Introduction to Computer Systems	
& two CS courses at the 400 level aboveCS 403, excludingCS 421andCS 491		
Choose one of the following:		3
STAT 200	Statistical Analysis	
STAT 212	Biostatistics	
CS 361	Probability & Statistics for Computer Science (recommended)	
CS 374	Introduction to Algorithms & Models of Computation	4
CS 421	Programming Languages & Compilers	3 or 4
Mathematics (may also fulfill the General Education QR I and II requirements)		
MATH 220	Calculus	5
or MATH 221	Calculus I	
MATH 225	Introductory Matrix Theory	2 or 3
or MATH 257	Linear Algebra with Computational Applications	
MATH 231	Calculus II	3
Required Geographic Information Science Coursework - Minimum of 24 hours		
GEOG 371	Spatial Analysis	4
GEOG 379	Intro to GIS Systems	4
GEOG 380	GIS II: Spatial Prob Solving	4
Two (2) additional GIS courses from the following list:		6
GEOG 205	Business Location Decisions	
GEOG 224	Environmental Data Science	
GEOG 280	Intro to Social Statistics	
GEOG 412	Geospatial Tech & Society	
GEOG 407	Foundations of CyberGIS & Geospatial Data Science	
GEOG 421	Earth Systems Modeling	
GEOG 439	Health Applications of GIS	
GEOG 440	Business Applications of GIS	
GEOG 460	Aerial Photo Analysis	
GEOG 468	Biological Modeling	
GEOG 473	Digital Cartography & Map Design	

GEOG 476	Applied GIS to Environ Studies	
GEOG 477	Introduction to Remote Sensing	
GEOG 478	Techniques of Remote Sensing	
GEOG 479	Advanced Topics in GIS	
GEOG 480	Principles of GIS	
GEOG 489	Programming for GIS	
Two (2) human and/or physical geography courses:		6
GEOG 204	Cities of the World	
GEOG 210	Social & Environmental Issues	
GEOG 221	Geographies of Global Conflict	
GEOG 222	Big Rivers of the World	
GEOG 287	Environment and Society	
GEOG 350	Sustainability and the City	
GEOG 356	Sustainable Development in South Asia	
GEOG 370	Water Planet, Water Crisis	
GEOG 384	Population Geography	
GEOG 401	Watershed Hydrology	
GEOG 405	Geography Field Course	
GEOG 406	Fluvial Geomorphology	
GEOG 408	Humans and River Systems	
GEOG 410	Green Development	
GEOG 436	Biogeography	
GEOG 438	Geography of Health Care	
GEOG 446	Sustainable Planning Seminar	
GEOG 455	Geog of Sub-Saharn Africa	
GEOG 465	Transportation & Sustainability	
GEOG 466	Environmental Policy	
GEOG 471	Recent Trends in Geog Thought	
GEOG 482	Challenges of Sustainability	
GEOG 483	Urban Geography	
GEOG 484	Cities, Crime, and Space	
GEOG 496	Climate & Social Vulnerability	
Total hours		**120**

[1] CS 100 (http://catalog.illinois.edu/search/?P=CS%20100) is an orientation course aimed at first-year students, so students who declare the major after the freshman year are not required to complete it.

EP Documentation

DMI Documentation

Banner/Codebook Name

BSLAS:Comp Sci & Geog&GIS-UIUC

Program Code:

10KV5676BSLA

Degree Code

BSLAS

Major Code

5676

Program Reviewer Comments

Elsa Gunter (egunter) (Tue, 23 Mar 2021 21:08:41 GMT): Rollback: I added in all the revisions to this program as a part of the CS+X suite. I have discussed this changes with the department, but I think they should be officially reviewed before they go forward.
Kathy Martensen (kmartens) (Wed, 07 Apr 2021 20:58:30 GMT): Administrative approval: No change to total hours required/restriction on options.

Key: 285

Proposal for revised curricula (degree, major, concentration, minor)

Submit completed proposals via email to Associate Dean Kelly Ritter (ritterk@illinois.edu). Please obtain Executive Officer and School Director (if applicable) approval via email and forward with the proposal to LAS.

Proposal Title: Add GEOG 407 to the list of elective courses in two Geography undergraduate programs.

Proposed effective date: Spring 2021

Sponsor(s): Shaowen Wang, Professor and Department Head, shaowen@illinois.edu

College contact: Kelly Ritter, Associate Dean for Curricula and Academic Policy, College of Liberal Arts and Sciences, ritterk@illinois.edu

PROGRAM DESCRIPTION and JUSTIFICATION

1) **Provide a brief description but concise description of your proposal.**

This proposal is to add **GEOG 407 – Foundations of CyberGIS & Geospatial Data Science** as an elective course in the following degree programs:
10KV5694BSLA Geography & Geographic Information Science, BSLAS, GIS Concentration (3886)
10KV5676BSLA : Computer Science & Geography & Geographic Information Science, BSLAS

2) **Provide a justification of the program**

This course provides an introduction to state of the art high-performance computing applications and will be of interest to students who want to pursue research and careers in geospatial technology.

10KV5694BSLA Geography & Geographic Information Science, BSLAS, GIS Concentration (3886)
CURRENT

Code	Title	Hours
Total concentration-required hours		26-30
GEOG 371	Spatial Analysis	4
GEOG 380	GIS II: Spatial Prob Solving	4
Select one of the following courses:		3
CS 105	Intro Computing: Non-Tech	
CS 125	Intro to Computer Science	
or equivalent course approved by the Department's Advisor		
Select a minimum of three courses from the following:		9-11
GEOG 205	Business Location Decisions	
GEOG/SOC 280	Intro to Social Statistics	
GEOG 412	Geospatial Tech & Society	
GEOG/ATMS 421	Earth Systems Modeling	
GEOG/PATH 439	Health Applications of GIS	
GEOG 460	Aerial Photo Analysis	
GEOG 468	Biological Modeling	
GEOG 473	Digital Cartography & Map Design	
GEOG 476	Applied GIS to Environ Studies	
GEOG 477	Introduction to Remote Sensing	
GEOG 478	Techniques of Remote Sensing	
GEOG 479	Advanced Topics in GIS	
GEOG 480	Principles of GIS	
GEOG 489	Programming for GIS	

10KV5694BSLA Geography & Geographic Information Science, BSLAS, GIS Concentration (3886)
PROPOSED

Code	Title	Hours
Total concentration-required hours		26-30
GEOG 371	Spatial Analysis	4
GEOG 380	GIS II: Spatial Prob Solving	4
Select one of the following courses:		3
CS 105	Intro Computing: Non-Tech	
CS 125	Intro to Computer Science	
or equivalent course approved by the Department's Advisor		
Select a minimum of three courses from the following:		9-11
GEOG 205	Business Location Decisions	
GEOG/SOC 280	Intro to Social Statistics	
GEOG 407	Foundations of CyberGIS & Geospatial Data Science	
GEOG 412	Geospatial Tech & Society	
GEOG/ATMS 421	Earth Systems Modeling	
GEOG/PATH 439	Health Applications of GIS	
GEOG 460	Aerial Photo Analysis	
GEOG 468	Biological Modeling	
GEOG 473	Digital Cartography & Map Design	
GEOG 476	Applied GIS to Environ Studies	
GEOG 477	Introduction to Remote Sensing	
GEOG 478	Techniques of Remote Sensing	
GEOG 479	Advanced Topics in GIS	
GEOG 480	Principles of GIS	
GEOG 489	Programming for GIS	

10KV5676BSLA : Computer Science & Geography & Geographic Information Science, BSLAS CURRENT

Required Geographic Information Science Coursework - Minimum of 24 hours		
GEOG 371	Spatial Analysis	4
GEOG 379	Intro to GIS Systems	4
GEOG 380	GIS II: Spatial Prob Solving	4
Two (2) additional GIS courses from the following list:		6
GEOG 205	Business Location Decisions	
GEOG 280	Intro to Social Statistics	
GEOG 412	Geospatial Tech & Society	
GEOG 421	Earth Systems Modeling	
GEOG 439	Health Applications of GIS	
GEOG 440	Business Applications of GIS	
GEOG 460	Aerial Photo Analysis	
GEOG 468	Biological Modeling	
GEOG 473	Digital Cartography & Map Design	
GEOG 476	Applied GIS to Environ Studies	
GEOG 477	Introduction to Remote Sensing	
GEOG 478	Techniques of Remote Sensing	
GEOG 479	Advanced Topics in GIS	
GEOG 480	Principles of GIS	
GEOG 489	Programming for GIS	

10KV5676BSLA : Computer Science & Geography & Geographic Information Science, BSLAS
PROPOSED

Required Geographic Information Science Coursework - Minimum of 24 hours		
GEOG 371	Spatial Analysis	4
GEOG 379	Intro to GIS Systems	4
GEOG 380	GIS II: Spatial Prob Solving	4
Two (2) additional GIS courses from the following list:		6
GEOG 205	Business Location Decisions	
GEOG 280	Intro to Social Statistics	
GEOG 407	Foundations of CyberGIS & Geospatial Data Science	
GEOG 412	Geospatial Tech & Society	
GEOG 421	Earth Systems Modeling	
GEOG 439	Health Applications of GIS	
GEOG 440	Business Applications of GIS	
GEOG 460	Aerial Photo Analysis	
GEOG 468	Biological Modeling	
GEOG 473	Digital Cartography & Map Design	
GEOG 476	Applied GIS to Environ Studies	
GEOG 477	Introduction to Remote Sensing	
GEOG 478	Techniques of Remote Sensing	
GEOG 479	Advanced Topics in GIS	
GEOG 480	Principles of GIS	
GEOG 489	Programming for GIS	

Key

GREEN HIGHLIGHT = Course addition, requirement replacement or updated hours

RED HIGHLIGHT = Course to be removed from listed requirements.

Current Require	Current Hours	
CS 100	Freshman Orientation (recommended) 1	1
CS 125	Introduction to Computer Science	4
CS 126	Software Design Studio	3
CS 173	Discrete Structures	3
CS 225	Data Structures	4
CS 233	Computer Architecture	4
CS 241	System Programming	4
Choose one of the following:		3
STAT 200	Statistical Analysis	
STAT 212	Biostatistics	
CS 361	Probability & Statistics for Computer Science (recommended)	
CS 374	Introduction to Algorithms & Models of Computation	4
CS 421	Programming Languages & Compilers	3 or 4
Mathematics (may also fulfill the General Education QR I and II requirements)		
MATH 220 or MATH 221	Calculus Calculus I	5
MATH 225	Introductory Matrix Theory	2
MATH 231	Calculus II	
Required Geographic Information Science Coursework - Minimum of 24 hours		3
GEOG 371	Spatial Analysis	
GEOG 379	Intro to GIS Systems	4
GEOG 380	GIS II: Spatial Prob Solving	4
Two (2) additional GIS courses from the following list:		4
GEOG 205	Business Location Decisions	6
GEOG 280	Intro to Social Statistics	
GEOG 412	Geospatial Tech & Society	
GEOG 421	Earth Systems Modeling	
GEOG 439	Health Applications of GIS	
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GEOG 476	Applied GIS to Environ Studies	
GEOG 477	Introduction to Remote Sensing	
GEOG 478	Techniques of Remote Sensing	
GEOG 479	Advanced Topics in GIS	
GEOG 480	Principles of GIS	
GEOG 489	Programming for GIS	
Two (2) human and/or physical geography courses:		6
GEOG 204	Cities of the World	
GEOG 210	Social & Environmental Issues	
GEOG 221	Geographies of Global Conflict	
GEOG 222	Big Rivers of the World	
GEOG 224	Environmental Data Science	
GEOG 287	Environment and Society	
GEOG 350	Sustainability and the City	
GEOG 356	Sustainable Development in South Asia	
GEOG 370	Water Planet, Water Crisis	
GEOG 384	Population Geography	
GEOG 401	Watershed Hydrology	
GEOG 405	Geography Field Course	
GEOG 406	Fluvial Geomorphology	
GEOG 408	Humans and River Systems	
GEOG 410	Green Development	
GEOG 436	Biogeography	
GEOG 438	Geography of Health Care	
GEOG 446	Sustainable Planning Seminar	
GEOG 455	Geog of Sub-Saharn Africa	
GEOG 465	Transportation & Sustainability	
GEOG 466	Environmental Policy	
GEOG 471	Recent Trends in Geog Thought	
GEOG 482	Challenges of Sustainability	
GEOG 483	Urban Geography	
GEOG 484	Cities, Crime, and Space	
GEOG 496	Climate & Social Vulnerability	
Total hours		120

Revised Require	Revised Hours	
CS 100	Freshman Orientation (recommended) 1	1
CS 124	Introduction to Computer Science I	3
CS 128	Introduction to Computer Science II	3
CS 173	Discrete Structures	3
CS 225	Data Structures	4
CS 222	Software Design Lab	1
Choose one of the following combinations:		8 to 11
CS 233 & CS 241 OR CS 240 & Two CS 4XX	Computer Architecture System Programming Introduction to Computer Systems Any two (2) 400-level CS courses above CS 403, excluding CS 421 and CS 491	
Choose one of the following:		3
STAT 200	Statistical Analysis	
STAT 212	Biostatistics	
CS 361	Probability & Statistics for Computer Science (recommended)	
CS 374	Introduction to Algorithms & Models of Computation	4
CS 421	Programming Languages & Compilers	3 or 4
Mathematics (may also fulfill the General Education QR I and II requirements)		
MATH 220 or MATH 221	Calculus Calculus I	5
MATH 225 or MATH 257	Introductory Matrix Theory Linear Algebra with Computational Applications	2 or 3
MATH 231	Calculus II	
Required Geographic Information Science Coursework - Minimum of 24 hours		3
GEOG 371	Spatial Analysis	
GEOG 379	Intro to GIS Systems	4
GEOG 380	GIS II: Spatial Prob Solving	4
Two (2) additional GIS courses from the following list:		4
GEOG 205	Business Location Decisions	6
GEOG 280	Intro to Social Statistics	
GEOG 412	Geospatial Tech & Society	
GEOG 407	Foundations of CyberGIS & Geospatial Data Science	
GEOG 421	Earth Systems Modeling	
GEOG 439	Health Applications of GIS	
GEOG 440	Business Applications of GIS	
GEOG 460	Aerial Photo Analysis	
GEOG 468	Biological Modeling	
GEOG 473	Digital Cartography & Map Design	
GEOG 476	Applied GIS to Environ Studies	
GEOG 477	Introduction to Remote Sensing	
GEOG 478	Techniques of Remote Sensing	
GEOG 479	Advanced Topics in GIS	
GEOG 480	Principles of GIS	
GEOG 489	Programming for GIS	
Two (2) human and/or physical geography courses:		6
GEOG 204	Cities of the World	
GEOG 210	Social & Environmental Issues	
GEOG 221	Geographies of Global Conflict	
GEOG 222	Big Rivers of the World	
GEOG 224	Environmental Data Science	
GEOG 287	Environment and Society	
GEOG 350	Sustainability and the City	
GEOG 356	Sustainable Development in South Asia	
GEOG 370	Water Planet, Water Crisis	
GEOG 384	Population Geography	
GEOG 401	Watershed Hydrology	
GEOG 405	Geography Field Course	
GEOG 406	Fluvial Geomorphology	
GEOG 408	Humans and River Systems	
GEOG 410	Green Development	
GEOG 436	Biogeography	
GEOG 438	Geography of Health Care	
GEOG 446	Sustainable Planning Seminar	
GEOG 455	Geog of Sub-Saharn Africa	
GEOG 465	Transportation & Sustainability	
GEOG 466	Environmental Policy	
GEOG 471	Recent Trends in Geog Thought	
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GEOG 496	Climate & Social Vulnerability	
Total hours		120

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Department of Mathematics

273 Altgeld Hall, MC-382
1409 West Green Street
Urbana, IL 61801

Re: Use of Math 257 in Computer Science and related programs

The Mathematics Department, working with the Grainger College of Engineering, has recently created the course MATH 257, *Linear Algebra with Computational Applications*. Quoting from the justification of the approved proposal, "In the future, MATH 257 will replace the MATH 415 requirement in many science and engineering curricula." With this in mind, the department would be pleased to have Computer Science add MATH 257 as a linear algebra option in their programs, specifically in:

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10KV1438BSLA: Mathematics & Computer Science, BSLAS
10KV0464BSLA: Statistics & Computer Science, BSLAS
10KV5348BSLA: Computer Science & Anthropology, BSLAS
10KV5349BSLA: Computer Science & Astronomy, BSLAS
10KV5350BSLA: Computer Science & Chemistry, BSLAS
10KV5351BSLA: Computer Science & Linguistics, BSLAS
10KV5667BSLA: Computer Science & Economics, BSLAS
10KV5676BSLA: Computer Science & Geography & Geographic Information Science, BSLAS
10KV5679BSLA: Computer Science & Philosophy, BSLAS
10KR5639BS: Computer Science + Music, BS
10KT5673BS: Computer Science & Advertising, BS
10KL5864BS: Computer Science & Animal Sciences, BS
10KL5623BS: Computer Science + Crop Sciences, BS
JP: 10KL5890BS & 1PKS5890MANS: JP: Computer Science & Animal Sciences, BS & Animal Science, MANSC
JP: 10KL5890BS & 1PKS5890MANS(MANU): JP: Computer Science & Animal Sciences, BS & Animal Science, MANSC
JP:10KL5903BS & 10KS5903MS: JP: Computer Science + Crop Sciences, BS & Crop Sciences, MS

As the Mathematics department is reallocating instructional resources from Math 415 to Math 257 as the need shifts, this will not cause any undue difficulties for Mathematics resources.

Sincerely

Randy McCarthy

Randy McCarthy
Professor of Mathematics
Dir of Undergraduate Studies in Math
rmccrthy@illinois.edu

telephone 217-333-3350 • *fax* 217-333-9576
email office@math.uiuc.edu • *url* http://www.math.uiuc.edu/

10KV5350BSLA: COMPUTER SCIENCE & CHEMISTRY, BSLAS

Completed Workflow

1. U Program Review (dforgacs@illinois.edu; eastuby@illinois.edu; aledward@illinois.edu)

Approval Path

1. Mon, 26 Aug 2019 19:08:35 GMT
   Deb Forgacs (dforgacs): Approved for U Program Review

History

1. Feb 22, 2019 by Deb Forgacs (dforgacs)
2. Aug 26, 2019 by Amy Elli (amyelli)

Date Submitted:Wed, 07 Apr 2021 12:56:05 GMT

Viewing:10KV5350BSLA : Computer Science & Chemistry, BSLAS
Proposal Type

Proposal Type:

Major (ex. Special Education)

This proposal is for a:

Revision

Proposal Title:

If this proposal is one piece of a multi-element change please include the other impacted programs here.*example: A BS revision with multiple concentration revisions*

Administrative approval: Revision of the BSLAS in Computer Science & Chemistry, College of Liberal Arts and Sciences

EP Control Number

EP.21.115

Official Program Name

Computer Science & Chemistry, BSLAS

Effective Catalog Term

Fall 2021

Sponsor College

Liberal Arts & Sciences

Sponsor Department

Chemistry

Sponsor Name

Scott Silverman, Professor Dept of Chemistry

Sponsor Email

sks@illinois.edu

College Contact

Kelly Ritter

College Contact Email

ritterk@illinois.edu

Program Description and Justification

Justification for proposal change:

In the CS component, the proposal involves changes to three aspects. The first is a reorganization of the material in the introductory course sequence. The second is adding an alternative to the require systems programming courses, allowing for the flexibility to choose two elective courses in computer science at the senior level. The third is to incorporate an option of a new linear algebra course, MATH 257, into the linear algebra requirement for the program.
These changes are broadly shared, with some degree-specific modifications the suite of undergraduate programs including Computer Science:
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10KL5623BS: Computer Science + Crop Sciences, BS
10KL5864BS: Computer Science & Animal Sciences, BS
10KR5639BS: Computer Science + Music, BS
10KT5673BS: Computer Science & Advertising, BS
10KV0464BSLA: Statistics & Computer Science, BSLAS
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JP. 10KL5890BS & 1PKS5890MANS(MANU): JP. Computer Science & Animal Sciences, BS & Animal Science, MANSC
JP.10KL5903BS & 10KS5903MS: JP. Computer Science + Crop Sciences, BS & Crop Sciences, MS
In more detail,
1) (CS 125(4cr) Introduction to Computer Science + CS 126(3cr) Software Design Studio) -> (CS 124(3cr) Introduction to Computer Science I + CS 128(3cr) Introduction to Computer Science II + CS 222(1cr) Software Design Lab), CS 242(3cr) Programming Studio -> CS 222(1cr) Software Design Lab, the CS 225 Data Structures prerequisite of CS 125 is replaced with (CS 126 or CS 128) as the programming prerequisite, CS 128 is open to all, CS 222 is restricted to &CS+ programs. The programming prerequisite for CS 173 is changed from CS 125 to (CS 124 or CS 125).
Justification: CS 128 takes about 2/3 of the material from old CS 126 and receives an hour from the old CS 125 topics, with the remaining topics remaining with CS 124. Replacing CS 126 with CS 128 makes the path to CS 225 uniform for all students (except ECE), including &CS+ majors, students wanting to transfer into one of the &CS+, students doing minors and students needing CS 225 to complete a concentration. It also allows CS 225 to start with an assumption that all students know how to program in C++, and assures all students in the class have a common programming background. Further, the new CS 128 will provide an extended ability for general students to increase their skills in programming and structured program design and development, but without the more specialized material in Data Structures. Adding CS 222 and removing CS 242 eliminates the attempt to discriminate between how students entering as freshmen versus as transfers take the code review class.

2) Change the requirements of CS 233(4cr) Computer Architecture and CS 241(4 cr) System Programming to the student's choice or (CS 233 and CS 241) or (CS 240(3 cr) Introduction to Computer Systems and two 400-level CS courses (not including CS 491))
Justification: This option is already a possibility in several of the CS+X degree programs and it allows students in Computer Science + Chemistry to customize their program to better focus on the aspects of CS that impact the areas of Chemistry most in line with their interests.

3) Change the linear algebra requirement from MATH 225 to (Math 225 or Math 257).

Justification: The Math department is developing MATH 257 as the eventual replacement for MATH 415, with the same theoretical content, but with an emphasis on using programming to perform matrix operations instead of calculating them on paper. Students in Chemistry and Computer Science should have the option of a stronger linear algebra class with stronger ties to programming.

Corresponding Degree

BSLAS Bachelor of Science in Liberal Arts and Sciences

Is this program interdisciplinary?

Yes

Interdisciplinary Colleges and Departments (list other colleges/departments which are involved other than the sponsor chose above)

College

Grainger College of Engineering

Department

Computer Science

Do you need to add an additional interdisciplinary relationship?

No

Academic Level

Undergraduate

Will you admit to the concentration directly?

No

Is a concentration required for graduation?

No

CIP Code

110199 - Computer and Information Sciences, Other.

Is This a Teacher Certification Program?

No

Will specialized accreditation be sought for this program?

No

Admission Requirements

Desired Effective Admissions Term

Fall 2021

Is this revision a change to the admission status of the program?

No

Provide a brief narrative description of the admission requirements for this program. Where relevant, include information about licensure requirements, student background checks, GRE and TOEFL scores, and admission requirements for transfer students.

N/A

Describe how critical academic functions such as admissions and student advising are managed.

N/A

Enrollment

Describe how this revision will impact enrollment and degrees awarded.

The department does not anticipate any impact to enrollment or degrees awarded

Estimated Annual Number of Degrees Awarded

What is the matriculation term for this program?

Fall

What is the typical time to completion of this program?

4 years

What are the minimum Total Credit Hours required for this program?

120

Delivery Method

Is this program available on campus and online?

No

This program is available:

On Campus

Budget

Are there budgetary implications for this revision?

No

Will the program or revision require staffing (faculty, advisors, etc.) beyond what is currently available?

No

Resource Implications

Facilities

Will the program require new or additional facilities or significant improvements to already existing facilities?

No

Technology

Will the program need additional technology beyond what is currently available for the unit?

No

Non-Technical Resources

Will the program require additional supplies, services or equipment (non-technical)?

No

Resources

For each of these items, be sure to include in the response if the proposed new program or change will result in replacement of another program(s). If so, which program(s), what is the anticipated impact on faculty, students, and instructional resources? Please attach any letters of support/ acknowledgement from faculty, students, and/or other impacted units as appropriate.

Attach File(s)

CS_letter_Math_257.pdf

Faculty Resources

Please address the impact on faculty resources including any changes in numbers of faculty, class size, teaching loads, student-faculty ratios, etc. Describe how the unit will support student advising, including job placement and/or admission to advanced studies.

N/A

Library Resources

Describe your proposal's impact on the University Library's resources, collections, and services. If necessary please consult with the appropriate disciplinary specialist within the University Library.

Current collections and services are adequate for the proposed program.

Instructional Resources

Will there be any reduction in other course offerings, programs or concentrations by your department as a result of this new program/proposed change?

No

Does the program include other courses/subjects impacted by the creation/revision of this program?

No

Financial Resources

How does the unit intend to financially support this proposal?

N/A

Will the unit need to seek campus or other external resources?

No

Are you seeking a change in the tuition rate or differential for this program?

No

Program Regulation and Assessment

Briefly describe the plan to assess and improve student learning, including the program's learning objectives; when, how, and where these learning objectives will be assessed; what metrics will be used to signify student's achievement of the stated learning objectives; and the process to ensure assessment results are used to improve student learning. (Describe how the program is aligned with or meets licensure, certification, and/or entitlement requirements, if applicable).

N/A

Is the career/profession for graduates of this program regulated by the State of Illinois?

No

Program of Study

"Baccalaureate degree requires at least 120 semester credit hours or 180 quarter credit hours and at least 40 semester credit hours (60 quarter credit hours) in upper division courses" (source: https://www.ibhe.org/assets/files/PrivateAdminRules2017.pdf). For proposals for new bachelor's degrees, if this minimum is not explicitly met by specifically-required 300- and/or 400-level courses, please provide information on how the upper-division hours requirement will be satisfied.

All proposals must attach the new or revised version of the Academic Catalog program of study entry. Contact your college office if you have questions.

Revised programs

CS CHEM revisions side-by-side comparative table April2021.xlsx
MATH 257 option to 225.pdf

Attach a side-by-side comparison with the existing program AND, if the revision references or adds "chose-from" lists of courses students can select from to fulfill requirements, a listing of these courses, including the course rubric, number, title, and number of credit hours.

Catalog Page Text

Statement for Programs of Study Catalog

General education:Students must complete the Campus General Education (https://courses.illinois.edu/)**requirements including the campus general education language requirement.**
Minimum required major and supporting course work:Normally equates to 66 hours. Twelve hours of 300- and 400-level in the major must be taken on this campus.
Minimum hours required for graduation:120 hours.

Code	Title	Hours
Required Computer Science Coursework		
CS 100	Freshman Orientation (recommended)[1]	1
CS 125	Introduction to Computer Science	4
CS 126	Software Design Studio	3
CS 124	Introduction to Computer Science I	3
CS 128	Introduction to Computer Science II	3
CS 173	Discrete Structures	3

CS 225	Data Structures	4
CS 222	Software Design Lab	1
Choose one of the following combinations		8-11
CS 233 & CS 241	Computer Architecture and System Programming	
CS 241	System Programming	4
OR		
CS 240	Introduction to Computer Systems	
& two CS courses at the 400 level aboveCS 403, excludingCS 421andCS 491		
Choose one of the following:		3
STAT 200	Statistical Analysis	
STAT 212	Biostatistics	
CS 361	Probability & Statistics for Computer Science	
CS 374	Introduction to Algorithms & Models of Computation	4
CS 421	Programming Languages & Compilers	3
Mathematics (may also fulfill the General Education Quantitative Reasoning I and II requirements)		
MATH 221	Calculus I	4-5
or MATH 220	Calculus	
MATH 225	Introductory Matrix Theory	2 or 3
or MATH 257	Linear Algebra with Computational Applications	
MATH 231	Calculus II	3
Required Chemistry Coursework - Minimum of 24 hours		
Foundation Courses- 12 hours required		
Select one of the following (General or Accelerated Chemistry):		8
CHEM 102 & CHEM 103 & CHEM 104 & CHEM 105	General Chemistry I and General Chemistry Lab I and General Chemistry II and General Chemistry Lab II	
or		
CHEM 202 & CHEM 203 & CHEM 204	Accelerated Chemistry I and Accelerated Chemistry Lab I and Accelerated Chemistry II	
CHEM 232	Elementary Organic Chemistry I	4
or CHEM 236	Fundamental Organic Chem I	
Advanced Chemistry Courses- 12 hours		
CHEM 440	Physical Chemistry Principles	4
or CHEM 442	Physical Chemistry I	
In consultation with an advisor, choose 8 hours of 300- or 400- level chemistry courses[2]		8

[1] CS 100 is an orientation course aimed at first-year students, so students who declare the major after the freshman year are not required to complete it.

[2] The following courses may not be used to complete the advanced chemistry hours: CHEM 315, CHEM 397, CHEM 445, CHEM 447, CHEM 492, CHEM 494, CHEM 496, CHEM 497 and CHEM 499; and any course in another unit, such as any BIOC or MCB course.

EP Documentation

DMI Documentation

Banner/Codebook Name

BSLAS: Comp Sci & Chem-UIUC

Program Code:

10KV5350BSLA

Degree Code

BSLAS

Major Code

5350

Program Reviewer Comments

Kathy Martensen (kmartens) (Wed, 07 Apr 2021 21:10:42 GMT): Administrative approval: No change to total hours/restriction on options.

Key: 283

Key

GREEN HIGHLIGHT = Course addition, requirement replacement or updated hours

RED HIGHLIGHT = Course to be removed from listed requirements.

Current Requirc	Current Hours	
CS 100	Freshman Orientation (recommended) 1	1
CS 125	Introduction to Computer Science	4
CS 126	Software Design Studio	3
CS 173	Discrete Structures	3
CS 225	Data Structures	4
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CS 361	Probability & Statistics for Computer Science (recommended)	
CS 374	Introduction to Algorithms & Models of Computation	4
CS 421	Programming Languages & Compilers	3 or 4
Mathematics (may also fulfill the General Education QR I and II requirements)		
MATH 220	Calculus	
or MATH 221	Calculus I	5
MATH 225	Introductory Matrix Theory	3
MATH 231	Calculus II	

Revised Requir	Revised Hours	
CS 100	Freshman Orientation (recommended) 1	1
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CS 361	Probability & Statistics for Computer Science (recommended)	
CS 374	Introduction to Algorithms & Models of Computation	4
CS 421	Programming Languages & Compilers	3 or 4
Mathematics (may also fulfill the General Education QR I and II requirements)		
MATH 220	Calculus	
or MATH 221	Calculus I	5
MATH 225	Introductory Matrix Theory	
or MATH 257	Linear Algebra with Computational Applications	2 or 3
MATH 231	Calculus II	

No change in the Chemistry coursework

UNIVERSITY OF ILLINOIS
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Department of Mathematics

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Re: Use of Math 257 in Computer Science and related programs

The Mathematics Department, working with the Grainger College of Engineering, has recently created the course MATH 257, *Linear Algebra with Computational Applications*. Quoting from the justification of the approved proposal, "In the future, MATH 257 will replace the MATH 415 requirement in many science and engineering curricula." With this in mind, the department would be pleased to have Computer Science add MATH 257 as a linear algebra option in their programs, specifically in:

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As the Mathematics department is reallocating instructional resources from Math 415 to Math 257 as the need shifts, this will not cause any undue difficulties for Mathematics resources.

Sincerely

Randy McCarthy

Randy McCarthy
Professor of Mathematics
Dir of Undergraduate Studies in Math
rmccrthy@illinois.edu

telephone 217-333-3350 • *fax* 217-333-9576
email office@math.uiuc.edu • *url* http://www.math.uiuc.edu/

MATH 257: LINEAR ALGEBRA WITH COMPUTATIONAL APPLICATIONS

Completed Workflow

1. 1257 Head (tyson@illinois.edu)
2. KV Dean (las-catalog@illinois.edu)
3. COTE (bmclvngr@illinois.edu)
4. Provost (kmartens@illinois.edu)
5. Registrar (fms-catalog@illinois.edu)
6. Banner (fms-catalog@illinois.edu)

Approval Path

1. Fri, 11 Sep 2020 16:06:49 GMT
   Jeremy Tyson (tyson): Approved for 1257 Head
2. Wed, 07 Oct 2020 15:10:03 GMT
   Kelly Ritter (ritterk): Approved for KV Dean
3. Wed, 07 Oct 2020 15:20:34 GMT
   Brenda Clevenger (bmclvngr): Approved for COTE
4. Wed, 07 Oct 2020 15:26:44 GMT
   Kathy Martensen (kmartens): Approved for Provost
5. Wed, 07 Oct 2020 20:32:52 GMT
   Deb Forgacs (dforgacs): Approved for Registrar
6. Sat, 10 Oct 2020 08:53:17 GMT
   system: Approved for Banner

History

1. Oct 10, 2020 by Alison Champion (abc)

Viewing:MATH 257 : Linear Algebra with Computational Applications

Changes proposed by: Alison Champion

General Information
Effective Term:

Fall 2021

College:

Liberal Arts & Sciences

Department/Unit Name (ORG Code):

Mathematics (1257)

Course Subject:

Mathematics (MATH)

Course Number:

257

Course Title:

Linear Algebra with Computational Applications

Abbreviated Title:

Linear Algebra w Computat Appl

Course Description:

Introductory course incorporating linear algebra concepts with computational tools, with real world applications to science, engineering and data science. Topics include linear equations, matrix operations, vector spaces, linear transformations, eigenvalues, eigenvectors, inner products and norms, orthogonality, linear regression, equilibrium, linear dynamical systems and the singular value decomposition.

Justification

Justification for change:

This course was developed in cooperation with Grainger College of Engineering to allow undergraduates to use linear algebra at an earlier stage in their studies and also to incorporate modern computational tools. It contains much of the material from MATH 415 but with computational tools and data science topics. It covers applications and topics not included in MATH 225.

In the future, MATH 257 will replace the MATH 415 requirement in many science and engineering curricula, and it will become a second choice or a replacement in curricula which currently require MATH 225, including most CS+X curricula.

Please Note: a syllabus is required for General Education review:

MATH257 Syllabus.pdf

Course Information

Course Credit

Undergraduate:

3

Registrar Use Only:

Banner Credit:

3

Billable Hours:

3

Grading Type

Letter Grade

Available for DFR:

No

Repeatability
No

Credit Restrictions
Credit Restrictions:

Credit is not given for both MATH 257 and any of MATH 125, MATH 225, MATH 227, MATH 415 or ASRM 406.

Advisory Statements
MATH 220 or MATH 221; CS 101 or equivalent programming experience.

Cross-listing

Class Schedule Information

Fees
No

Course Description in the Catalog Entry
This is how the above information will be represented in the Catalog:

Introductory course incorporating linear algebra concepts with computational tools, with real world applications to science, engineering and data science. Topics include linear equations, matrix operations, vector spaces, linear transformations, eigenvalues, eigenvectors, inner products and norms, orthogonality, linear regression, equilibrium, linear dynamical systems and the singular value decomposition. Course Information: Credit is not given for both MATH 257 and any of MATH 125, MATH 225, MATH 227, MATH 415 or ASRM 406. Students must register for a lecture, a lab, and a discussion section. Prerequisite: MATH 220 or MATH 221; CS 101 or equivalent programming experience.

Additional Course Notes
Students must register for a lecture, a lab, and a discussion section.

Course Detail
Frequency of course:

Every Fall
Every Spring
Every Summer

Duration of the course

Full

Anticipated Enrollment:

800

Expected distribution of student registration:

Freshman:
30 %

Sophomore:
50 %

Junior:
10 %

Senior:
10 %

General Education

Additional Course Information

Does this course replace an existing course?

No

Does this course impact other courses?

Yes

Specify the courses affected:

MATH 125, MATH 225, MATH 415, ASRM 406 credit restrictions. This course may also serve as prerequisite for courses currently listing MATH 415 as a prerequisite, both within and outside of MATH rubric courses.

Does the addition of this course impact the departmental curriculum?

No

Has this course been offered as a special topics or other type of experimental course?

Yes

Please indicate the Banner subject, course number, section ID, term and enrollment for each offering:

MATH 299 E1 add-on to Math 415 in Spring 2020, 24;
MATH 415 PL1, Fall 2020, 280.

Will this course be offered on-line?

Face-to-Face

Faculty members who will teach this course:

Philipp Hieronymi

Course ID:

1012152

Course Edits Proposed by:

Philipp Hieronymi

Key: 12299

10KT5673BS: COMPUTER SCIENCE & ADVERTISING, BS

In Workflow

1. U Program Review (dforgacs@illinois.edu; eastuby@illinois.edu; aledward@illinois.edu)
2. 1408 Committee Chair (jpchambe@illinois.edu)
3. 1408 Head (mzyao@illinois.edu)
4. 1434 Head (namato@illinois.edu; vmahesh@illinois.edu; egunter@illinois.edu)
5. KP Committee Chair (bsnewell@illinois.edu; danko@illinois.edu; kcp@illinois.edu; jmakela@illinois.edu)
6. KP Dean (candyd@illinois.edu)
7. KT Committee Chair (jpchambe@illinois.edu; keclark@illinois.edu)
8. KT Dean (keclark@illinois.edu; tsulkin@illinois.edu)
9. University Librarian (jpwilkin@illinois.edu)
10. Provost (kmartens@illinois.edu)
11. Senate EPC (bjlehman@illinois.edu; moorhouz@illinois.edu; kmartens@illinois.edu)
12. Senate (jtempel@illinois.edu)
13. U Senate Conf (none)
14. Board of Trustees (none)
15. IBHE (none)
16. DMI (eastuby@illinois.edu; aledward@illinois.edu; dforgacs@illinois.edu)

Approval Path

1. Thu, 08 Apr 2021 15:02:47 GMT
   Emily Stuby (eastuby): Approved for U Program Review
2. Thu, 08 Apr 2021 15:16:38 GMT
   Katie Clark (keclark): Approved for 1408 Committee Chair
3. Thu, 08 Apr 2021 16:43:52 GMT
   Mike Yao (mzyao): Approved for 1408 Head
4. Thu, 08 Apr 2021 19:10:11 GMT
   Elsa Gunter (egunter): Approved for 1434 Head
5. Thu, 08 Apr 2021 19:29:31 GMT
   Brooke Newell (bsnewell): Approved for KP Committee Chair
6. Thu, 08 Apr 2021 19:41:04 GMT
   Candy Deaville (candyd): Approved for KP Dean
7. Thu, 08 Apr 2021 20:02:17 GMT
   Katie Clark (keclark): Approved for KT Committee Chair
8. Thu, 08 Apr 2021 20:02:59 GMT
   Katie Clark (keclark): Approved for KT Dean
9. Thu, 08 Apr 2021 20:06:26 GMT
   John Wilkin (jpwilkin): Approved for University Librarian
10. Thu, 08 Apr 2021 21:45:32 GMT
    Kathy Martensen (kmartens): Approved for Provost

History

1. Feb 6, 2019 by Deb Forgacs (dforgacs)
2. Feb 22, 2019 by Deb Forgacs (dforgacs)

Date Submitted:Thu, 08 Apr 2021 14:34:36 GMT

Viewing:10KT5673BS : Computer Science & Advertising, BS

Changes proposed by: Katie Clark

Proposal Type

Proposal Type:

Major (ex. Special Education)

This proposal is for a:

Revision

Proposal Title:

If this proposal is one piece of a multi-element change please include the other impacted programs here.*example: A BS revision with multiple concentration revisions*

Administrative approval: Revision to CS requirements of the major.

EP Control Number

EP.21.115

Official Program Name

Computer Science & Advertising, BS

Effective Catalog Term

Fall 2021

Sponsor College

Media, College of

Sponsor Department

Advertising

Sponsor Name

Jason Chambers

Sponsor Email

jpchambe@illinois.edu

College Contact

Katie Clark

College Contact Email

keclark@illinois.edu

Program Description and Justification

Justification for proposal change:

The CS Department has updated requirements to their major and these changes should be reflected in the CS+ADV major as well.

In brief, the revisions are to change CS 125 and 126 to CS 124, 128, and 222, to add Math 257 as an option for linear algebra, in addition to Math 225.

In the CS component, the proposal involves changes to two aspects. The first is a reorganization of the material in the introductory course sequence. The second is to incorporate an option of a new linear algebra course, MATH 257, into the linear algebra requirement for the program. These changes are broadly shared, with some degree-specific modifications the suite of undergraduate programs including Computer Science:
10KP0112BS: Computer Science, BS
10KL5623BS: Computer Science + Crop Sciences, BS
10KL5864BS: Computer Science & Animal Sciences, BS
10KR5639BS: Computer Science + Music, BS
10KT5673BS: Computer Science & Advertising, BS
10KV0464BSLA: Statistics & Computer Science, BSLAS
10KV1438BSLA: Mathematics & Computer Science, BSLAS
10KV5348BSLA: Computer Science & Anthropology, BSLAS
10KV5349BSLA: Computer Science & Astronomy, BSLAS
10KV5350BSLA: Computer Science & Chemistry, BSLAS
10KV5351BSLA: Computer Science & Linguistics, BSLAS
10KV5667BSLA: Computer Science & Economics, BSLAS
10KV5676BSLA: Computer Science & Geography & Geographic Information Science, BSLAS
10KV5679BSLA: Computer Science & Philosophy, BSLAS
JP. 10KL5890BS & 1PKS5890MANS: JP. Computer Science & Animal Sciences, BS & Animal Science, MANSC
JP. 10KL5890BS & 1PKS5890MANS(MANU): JP. Computer Science & Animal Sciences, BS & Animal Science, MANSC
JP.10KL5903BS & 10KS5903MS: JP. Computer Science + Crop Sciences, BS & Crop Sciences, MS

In more detail,
1) (CS 125(4cr) Introduction to Computer Science + CS 126(3cr) Software Design Studio) -> (CS 124(3cr) Introduction to Computer Science I + CS 128(3cr) Introduction to Computer Science II + CS 222(1cr) Software Design Lab), CS 242(3cr) Programming Studio -> CS 222(1cr) Software Design Lab, the CS 225 Data Structures prerequisite of CS 125 is replaced with (CS 126 or CS 128) as the programming prerequisite, CS 128 is open to all, CS 222 is restricted to &CS+ programs. The programming prerequisite for CS 173 is changed from CS 125 to (CS 124 or CS 125).

Justification: CS 128 takes about 2/3 of the material from the old CS 126 and receives an hour from the old CS 125 topics, with the remaining topics remaining with CS 124. Replacing CS 126 with CS 128 makes the path to CS 225 uniform for all students (except ECE), including &CS+ majors, students wanting to transfer into one of the &CS+ programs, students doing minors and students needing CS 225 to complete a concentration. It also allows CS 225 to start with an assumption that all students know how to program in C++, and assures all students in the class have a common programming background. Further, the new CS 128 will provide an extended ability for general students to increase their skills in programming and structured program design and development, but without the more specialized material in Data Structures. Adding CS 222 and removing CS 242 eliminates the attempt to discriminate between how students entering as freshmen versus as transfers take the code review class.

2) Change the linear algebra requirement from MATH 225 to (Math 225 or Math 257).

Justification: The Math department is developing MATH 257 as the eventual replacement for MATH 415, with the same theoretical content, but with an emphasis on using programming to perform matrix operations instead of calculating them on paper. Students in CS+Advertising should have the option of a stronger linear algebra class with stronger ties to programming.

Corresponding Degree

BS Bachelor of Science

Is this program interdisciplinary?

Yes

Interdisciplinary Colleges and Departments (list other colleges/departments which are involved other than the sponsor chose above)

College

Grainger College of Engineering

Department

Computer Science

Do you need to add an additional interdisciplinary relationship?

No

Academic Level

Undergraduate

Will you admit to the concentration directly?

No

Is a concentration required for graduation?

No

CIP Code

11.0199 - 11.0199

Is This a Teacher Certification Program?

No

Will specialized accreditation be sought for this program?

No

Admission Requirements

Desired Effective Admissions Term

Fall 2021

Is this revision a change to the admission status of the program?

No

Provide a brief narrative description of the admission requirements for this program. Where relevant, include information about licensure requirements, student background checks, GRE and TOEFL scores, and admission requirements for transfer students.

migration

Describe how critical academic functions such as admissions and student advising are managed.

migration

Enrollment

Describe how this revision will impact enrollment and degrees awarded.

No change is anticipated in the enrollment and degree awarded.

Estimated Annual Number of Degrees Awarded

Year One Estimate

migration

5th Year Estimate (or when fully implemented)

migration

What is the matriculation term for this program?

Fall

What is the typical time to completion of this program?

4 years

What are the minimum Total Credit Hours required for this program?

124

Delivery Method

Is this program available on campus and online?

No

This program is available:

On Campus

Budget

Are there budgetary implications for this revision?

No

Will the program or revision require staffing (faculty, advisors, etc.) beyond what is currently available?

No

Resource Implications

Facilities

Will the program require new or additional facilities or significant improvements to already existing facilities?

No

Technology

Will the program need additional technology beyond what is currently available for the unit?

No

Non-Technical Resources

Will the program require additional supplies, services or equipment (non-technical)?

No

Resources

For each of these items, be sure to include in the response if the proposed new program or change will result in replacement of another program(s). If so, which program(s), what is the anticipated impact on faculty, students, and instructional resources? Please attach any letters of support/ acknowledgement from faculty, students, and/or other impacted units as appropriate.

Attach File(s)

CS_letter_Math_257.pdf

Faculty Resources

Please address the impact on faculty resources including any changes in numbers of faculty, class size, teaching loads, student-faculty ratios, etc. Describe how the unit will support student advising, including job placement and/or admission to advanced studies.

migration

Library Resources

Describe your proposal's impact on the University Library's resources, collections, and services. If necessary please consult with the appropriate disciplinary specialist within the University Library.

migration

Instructional Resources

Will there be any reduction in other course offerings, programs or concentrations by your department as a result of this new program/proposed change?

No

Does the program include other courses/subjects impacted by the creation/revision of this program?

No

Financial Resources

How does the unit intend to financially support this proposal?

migration

Will the unit need to seek campus or other external resources?

No

Are you seeking a change in the tuition rate or differential for this program?

Yes

Program Regulation and Assessment

Briefly describe the plan to assess and improve student learning, including the program's learning objectives; when, how, and where these learning objectives will be assessed; what metrics will be used to signify student's achievement of the stated learning objectives; and the process to ensure assessment results are used to improve student learning. (Describe how the program is aligned with or meets licensure, certification, and/or entitlement requirements, if applicable).

migration

Is the career/profession for graduates of this program regulated by the State of Illinois?

No

Program of Study

“Baccalaureate degree requires at least 120 semester credit hours or 180 quarter credit hours and at least 40 semester credit hours (60 quarter credit hours) in upper division courses” (source: https://www.ibhe.org/assets/files/PrivateAdminRules2017.pdf). For proposals for new bachelor’s degrees, if this minimum is not explicitly met by specifically-required 300- and/or 400-level courses, please provide information on how the upper-division hours requirement will be satisfied.

All proposals must attach the new or revised version of the Academic Catalog program of study entry. Contact your college office if you have questions.

Revised programs

BS in Computer Science + ADV Curriculum side-by-side 2021-04-05.xlsx

Attach a side-by-side comparison with the existing program AND, if the revision references or adds “chose-from” lists of courses students can select from to fulfill requirements, a listing of these courses, including the course rubric, number, title, and number of credit hours.

Catalog Page Text

Catalog Page Text: Description of program for the catalog page. This is not official content, it is used to help build the catalog pages for the program. Can be edited in the catalog by the college or department.

COMPUTER SCIENCE AND ADVERTISING is sponsored jointly by the Departments of Computer Science and Advertising. This is a program for students who plan to pursue careers in the advertising field that have a technology focus. Cloud computing, the availability and ubiquity of data, and the rapid and pervasive adoption of mobile technology have created a paradigm shift in the advertising industry. Projected areas of growth in advertising and communications will be in Search Engine Optimization, web analytics, Computational Advertising, and other emerging areas of technology/media. The degree will prepare students for advanced study at the graduate level as well as immediate entry into the workforce at advertising agencies, businesses with in-house advertising and marketing divisions, and technology companies.

Statement for Programs of Study Catalog

General education:Students must complete the Campus General Education (https://courses.illinois.edu/gened/DEFAULT/DEFAULT/)**requirements including the campus general education language requirement.**
Minimum required major and supporting course work:Minimum required major and supporting course work normally equates to 68 hours plus 12 additional hours of College of Media requirements. All campus general education and foreign language requirements must be met. The minimum hours required for graduation is 124. At least 12 hours of 300- and 400-level course work must be taken on this campus, and a minimum of 40 hours of upper-division course work is required.
Minimum hours required for graduation:124 hours
To graduate from the Computer Science & Advertising curriculum, a student must complete the following courses, all of which must be taken for a traditional letter grade.

Code	Title	Hours
Computer Science Core		
CS 125	Introduction to Computer Science	4
CS 126	Software Design Studio	3
CS 124	Introduction to Computer Science I	3
CS 128	Introduction to Computer Science II	3
CS 173	Discrete Structures	3
CS 222	Software Design Lab	1
CS 225	Data Structures	4
CS 240	Introduction to Computer Systems	3

CS 374	Introduction to Algorithms & Models of Computation	4
CS 421	Programming Languages & Compilers	3 or 4
Computer Science Technical Electives: Two 400-level courses chosen in consultation with an advisor. These two courses must be aboveCS 403, notCS 491, and distinct from all other courses used to fulfill program requirements or options.		6
Mathematical Foundations (also fulfills QR I and II gen eds.)		
MATH 220	Calculus	5
or MATH 221	Calculus I	
MATH 231	Calculus II	3
MATH 225	Introductory Matrix Theory	2 or 3
or MATH 257	Linear Algebra with Computational Applications	
CS 361	Probability & Statistics for Computer Science	3
College of Media Foundations		
Select one from:		3-4
ANTH 103	Anthro in a Changing World	
PSYC 100	Intro Psych	
SOC 100	Introduction to Sociology	
ECON 102	Microeconomic Principles	3
ECON 103	Macroeconomic Principles	3
or ECON 302	Inter Microeconomic Theory	
BADM 320	Principles of Marketing	3
Advertising Core		
ADV 150	Introduction to Advertising	3
ADV 281	Advertising Research Methods	3
ADV 283	Advertising and Brand Strategy	3
ADV 284	Consumer Insight	3
ADV 390	Content Creation	3
ADV 460	Innovation in Advertising	3
ADV 483	Audience Analysis	3
ADV 461	Computational Advertising	3
ADV 492	Tech and Advertising Campaigns	3
Total Hours		**124**

EP Documentation

DMI Documentation

Banner/Codebook Name

BS:Comp Sci & Advertising-UIUC

Program Code:

10KT5673BS

Degree Code

BS

Major Code

5673

Program Reviewer Comments

Kathy Martensen (kmartens) (Thu, 08 Apr 2021 21:44:46 GMT): Administrative approval: No change to total hours required/restriction of options.

Key: 571

Computer Science + Crop Sciences Curriculum Revision: Side-by-side Comparison

Key

GREEN HIGHLIGHT = Course addition, requirement replacement or updated hours

RED HIGHLIGHT = Course to be removed from listed requirements.

Current Requirement		Current Hours
General education: Students must complete the Campus General Education requirements including the campus general education language requirement.		
Minimum required major and supporting course work: Minimum required major and supporting course work normally equates to 68 hours plus 12 additional hours of College of Media requirements. All campus general education and foreign language requirements must be met. The minimum hours required for graduation is 124. At least 12 hours of 300- and 400-level course work must be taken on this campus, and a minimum of 40 hours of upper-division course work is required.		
Minimum hours required for graduation: 124 hours		
To graduate from the Computer Science & Advertising curriculum, a student must complete the following courses, all of which must be taken for a traditional letter grade.		
Course List		
Computer Science Core		
CS 125	Introduction to Computer Science	4
CS 126	Software Design Studio	3
CS 173	Discrete Structures	3
CS 225	Data Structures	4
CS 240	Introduction to Computer Systems	3
CS 374	Introduction to Algorithms & Models of Computation	4
CS 421	Programming Languages & Compilers	3 or 4
Computer Science Technical Electives: Two 400-level courses chosen in consultation with an advisor.		6
Mathematical Foundations (also fulfills QR I and II gen eds.)		
MATH 220	Calculus	5
or MATH 221	Calculus I	
MATH 231	Calculus II	3
MATH 225	Introductory Matrix Theory	2
CS 361	Probability & Statistics for Computer Science	3
College of Media Foundations		
Select one from:		3 or 4
ANTH 103	Anthro in a Changing World	
PSYC 100	Intro Psych	
SOC 100	Introduction to Sociology	
ECON 102	Microeconomic Principles	3
ECON 103	Macroeconomic Principles	3
or ECON 302	Inter Microeconomic Theory	
BADM 320	Principles of Marketing	3
Advertising Core		
ADV 150	Introduction to Advertising	3
ADV 281	Advertising Research Methods	3
ADV 283	Advertising and Brand Strategy	3
ADV 284	Consumer Insight	3
ADV 390	Content Creation	3
ADV 460	Innovation in Advertising	3
ADV 483	Audience Analysis	3
ADV 461	Computational Advertising	3
ADV 492	Tech and Advertising Campaigns	3
Total Hours		**124**

Current Requirement		Current Hours
General education: Students must complete the Campus General Education requirements including the campus general education language requirement.		
Minimum required major and supporting course work: Minimum required major and supporting course work normally equates to 68 hours plus 12 additional hours of College of Media requirements. All campus general education and foreign language requirements must be met. The minimum hours required for graduation is 124. At least 12 hours of 300- and 400-level course work must be taken on this campus, and a minimum of 40 hours of upper-division course work is required.		
Minimum hours required for graduation: 124 hours		
To graduate from the Computer Science & Advertising curriculum, a student must complete the following courses, all of which must be taken for a traditional letter grade.		
Course List		
Computer Science Core		
CS 124	Introduction to Computer Science I	3
CS 128	Introduction to Computer Science II	3
CS 173	Discrete Structures	3
CS 225	Data Structures	4
CS 222	Software Design Lab	1
CS 240	Introduction to Computer Systems	3
CS 374	Introduction to Algorithms & Models of Computation	4
CS 421	Programming Languages & Compilers	3 or 4
Computer Science Technical Electives: Two 400-level courses chosen in consultation with an advisor. These two courses must be above CS 403, not CS 491, and distinct from all other courses used to fulfill program requirements or options.		6
Mathematical Foundations (also fulfills QR I and II gen eds.)		
MATH 220	Calculus	5
or MATH 221	Calculus I	
MATH 231	Calculus II	3
MATH 225 or MATH 257	Introductory Matrix Theory Linear Algebra with Computational Applications	2 or 3
CS 361	Probability & Statistics for Computer Science	3
College of Media Foundations		
Select one from:		3 or 4
ANTH 103	Anthro in a Changing World	
PSYC 100	Intro Psych	
SOC 100	Introduction to Sociology	
ECON 102	Microeconomic Principles	3
ECON 103	Macroeconomic Principles	3
or ECON 302	Inter Microeconomic Theory	
BADM 320	Principles of Marketing	3
Advertising Core		
ADV 150	Introduction to Advertising	3
ADV 281	Advertising Research Methods	3
ADV 283	Advertising and Brand Strategy	3
ADV 284	Consumer Insight	3
ADV 390	Content Creation	3
ADV 460	Innovation in Advertising	3
ADV 483	Audience Analysis	3
ADV 461	Computational Advertising	3
ADV 492	Tech and Advertising Campaigns	3
Total Hours		**124**

UNIVERSITY OF ILLINOIS SYSTEM

Office of the Executive Vice President/Vice President for Academic Affairs
377 Henry Administration Building
506 South Wright Street
Urbana, IL 61801

May 18, 2018

Gretchen Lohman
Illinois Board of Higher Education
1 N. Old State Capitol Plaza, Suite 333
Springfield, IL 62701

Dear Gretchen:

I write to request of the IBHE a Reasonable and Moderate Extension (RME) to establish the Bachelor of Science with a major in Computer Science and Advertising in the College of Media at the University of Illinois at Urbana-Champaign.

This program follows the "CS + X" model that comprised four College of Liberal Arts and Sciences (LAS) degree programs approved by IBHE on February 5, 2013: Computer Science + Anthropology, Computer Science + Astronomy, Computer Science + Chemistry, and Computer Science + Linguistics as well as CS + Economics, which was approved by IBHE on March 27, 2018. In addition, it follows the "CS + Xs" from the College of Agricultural, Consumer and Environmental Sciences (BS in Computer Science and Crop Sciences, approved by IBHE on May 26, 2017) and from the College of Fine and Applied Arts (BS in Computer Science and Music, approved by IBHE on August 30, 2017).

The CS + X curriculum was designed to encourage units to propose additional major pairings by crafting a minimum of 24 hours of supporting coursework with a minimum of 30 hours of computer science coursework. The model structure for the proposed program resembles the original approved in 2013. We therefore make this RME request under definition #14, "Creation of a new program that results from the reorganization or restructuring of an existing program that have over time evolved into separate and distinct programs, or options have evolved into separate programs."

The CIP code requested is: 11.0199, Computer and Information Sciences, Other.

Background and Description:

The proposed program provides a flexible option for undergraduate students who plan to pursue technology-focused careers in the advertising field. Cloud computing, the availability and ubiquity of data, and the rapid and pervasive adoption of mobile technology have created a paradigm shift in the advertising industry. Projected areas of growth in advertising and communications will be in search engine optimization, web analytics, computational advertising, and other areas of emerging technology/media (https://www.monster.com/career-advice/article/marketing-jobs-outlook-2012).

Needs Assessment:

This is an era of "big data" where 2.5 quintillion bytes of data are created daily. Billions of individual ads, search queries, page impressions, and photo uploads, and purchases are analyzed by Google, Facebook, and Amazon to identify, understand, and predict social relationships and patterns. Insights

from these data are used to create customized messages for consumers related to movies, health, finance, politics, and myriad other categories.

For example, computational advertising, which seeks to find the best match between an individual user in a given media context and relevant advertisement, is the future of advertising and the web (Essex – CACM 2009). Using data mining, machine learning, computational techniques, microeconomics, and psychology, computational advertising can help media producers, media sellers, and businesses focus on using data and information for crafting new models of content delivery that can benefit the consumer. This paradigm requires both the mechanics of science and data manipulation (computer science) as well as the art, sociology, and psychology of understanding messages and people (advertising).

The proposed program will enhance the offerings of the University of Illinois at Urbana-Champaign by making it the first institution to introduce a cross-disciplinary curriculum in the fields of Computer Science and Advertising. To date, a few of the university's peer institutions in Advertising (e.g., Michigan State University, University of Texas-Austin) recommend a specialization or certificate in information technology or computing, but these courses are not tailored to the advertising audience nor are there any cross-disciplinary offerings. In Computer Science, Georgia Tech offers a B.S. in Computational Media with courses in film and games, but none related to advertising or consumer analytics. Stanford University offers a course entitled "Computational Advertising" through the Department of Management Science & Engineering. Yet, despite the obvious synergies between computer science and advertising, no advertising department or computer science department offers an explicit cross-disciplinary curriculum. The University of Illinois at Urbana-Champaign is the perfect place to do so.

It is anticipated the students who choose to enroll in the proposed program will be a different population than those who are enrolled in/are prospectively enrolled in the existing Bachelor of Science in Advertising. Advertising majors can choose careers in strategy, social science research, and creativity; none of these arenas mandates a computer science and advertising major. The proposed program is intended to appeal to a population of students who wish to apply their strong computer science skills to the advertising industry, where there is a recent, growing, acute need for data managers. For the university, the new degree offers growth potential with respect to its undergraduate body.

Finally, the proposed Bachelor of Science in Computer Science and Advertising will advance the goals of both the Department of Advertising and the Department of Computer Science. Advertising aims to become a resource and leader in advertising of the future. Advertising models and audience consumption of media are shifting rapidly into digital spaces. The most sought-after graduates must not only understand, analyze, and shape media content (advertising), but must also be able to create new software, analyze complex data, and develop algorithms that make use of such data in innovative ways to create novel relationships between consumers and companies (consumer science). The Computer Science Department is committed to spreading the understanding and application of computational methods widely outside the engineering universe. Advertising is a natural pairing because of the applicability of data mining algorithms, the relevance of social media, and the relationships with numerous areas such as algorithmic game theory, security, and privacy.

Comparable Programs in Illinois:

According to the IBHE Academic Degree Programs list, no other institutions in Illinois have degrees similar to the proposed Bachelor of Science with a major in Computer Science and Advertising.

Enrollment:

Enrollment is projected to be approximately 15 to 25 students per year, with steady-state being 60 to 100 majors enrolled. Approximately 20 degrees will be awarded annually.

Admissions:

First-year applicants will be assessed by the Office of Undergraduate Admissions based on the information provided in the application, and coordinated with admission requirements to other Computer Science programs. Academic achievements, such as GPA, are the most important factor, but extra-curricular involvement, individual interests, personal characteristics, and special talents are also considered. The following is a list of factors considered during the review process: ACT and SAT sub-scores in English, Math, and the Social Sciences; Lab Science course work; Foreign Language course work; ACT or SAT composite score; high school GPA; and two essay responses.

For current University of Illinois at Urbana-Champaign undergraduate students in other colleges or majors, applications for admission will be evaluated for transfer by a committee of Computer Science and Advertising advisors and faculty. Decisions will be based on a holistic review done twice per year that considers the following factors: GPA (recommended at least 3.5); performance in core CS classes (CS 173 and CS 225, at least B+ in each recommended); performance in core Advertising courses (ADV 150 and ADV 281, grades of at least B+ in each recommended); grades in other CS and ADV courses counting toward the major; essay and statement of interest; demonstrated interest in both computer science and advertising via participation in student groups, internships, or projects, career goals, and other experiences. Students who are neither Computer Science nor Advertising majors who have fewer than two years remaining towards their degree will normally not be allowed to transfer.

Program and Curriculum Description:

Delivery of this major will be predominantly face-to-face.

Statement for the Academic Catalog's Programs of Study Listing:

Computer Science and Advertising

www.cs.illinois.edu or www.media.illinois.edu/advertising

This major is sponsored jointly by the Departments of Computer Science and Advertising. The major in Computer Science and Advertising is a flexible program for undergraduate students who plan to pursue careers in the advertising field that have a technology focus. Cloud computing, the availability and ubiquity of data, and the rapid and pervasive adoption of mobile technology have created a paradigm shift in the advertising industry. Projected areas of growth in advertising and communications will be located in search engine optimization, web analytics, computational advertising, and other areas of emerging technology/media. The degree will prepare students for advanced study at the graduate level, as well as immediate entry into the workforce at advertising agencies, businesses with in-house advertising and marketing divisions, and technology companies.

Email: academic@cs.illinois.edu or media-ssc@illinois.edu

Degree title: Bachelor of Science in Computer Science and Advertising

Minimum required major and supporting course work normally equates to 68 hours, plus 12 additional hours of College of Media requirements. All campus general education and foreign language requirements must be met. The minimum hours required for graduation is 124. At least 12 hours of 300- and 400-level coursework must be taken on this campus, and a minimum of 40 hours of upper-division coursework are required.

A Major Plan of Study Form must be completed and submitted to the Department of Computer Science Office of Undergraduate Affairs by the beginning of the fifth semester (60-75 hours). Please see the computer science advisor in 1210 Siebel Center, as well as the advertising advisor in the College of Media Student Services Center.

To graduate from the Computer Science and Advertising curriculum, a student must complete the following courses, all of which must be taken for a traditional letter grade.

Computer Science Core – minimum 24 hours	Hours
CS 125, Introduction to Computer Science	4
CS 126, Programming Studio	3
CS 173, Discrete Structures	3
CS 225, Data Structures*	3
CS 240, Introduction to Systems*	3
CS 374, Theory and Algorithms I	4
CS 421, Programming Languages and Compliers	3
Computer Science Technical Electives: Two 400-levelcourses chosen in consultation with an advisor	6
Computer Science Core – minimum 24 hours	Hours
Mathematical Foundations (also fulfills Quant. Reasoning I and II gen eds.)—min. 12-13 hours	Hours
MATH 220 or 221, Calculus I	4-5
MATH 231, Calculus II	3
MATH 225, Introductory Matrix Theory	2
CS 361, Probability and Statistics for Computer Science	3

College of Media Foundations – minimum 12-13 hours	Hours
PSYC 100, Introduction to Psychology; SOC 100, Introduction to Sociology; or ANTH 103, Anthropology in a Changing World	3-4
ECON 102, Microeconomic Principles	3
ECON 103, Macroeconomic Principles or ECON 302, Intermediate Microeconomics	3
BADM 320, Principles of Marketing	3

Advertising Core – minimum 27 hours	Hours
ADV 150, Introduction to Advertising	3
ADV 281, Research Methods*	3
ADV 283, Advertising and Brand Strategy*	3
ADV 284, Consumer Insights*	3
ADV 390, Content Creation	3
ADV 460, Innovating Communication	3

ADV 483, Audience Analysis: Contact & Connections	3
CS/ADV 461, Computational Advertising	3
CS/ADV Team/Projects Course: ADV 492, Advertising Content & Technologies	3

69-70 hours for Major, 12-13 for College requirements. Total minimum hours required for graduation = 124.

This program has 34 semester hours of designated required 300-400 level courses. In addition, the program includes 15 hours of required 200 level courses with two to three prerequisites, which are considered advanced level by the university, and are typically taken by juniors and seniors. Those are: CS 225 (2 prerequisites); CS 240 (3 prerequisites); ADV 281 (2 prerequisites); ADV 283 (3 prerequisites); ADV 284 (3 prerequisites).

Course Descriptions: See Appendix A

Side by Side Curricula Comparisons:

	BS in Computer Science	**BS in CS + X in LAS: Anthropology, Astronomy, Chemistry, Economics, and Linguistics**	**Proposed BS in Computer Science + Advertising**
Composition I	RHET 105 (4 hours)	RHET 105 (4 hours)	RHET 105 (4 hours)
Advanced Composition	Select from approved list (3-4 hours)	Select from approved list (3-4 hours)	Select from approved list (3-4 hours)
Western Culture(s)	Select from approved list (3-4 hours)	Select from approved list (3-4 hours)	Select from approved list (3-4 hours)
Non-Western Culture(s)	Select from approved list (3-4 hours)	Select from approved list (3-4 hours)	Select from approved list (3-4 hours)
U.S. Minority Culture(s)	Select from approved list (3-4 hours)	Select from approved list (3-4 hours)	Select from approved list (3-4 hours)
Language	Through third level of one language	Through third level of one language	Through third level of one language
Quantitative Reasoning I	CS 125 (4 hours)	CS 125 (4 hours)	CS 125 (4 hours)
Quantitative Reasoning II	CS 225 (4 hours)	CS 225 (4 hours)	CS 225 (4 hours)
Natural Sciences and Technology	Select from approved list (6 hours)	Select from approved list (6 hours)	Select from approved list (6 hours)
Humanities and the Arts	Select from approved list (6 hours)	Select from approved list (6 hours)	Select from approved list (6 hours)
Social and Behavioral Sciences	Select from approved list (6 hours)	Select from approved list (6 hours)	Select from approved list (6 hours)
Freshmen Orientation	CS 101 (1 hour), ENG 100 (0 hour)	CS 101 (1 hour)	FAA 101 (1 hour)
Computer Science	CS 125, 126, 173, 225,	CS 125, 126, 173, 225,	CS 125, 126, 173, 225,

Technical Core	233, 241, 361, 374, 421 (32 hours) plus CS 357 (3 hours)	233, 241, 361, 374, 421 (32 hours)	240, 361, 374, 421, plus two 400-level CS electives aligned with CS+Advertising needs (33 hours)
Foundational Math Courses	MATH 220/221, 231, 241, 415 (14-15 hours)	MATH 220/221, 225 231 (9-10 hours)	MATH 220/221, 225 231 (9-10 hours)
Major or concentration required courses outside of above CS and Math	66 hours	33-36 hours	39-40 hours
Total minimum required hours	128 hours	120 hours	124 hours

Assessment:

Learning Objectives/Outcomes

The program's student learning objectives are not significantly different than those for students with a Computer Science degree, though the ability to design systems is at a level of less complexity. In addition, students are expected students to obtain advanced knowledge in the Advertising discipline, in which computer technology can play a significant role:

By the time of graduation, students will have attained:

(a) An ability to apply knowledge of computing and mathematics appropriate to the discipline
(b) An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
(c) An ability to contribute to the design, implementation, and evaluation of a computer-based system, process, component, or program to meet desired needs
(d) An ability to function effectively on teams to accomplish a common goal
(e) Recognition of the need for and an ability to engage in continuing professional development
(f) An ability to use current techniques, skills, and tools necessary for computing practice
(g) An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices
(h) An ability to apply design and development principles in the construction of software systems of moderate complexity
(i) Advanced knowledge of topics in Advertising
(j) Intellectual reasoning and knowledge
(k) Creative inquiry and discovery
(l) Effective collaboration and communication
(m) Effective leadership and community engagement
(n) Social, cultural, and global understanding
(o) Passion for learning

The various core courses and degree requirements are aligned with these learning goals, and successful completion will ensure that the goals are met. The table below describes which courses support each of the learning goals.

Class\goal	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)
CS 125	x	x	x	x	x	x		x							
CS 126	x	x	x	x	x	x		x							
CS 173	x	x	x			x	x								
CS 225	x	x	x	x	x	x		x							
CS 240	x	x	x			x		x							
CS 374	x	x	x	x		x	x								
CS 421	x				x	x	x	x							
MATH 221	x						x								
MATH 231	x						x								
MATH 225	x						x								
ADV 150										x	x	x	x	x	x
ADV 281									x	x	x	x		x	x
ADV 283				x	x				x	x	x	x		x	x
ADV 284				X	x				x	x	x	x	x	x	x
ADV 290					x				x	x	x	x			
ADV 305					x				x	x	x	x	x	x	x
ADV 310					x				x	x	x	x		x	x
ADV 311					x				x	x	x	x		x	x
ADV 312					x				x	x		x		x	x
ADV 350					x				x	x	x	x		x	x
ADV 390					x				x	x	x	x	x	x	x
ADV 393					x				x	x	x	x		x	x
ADV 396					x				x	x	x	x		x	x
ADV 399					x				x	x	x	x		x	x
ADV 409					x				x	x	x	x	x		x
ADV 410					x				x	x	x	x	x	x	x
ADV 452					x				x	x	x	x	x	x	x
ADV 460				x	x				x	x	x	x	x		x
ADV 475					x				x	x	x	x		x	x
ADV 476					x				x	x	x	x		x	x
ADV 478					x				x	x	x	x		x	x
ADV 481					x				x	x	x	x	x	x	x
ADV 483				x	x				x	x	x	x		x	x
ADV 490: Copywriting					x				x	x	x	x	x		x
ADV 490: Social Media Analytics					x				x	x	x			x	x
ADV 492					x				x	x	x	x	x	x	x
ADV 496					x				x	x	x	x		x	x
ADV 497					x				x	x		x		x	x
ADV 498				x	x				x	x	x	x	x		x

Assessment of Learning Objectives/Outcomes and Use of Assessment Results:

At a minimum, for graduation students are expected to achieve competency as evidenced by a cumulative GPA of at least 2.0 ("C") in their discipline. While grades in individual courses may be lower, students who receive a grade lower than "C-" (for example, a score less than 70% on a well-calibrated final exam) in a course that is a prerequisite for a follow-on course, are strongly advised to repeat the course before attempting to advance through the program.

Student performance and course efficacy is regularly evaluated by both individual instructors, based on student exam and homework scores and student course evaluations, by Computer Science sub-area faculty for courses under their purview, and by an undergraduate study committee that evaluates curricular changes, course revisions, and new course proposals, and provides recommendations to the entire CS faculty for adoption. Changes in course delivery methods, in homework and programming project design, and in topical coverage result from such evaluations.

Program Evaluation:

The departments of Advertising and Computer Science regularly meet to evaluate existing majors in their respective units; it will be straightforward to incorporate consideration and evaluation of the proposed program into those discussions.

Data to aid in the evaluation of the program will include:

- Student performance data in comparison to students enrolled in the existing "single" majors (Computer Science major, Advertising major, Computer Science and Advertising major)
- Retention rates
- Average time to degree
- Annual senior surveys
- Employment rates and salaries, comparisons to national averages
- Rates of employment in summer internship programs
- Rates of acceptance to graduate schools
- Alumni surveys, to be conducted every five years

Resources:

No additional university or external resources will be needed for the proposed program. Courses that are part of the program are already in existence with appropriate capacity and are offered regularly. The anticipated enrollment numbers are such that impact on class sizes will be minimal and not require new faculty hires nor new hires for advising or related student support services.

No additional impact on the University Library is anticipated given that required texts and other electronic resources are already made available for students in the existing economics and computer science majors.

Faculty Listing: See Appendix B

This program was approved by the Senate on October 23, 2017, and the Board of Trustees on November 16, 2017.

Please let me know if you have questions about this request.

Sincerely,

Julian Parrott
Assistant Vice President for Academic Affairs

C: Amy Edwards
Ellen Foran
Kathy Johnson
Kristi Kuntz
Chris Lehman
Kathy Martensen
Cathy Menacher
Jessica Mette
Kim Midden
Renee Nagy
Nathan Wilds
Aubrie Williams
Barbara Wilson

APPENDIX A

Course Listing

CS 125 Intro to Computer Science credit: 4 Hours
Basic concepts in computing and fundamental techniques for solving computational problems. Intended as a first course for computer science majors and others with a deep interest in computing. Prerequisite: Three years of high school mathematics or MATH 112. This course satisfies the General Education Criteria for Quantitative Reasoning I.

CS 126 Software Design Studio credit: 3 Hours
Fundamental principles and techniques of software development. Design, documentation, testing, and debugging software, with a significant emphasis on code review. Credit is not given for both CS 242 and CS 126. Prerequisite: CS 125. For majors only.

CS 173 Discrete Structures credit: 3 Hours
Discrete mathematical structures frequently encountered in the study of Computer Science. Sets, propositions, Boolean algebra, induction, recursion, relations, functions, and graphs. Credit is not given for both CS 173 and MATH 213. Prerequisite: One of CS 125, ECE 220; one of MATH 220, MATH 221.

CS 225 Data Structures credit: 4 Hours
Data abstractions: elementary data structures (lists, stacks, queues, and trees) and their implementation using an object-oriented programming language. Solutions to a variety of computational problems such as search on graphs and trees. Elementary analysis of algorithms. Prerequisite: CS 125 or ECE 220; CS173 or MATH 213. This course satisfies the General Education Criteria for Quantitative Reasoning II.

CS 240 Introduction to Computer Systems credit: 3 Hours
Basics of computer systems. Number representations, assembly/machine language, abstract models of processors (fetch/execute, memory hierarchy), processes/process control, simple memory management, file I/O and directories, network programming, usage of cloud services. Prerequisite: CS 225 or both CS 205 and CS 110C++.

CS 374 Introduction to Algorithms & Models of Computation credit: 4 Hours
Analysis of algorithms, major paradigms of algorithm design including recursive algorithms, divide-and-conquer algorithms, dynamic programming, greedy algorithms, and graph algorithms. Formal models of computation including finite automata and Turing machines. Limitations of computation arising from fundamental notions of algorithm and from complexity-theoretic constraints. Reductions, undecidability and NP-completeness. Same as ECE 374. Prerequisite: CS 225; MATH 225 or MATH 415.

CS 421 Programming Languages & Compilers credit: 3 or 4 Hours
Structure of programming languages and their implementation. Basic language design principles; abstract data types; functional languages; type systems; object-oriented languages. Basics of lexing, parsing, syntax-directed translation, semantic analysis, and code generation. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CS 233 and CS 373.

MATH 220 Calculus credit: 5 Hours
First course in calculus and analytic geometry; basic techniques of differentiation and integration with applications including curve sketching; antidifferentation, the Riemann integral, fundamental theorem, exponential and trigonometric functions. Credit is not given for both MATH 220 and either MATH 221 or MATH 234. Prerequisite: An adequate ALEKS placement score as described at http://math.illinois.edu/ALEKS/, demonstrating knowledge of topics of MATH 115. Students with previous calculus experience should consider MATH 221. This course satisfies the General Education Criteria for Quantitative Reasoning I.

MATH 221 Calculus I credit: 4 Hours
First course in calculus and analytic geometry for students with some calculus background; basic techniques of differentiation and integration with applications including curve sketching; antidifferentation, the Riemann integral, fundamental theorem, exponential and trigonometric functions. Credit is not given for both MATH 221 and either MATH 220 or MATH 234. Prerequisite: An adequate ALEKS placement score as described at http://math.illinois.edu/ALEKS/ and either one year of high school calculus or a minimum score of 2 on the AB Calculus AP exam. This course satisfies the General Education Criteria for Quantitative Reasoning I.

MATH 225 Introductory Matrix Theory credit: 2 Hours
Systems of linear equations, matrices and inverses, determinants, and a glimpse at vector spaces, eigenvalues and eigenvectors. Credit is not given for both MATH 225 and any of MATH 125, MATH 410, or MATH 415. Prerequisite: MATH 220 or MATH 221; or equivalent.

MATH 231 Calculus II credit: 3 Hours
Second course in calculus and analytic geometry: techniques of integration, conic sections, polar coordinates, and infinite series. Prerequisite: MATH 220 or MATH 221. This course satisfies the General Education Criteria for Quantitative Reasoning I.

CS 361 Probability & Statistics for Computer Science credit: 3 Hours
Introduction to probability theory and statistics with applications to computer science. Topics include: visualizing datasets, summarizing data, basic descriptive statistics, conditional probability, independence, Bayes theorem, random variables, joint and conditional distributions, expectation, variance and covariance, central limit theorem. Markov inequality, Chebyshev inequality, law of large numbers, Markov chains, simulation, the PageRank algorithm, populations and sampling, sample mean, standard error, maximum likelihood estimation, Bayes estimation, hypothesis testing, confidence intervals, linear regression, principal component analysis, classification, and decision trees. Same as STAT 361. Credit is not given for both CS 361and ECE 313. Prerequisite: MATH 220 or 221; credit or concurrent registration in MATH 225. For majors only.

ADV 150 Introduction to Advertising credit: 3 Hours
Introduction to the practice and profession of advertising. Course material covers various functional areas of advertising and integrated brand promotion, including account planning, creative, media, research, consumer behavior, sales promotion and interactive advertising. Topics also include how advertising relates to society in cultural, social, ethical and regulatory contexts. Open to all undergraduate majors.

ADV 281 Advertising Research Methods credit: 3 Hours
Introduces students to the wide spectrum of qualitative and quantitative research techniques that are commonly used in the advertising industry. In addition to examining the principles, methods and techniques of advertising research, the course will address issues such as when research should and should not be conducted, analyzing data sets, forming meaningful research questions, figuring out how to answer the questions, and presenting the answers to these questions in a clear and compelling manner. Credit is not given for ADV 281 if credit for ADV 481 has been earned. Prerequisite: ADV 150, STAT 100 or equivalent.

ADV 283 Advertising and Brand Strategy credit: 3 Hours
Designed to help students acquire brand decision-making skills. Advertising and marketing theories, practical problems and traditional cases will be studied as they learn to build a strong brand strategy that will lead to a strong brand advertising strategy. This encompasses every facet of making advertising decisions for a brand. This involves understanding the content a consumer requires, how the consumer will come in contact with the brand, and what is the goal of the connection between consumer and content/contact. Prerequisite: ADV 150, ADV 281.

ADV 284 Consumer Insight credit: 3 Hours
Course focuses on methods of eliciting consumer insight. In particular, this class introduces the process and applied outcomes of consumer insight in terms of building brand strategy. Techniques for persuasive presentation of insight will also be introduced. Prerequisite: ADV 281.

ADV 390 Content Creation credit: 3 Hours
Explores theories of creativity; situates creativity and creative practices within the social structure of organizations that develop creative content; examines the relationship between creative strategy, creative concepts and creative executions; exposes students to the practice of creating content for traditional and non-traditional media vehicles. Prerequisite: ADV 284.

ADV 460 Innovation in Advertising credit: 3 Hours
This course is intended to improve creative and critical thinking skill in advertising planning by understanding the core technology and perspective of digital and other innovative media in the context of integrated communication. This will allow students to understand how consumers perceive and process digital advertising messages; to research critical questions in digital consumer behavior; to learn how to utilize digital and non-digital media in the context of integrated communication; to apply knowledge of digital communication technology to the real-world advertising cases. 3 undergraduate hours. 3 graduate hours. Credit is not given for ADV 460 if credit for the Digital Advertising section of ADV 490 has been earned. Prerequisite: ADV 283, ADV 284.

ADV 461 Computational Advertising credit: 3 Hours
This class will survey the emerging landscape of computational advertising. It will provide students with a thorough understanding of the technologies including web-search, auctions, behavioral targeting, and mechanisms for viral marketing that underpin the display of advertisements on a variety of locations. These locations include web pages (banner ads), on prominent search engines (text ads), on social media platforms, as well as cell phones. The students shall also learn about new research areas in computational advertising including electronic billboards, moving objects (banners atop taxi cabs) and algorithmic synthesis of personalized advertisements. This class will also discuss issues related to consumer privacy. 3 undergraduate hours. No graduate credit. Prerequisite: ADV 460, ADV 483. Junior or senior standing required.

ADV 483 Audience Analysis credit: 3 Hours
Analyzes audiences and matches consumer insights with strategic ideas for brand communication, contact, and connection. 3 undergraduate hours. No graduate credit. Prerequisites: ADV 283 and ADV 284.

ADV 492 Tech and Advertising Campaigns credit: 3 Hours
With the maturation of the internet as an advertising and media channel, advertising, journalism, and communications students need to know more about technology and how that impacts their messages and designs. Likewise, computer scientists could benefit from knowledge of what the end user is looking for when designing web content, applications and other web-based media. Students in this course will gain design knowledge as well as a hands-on experience in completing a technology-driven advertising campaign. Students will participate in engineering, advertising and project management activities with individual as well as team responsibilities. Same as CS 468. 3 undergraduate hours. No graduate credit. Credit is not given for ADV 492 and ADV 498. Prerequisite: CS 225 or consent of instructors. Junior or senior standing in Advertising or Computer Science.

APPENDIX B

Faculty Listing

Advertising

The Charles H. Sandage Department of Advertising comprises approximately 20 faculty and those faculty dedicated to teaching in required courses in the Advertising major will also be engaged in the education of CS + Advertising majors:

Senior Lecturer Steven Hall is the single 2015 recipient of the national teaching award from the American Advertising Federation: Distinguished Advertising Educator Award. He also earned the campus-wide Excellence in Undergraduate Teaching Award from the Office of the Provost and Vice-Chancellor for Academic Affairs in 2016. He teaches ADV 150 Introduction to Advertising to both majors and non-majors across campus.

Professor Patrick Vargas is a scholar of research methods and of the psychological processes involved in processing advertising messages, in particular of attitude measurement, formation and change. He serves as Associate Editor of the flagship *Journal of Advertising*, and teaches the required course for all majors, ADV281 Research Methods.

Associate Professor Kevin Wise explores the psychophysiological responses that occur in response to advertising messages, now that audiences are increasingly active (e.g., clicking, scrolling, walking) during media use. He teaches the required course for all majors, ADV281 Research Methods.

Assistant Professor Amanda Mabry-Flynn studies the role of social and cultural norms in driving responses to public health campaigns, particularly those concerned with deterring sexual violence. She teaches the required course for all majors, ADV283 Advertising and Brand Strategy.

Associate Professor Brittany Duff conducts research on attention toward advertising messages, and the role of multi-tasking in attention distribution. She teaches the required course for all majors, ADV284 Consumer Insights.

Senior lecturer Peter Sheldon earned the annual Distinguished Teaching Award from the Association for Education in Journalism and Mass Communication (AEJMC)'s Advertising Division in 2014. He has also earned the annual campus-wide Excellence in Undergraduate teaching award twice. A former Art Director, he teaches the required course for all majors, ADV390 Content Creation.

Associate Professor Chang Dae Ham studies how consumers resist persuasion attempts by advertisers, especially in the context of digital media. He also investigates how consumers' on-line activity in sharing product and advertising responses results in co-branding, i.e., consumer influence over brand identity. He teaches the required course for all majors, ADV 460 Innovations in Advertising.

Associate Professor Sela Sar conducts research on the impact of mood and emotion on the reception of advertising messages. He teaches the required course for all majors, ADV483 Audience Analysis.

COMPUTER SCIENCE

The CS department has approximately 80 faculty, working in many areas of computer science. Because most of the core foundational courses of the CS + X (and proposed program) degrees are the same as those taken by CS majors in the college of Engineering, these same faculty will be engaged in the

education of CS + Advertising majors. It is impractical to list all faculty here. A listing with links to faculty interests may be found here: https://cs.illinois.edu/people/faculty/department-faculty.

Faculty with particular interests that overlap areas of CS + Advertising will include those in the Human-Computer Interaction group, the Artificial Intelligence group, and the Data and Information Systems groups; their particular areas of expertise are listed briefly here. More information about individual faculty is available at the above link.

Human-Computer Interaction, Graphics, and VIsualization

Brian P. Bailey	human-computer interfaces, creativity support tools, online innovation communities, collaboration in multi-device environments
David Forsyth	graphics, projection mapping
Wai-Tat Fu	human-computer interaction, information systems, knowledge representation
John Hart	graphics, computational topology, scientific visualization
Karrie Karahalios	social computing, social network analysis, social spaces, smart infrastructure
Alex Kirlik	human factors, cognitive engineering
Ranjitha Kumar	data-driven design, human-computer interaction, data mining, machine learning, Web
Steven M. LaValle	virtual reality, human perception
Hari Sundaram	social and information networks, wearable sensors, computational advertising

Artificial Intelligence

Margaret Fleck	computational linguistics, programming language tools
David A. Forsyth	computer vision, object recognition, scene understanding

Julia Hockenmaier	natural language processing, computational linguistics
Derek Hoiem	computer vision, object recognition, spatial understanding, scene interpretation
Nan Jiang	joining fall 2018; reinforcement learning
Bo Li	joining fall 2018; secure machine learning
Oluwasanmi Koyejo	machine learning, neuroscience, neuroimaging
Steven M. LaValle	robotics, motion planning, and virtual reality
Svetlana Lazebnik	computer vision, object recognition, scene interpretation, modeling and organization of large-scale image collections
Jian Peng	machine learning and optimization
Mark Sammons	natural language processing, textual inference
Paris Smaragdis	machine listening, signal processing, music information retrieval, and speech and audio analysis
Matus Telgarsky	machine learning theory

Data and Information Systems

Kevin C. Chang	data mining, database systems, machine learning, information retrieval, web search/mining, social media analytics
Jiawei Han	data mining, data warehousing, database systems, information networks

Aditya Parameswaran	data management, data mining, database theory, interactive systems, crowdsourced computation
Saurabh Sinha	bioinformatics, genomics
Hari Sundaram	social and information networks, wearable sensors, computational advertising
Marianne Winslett	information security, scientific data management
ChengXiang Zhai	information retrieval, text mining, natural language processing, bioinformatics

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Department of Mathematics

273 Altgeld Hall, MC-382
1409 West Green Street
Urbana, IL 61801

Re: Use of Math 257 in Computer Science and related programs

The Mathematics Department, working with the Grainger College of Engineering, has recently created the course MATH 257, *Linear Algebra with Computational Applications*. Quoting from the justification of the approved proposal, "In the future, MATH 257 will replace the MATH 415 requirement in many science and engineering curricula." With this in mind, the department would be pleased to have Computer Science add MATH 257 as a linear algebra option in their programs, specifically in:

10KP0112BS: Computer Science, BS
10KV1438BSLA: Mathematics & Computer Science, BSLAS
10KV0464BSLA: Statistics & Computer Science, BSLAS
10KV5348BSLA: Computer Science & Anthropology, BSLAS
10KV5349BSLA: Computer Science & Astronomy, BSLAS
10KV5350BSLA: Computer Science & Chemistry, BSLAS
10KV5351BSLA: Computer Science & Linguistics, BSLAS
10KV5667BSLA: Computer Science & Economics, BSLAS
10KV5676BSLA: Computer Science & Geography & Geographic Information Science, BSLAS
10KV5679BSLA: Computer Science & Philosophy, BSLAS
10KR5639BS: Computer Science + Music, BS
10KT5673BS: Computer Science & Advertising, BS
10KL5864BS: Computer Science & Animal Sciences, BS
10KL5623BS: Computer Science + Crop Sciences, BS
JP: 10KL5890BS & 1PKS5890MANS: JP: Computer Science & Animal Sciences, BS & Animal Science, MANSC
JP: 10KL5890BS & 1PKS5890MANS(MANU): JP: Computer Science & Animal Sciences, BS & Animal Science, MANSC
JP:10KL5903BS & 10KS5903MS: JP: Computer Science + Crop Sciences, BS & Crop Sciences, MS

As the Mathematics department is reallocating instructional resources from Math 415 to Math 257 as the need shifts, this will not cause any undue difficulties for Mathematics resources.

Sincerely

Randy McCarthy

Randy McCarthy
Professor of Mathematics
Dir of Undergraduate Studies in Math
rmccrthy@illinois.edu

telephone 217-333-3350 • *fax* 217-333-9576
email office@math.uiuc.edu • *url* http://www.math.uiuc.edu/

10KV0464BSLA: STATISTICS & COMPUTER SCIENCE, BSLAS

Completed Workflow

1. Provost (kmartens@illinois.edu)

Approval Path

1. Mon, 10 Jun 2019 20:49:03 GMT
   Kathy Martensen (kmartens): Approved for Provost

History

1. Mar 22, 2019 by Deb Forgacs (dforgacs)
2. Jun 10, 2019 by Amy Elli (amyelli)

Date Submitted:Wed, 07 Apr 2021 21:13:13 GMT

Viewing:10KV0464BSLA : Statistics & Computer Science, BSLAS

Changes proposed by: Amy Elli

Proposal Type

Proposal Type:

Major (ex. Special Education)

This proposal is for a:

Revision

Proposal Title:

If this proposal is one piece of a multi-element change please include the other impacted programs here.*example: A BS revision with multiple concentration revisions*

Administrative approval: Revision to the BSLAS of Statistics & Computer Science College of LAS

EP Control Number

EP.21.115

Official Program Name

Statistics & Computer Science, BSLAS

Effective Catalog Term

Fall 2021

Sponsor College

Liberal Arts & Sciences

Sponsor Department

Statistics

Sponsor Name

David Unger, Director of Undergraduate Programs, Department of Statistics

Sponsor Email

dunger@illinois.edu

College Contact

Kelly Ritter

College Contact Email

ritterk@illinois.edu

Program Description and Justification

Justification for proposal change:

In the CS component, the proposal involves changes to three aspects. The first is a reorganization of the material in the introductory course sequence. The second is adding an alternative to the require systems programming courses, allowing for the flexibility to choose two elective courses in computer science at the senior level. The third is to incorporate an option of a new linear algebra course, MATH 257, into the linear algebra requirement for the program.
These changes are broadly shared, with some degree-specific modifications the suite of undergraduate programs including Computer Science:
10KP0112BS: Computer Science, BS
10KL5623BS: Computer Science + Crop Sciences, BS
10KL5864BS: Computer Science & Animal Sciences, BS
10KR5639BS: Computer Science + Music, BS
10KT5673BS: Computer Science & Advertising, BS
10KV0464BSLA: Statistics & Computer Science, BSLAS
10KV1438BSLA: Mathematics & Computer Science, BSLAS
10KV5348BSLA: Computer Science & Anthropology, BSLAS
10KV5349BSLA: Computer Science & Astronomy, BSLAS
10KV5350BSLA: Computer Science & Chemistry, BSLAS
10KV5351BSLA: Computer Science & Linguistics, BSLAS
10KV5667BSLA: Computer Science & Economics, BSLAS
10KV5676BSLA: Computer Science & Geography & Geographic Information Science, BSLAS
10KV5679BSLA: Computer Science & Philosophy, BSLAS
JP. 10KL5890BS & 1PKS5890MANS: JP. Computer Science & Animal Sciences, BS & Animal Science, MANSC
JP. 10KL5890BS & 1PKS5890MANS(MANU): JP. Computer Science & Animal Sciences, BS & Animal Science, MANSC
JP.10KL5903BS & 10KS5903MS: JP. Computer Science + Crop Sciences, BS & Crop Sciences, MS
In more detail,
1) (CS 125(4cr) Introduction to Computer Science + CS 126(3cr) Software Design Studio) -> (CS 124(3cr) Introduction to Computer Science I + CS 128(3cr) Introduction to Computer Science II + CS 222(1cr) Software Design Lab), CS 242(3cr) Programming Studio -> CS 222(1cr) Software Design Lab, the CS 225 Data Structures prerequisite of CS 125 is replaced with (CS 126 or CS 128) as the programming prerequisite, CS 128 is open to all, CS 222 is restricted to &CS+ programs. The programming prerequisite for CS 173 is changed from CS 125 to (CS 124 or CS 125).
Justification: CS 128 takes about 2/3 of the material from old CS 126 and receives an hour from the old CS 125 topics, with the remaining topics remaining with CS 124. Replacing CS 126 with CS 128 makes the path to CS 225 uniform for all students (except ECE), including &CS+ majors, students wanting to transfer into one of the &CS+, students doing minors and students needing CS 225 to complete a concentration. It also allows CS 225 to start with an assumption that all students know how to program in C++, and assures all students in the class have a common programming background. Further, the new CS 128 will provide an extended ability for general students to increase their skills in programming and structured program design and development, but without the more specialized material in Data Structures. Adding CS 222 and removing CS 242 eliminates the attempt to discriminate between how students entering as freshmen versus as transfers take the code review class.

2. Change the requirements of CS 233(4cr) Computer Architecture and CS 241(4 cr) System Programming to the student's choice or (CS 233 and CS 241) or (CS 240(3 cr) Introduction to Computer Systems and two 400-level CS courses (not including CS 491))
Justification: This option is already a possibility in several of the CS+X degree programs and it allows students in CS+Statistics to customize their program to better focus on the aspects of CS that impact the areas of Statistics most in line with their interests.
3. Change the linear algebra requirement from MATH 225 to (Math 225 or Math 257).
Justification: The Math department is developing MATH 257 as the eventual replacement for MATH 415, with the same theoretical content, but with an emphasis on using programming to perform matrix operations instead of calculating them on paper. Students in CS+Statistics should have the option of a stronger linear algebra class with stronger ties to programming.
4. A revision to the Statistics Introductory Sequence: The current Group I requires completion of STAT 200, STAT 212, or CS 361. The newly created STAT 107 will be added to the list. CS 361 will be removed from the list. The remaining courses will no longer be identified as Group I.
5. A revision to the Probability and Statistics Sequence: The current Probability and Statistics Foundation core includes STAT 400, 410, and 428. STAT 425 and 426 (Statistical Modeling I and II) will be added to this statistical core. STAT 428 will be relocated to the group of Statistics elective applied courses.
6. Relabeling the elective groups for greater clarity and organization:
• The current Group II: Mathematical Analysis and Modeling will be removed from the program.

• The current Group IV: Statistical Analysis and Modeling includes STAT 420, 425, 426, and 448. The revision removes STAT 420, moves STAT 425 and 426 to a core sequence, retains STAT 448, and adds several more course options. STAT 428 currently exists as a required course but will now join this group. The updated group will contain STAT 428, 431, 432, 440, and 448. This group will be relabeled as Statistical Application Electives.

• The current Group III: Computational Application Areas will contain the same list of courses, except for the removal of STAT 385. This group will be relabeled as Computational Application Electives.
As the practice and teaching of both the fields of Statistics and Computer Science have grown and evolved over the past few years, so have our respective curricula. This is particularly true in the area of data science, where applications in Statistics and Computer Science (Stat&CS) intersect. The revisions in this document are the results of a collaboration within and between our departments to assess which courses will benefit our students the most, to involve fewer STAT and CS courses that are less relevant to data science, and to incorporate more that are.
The justifications which follow each address a revision item that appeared in the previous section.
1. A revision to the Computer Science Introductory Sequence: Replacing CS 126 with CS 128 makes the path to CS 225 uniform for all students (except those in ECE), including students in Computer Science majors, students wanting to transfer into Computer Science majors, students doing minors and students needing CS 225 to complete a concentration. Adding CS 222 and removing CS 242 eliminates the attempt to distinguish between how freshmen and transfer students take the code-review class.

2. The addition of an alternate Computer Architecture/System programming option: This option is already a possibility in several of the CS+X degree programs outside of the LAS programs, and it allows students in Stat&CS to customize their program to better focus on the aspects of CS that impact the Statistics areas most in line with their interests.

3. Adding new Linear Algebra options: MATH 257 is designed to be a replacement for MATH 415: Applied Linear Algebra with essentially the theoretical content of MATH 415, but with an emphasis on using programming to perform matrix operations instead of calculating them on paper. The more rigorous MATH 415 will continue to be allowed for students to take in order to better prepare for STAT and CS electives that require a stronger foundation in linear algebra.

4. A revision to the Statistics Introductory Sequence: STAT 107: Data Science Discovery is just the first in a sequence of new STAT courses aimed at bringing data science skills and tools to more of the student population. It is only fitting that it be added as a gateway into the Stat&CS major.

With the inclusion of two STAT courses to the require core (Item 5 below), CS 361 no longer exists as a viable choice for students in STAT&CS. While a worthy complementary course in CS+X programs, CS 361 presents a redundancy with our Statistical Modeling sequence (STAT 425+426). Further, its prerequisites of Calc I and linear algebra (and thus inherently Calc II and Calc III) are a bit heavier than the others offered as an introductory course for first year students. Thus, we propose CS 361 be removed as an option.

5. A revision to the Probability and Statistics Sequence: The relocation of both STAT 425 and STAT 426 from optional electives to required core courses will bring the Stat&CS curriculum in alignment with the Statistics major. The current Stat&CS major plan of study does not have a requirement for advanced statistical modeling, but the revision will remedy this omission. The removal of CS 361 (Item 4) addresses a duplication that would occur if all three of these courses remained.

6. Relabeling the elective groups for greater clarity and organization:
• The current Group II: Mathematical Analysis and Modeling will be removed from the program. The removal of Group II is tied to the revision to the Probability and Statistics Sequence (Item 5 above). The revision aims to refocus the program on areas where more regularly utilized methods in computational analysis take place in today's workforce. Further, this more pragmatic curriculum will maintain stronger ties to the CS courses in the program. For those pursuing a post-baccalaureate education, our students will be as strong or stronger candidates for MS and PhD programs in Statistics under the revision, even with the removal of this group. Logistically speaking, the absence of this more abstract set of courses (i.e., the former Group II) and their credit hour contribution to the program provides the breathing room for the addition of STAT 426 as a required course to align with the Statistics Major and without necessitating a change in total credit hours.
• The current Group IV: Statistical Analysis and Modeling is being updated and renamed. STAT 425 and 426 are moving from the Group IV electives to the required core as described in Item 5. We are removing STAT 420 as it is a less rigorous redundancy to STAT 425+426. It will be a more suitable

course intended for our Minor students and non-major graduates. STAT 448 will remain as an elective, but it will be joined by STAT 428 (which was formerly required) and others. As the application of statistics has branched out, so have our course offerings. Along with STAT 428, a newer crop of courses including STAT 431, 432, 440, and 448 offer our students greater variety to add to their foundational skills in computational statistics. For better clarity for students, this group will be relabeled as Statistical Application Electives.

• The current Group III: Computational Application Areas will contain the same list of courses, except for the removal of STAT 385. STAT 385 is somewhat of a redundancy to several CS courses as it contains a variety of Computer Science topics related to statistical analysis. These topics are also found throughout the core of the CS-side of the curriculum. For students in the Stat&CS program, we feel it will be a better experience if they get those topics directly from CS. As with the other electives, for clarity this group will be relabeled as Computational Application Electives.
Our graduates in Stat&CS are moving into careers where skills in advanced modeling and data science are not only encouraged but required. It is only appropriate that the curriculum be updated to reflect this.

Corresponding Degree

BSLAS Bachelor of Science in Liberal Arts and Sciences

Is this program interdisciplinary?

Yes

Interdisciplinary Colleges and Departments (list other colleges/departments which are involved other than the sponsor chose above)

College

Grainger College of Engineering

Department

Computer Science

Do you need to add an additional interdisciplinary relationship?

No

Academic Level

Undergraduate

Will you admit to the concentration directly?

No

Is a concentration required for graduation?

No

CIP Code

270599 - Statistics, Other.

Is This a Teacher Certification Program?

No

Will specialized accreditation be sought for this program?

No

Admission Requirements

Desired Effective Admissions Term

Fall 2021

Is this revision a change to the admission status of the program?

No

Provide a brief narrative description of the admission requirements for this program. Where relevant, include information about licensure requirements, student background checks, GRE and TOEFL scores, and admission requirements for transfer students.

No proposed changes to Admission Requirements

Describe how critical academic functions such as admissions and student advising are managed.

First-Year student (i.e., “freshman”) admissions are primarily determined by the College of Liberal Arts & Sciences (LAS) and Office of Undergraduate Admissions (OUA). There is some input from our department but Computer Science provides most of the guidance to balance our enrollment with fellow programs in Computer Science (ENG), Mathematics & Computer Science (LAS), and the CS+X majors. Students who wish to transfer into Stat&CS must successfully complete a series of introductory courses in both departments prior to submitting an application portfolio which includes essay writing.
Our departments share in the responsibility of mentoring and advising students in Stat&CS. Readiness for entering the program, continued progress in the major, and preparation for post-baccalaureate opportunities (such as graduate school or employment) are monitored by a team of full-time academic and career advisors, faculty, and program directors within our two Departments.

Enrollment

Describe how this revision will impact enrollment and degrees awarded.

We anticipate no discernible impact on enrollment and degrees awarded resulting from this revision. If anything, the proposed revision would have a positive impact on enrollment and degrees awarded. Computer Science at Illinois continues to be a national leader, and our undergraduate program in Statistics has grown rapidly in the past five years. Due to hiring limitations, we were unable to provide a supply of courses to meet the demand from outside our program. With many new faculty hires and innovative creation of new courses in Statistics of late, not only are we able to meet the demand, but we can offer a variety of dynamic new courses. With the revision, our majors will have a more structured and clearer path toward degree completion.

Estimated Annual Number of Degrees Awarded

What is the matriculation term for this program?

Fall

What is the typical time to completion of this program?

4 years

What are the minimum Total Credit Hours required for this program?

120

Delivery Method

Is this program available on campus and online?

No

This program is available:

On Campus

Budget

Are there budgetary implications for this revision?

Yes

Please describe the budgetary implications for this revision, addressing applicable personnel, facilities, technology and supply costs.

Computer Science: This revision constitutes a redistribution of existing instructional resources but should not cause a significant change in applicable personnel, technology, and supply costs. Allowing CS 128 to be taken by non-majors, as well as majors, will increase the enrollment over and above that of CS 126 and CS 242 and may have a small impact on scheduling (requiring a larger classroom or additional lectures) but this will be partially offset by eliminating redundancies (e.g., the need to teach both CS 126 and CS 242). The need for additional Teaching Assistants in CS 128 in contrast to CS 126 and CS 242 combined, due to outside enrollment now being allowed, will be offset by the revenue generated by the additional income for the additional IUs.
Statistics: This is a revision of an existing degree program, and for the most part involves only a shift in enrollments of courses currently offered within Statistics. In particular, we will have to increase the availability of the now-required STAT 426, but that is offset by the relocation of STAT 428 from required to elective.

Will the program or revision require staffing (faculty, advisors, etc.) beyond what is currently available?

No

Resource Implications

Facilities

Will the program require new or additional facilities or significant improvements to already existing facilities?

No

Technology

Will the program need additional technology beyond what is currently available for the unit?

No

Non-Technical Resources

Will the program require additional supplies, services or equipment (non-technical)?

No

Resources

For each of these items, be sure to include in the response if the proposed new program or change will result in replacement of another program(s). If so, which program(s), what is the anticipated impact on faculty, students, and instructional resources? Please attach any letters of support/ acknowledgement from faculty, students, and/or other impacted units as appropriate.

Faculty Resources

Please address the impact on faculty resources including any changes in numbers of faculty, class size, teaching loads, student-faculty ratios, etc. Describe how the unit will support student advising, including job placement and/or admission to advanced studies.

Computer Science: No significant changes anticipated. As mentioned above, allowing CS 128 to be taken by non-majors, as well as majors, will increase the enrollment over and above that of CS 126 and CS 242 and may have a small impact on scheduling (requiring a larger classroom or additional lectures) but this will be partially offset by eliminating redundancies (e.g., the need to teach both CS 126 and CS 242).

Statistics: Thanks to a recent wave of successful hires for faculty, advising staff, and support staff, Statistics currently has the necessary staffing for the STAT courses involved.

Library Resources

Describe your proposal's impact on the University Library's resources, collections, and services. If necessary please consult with the appropriate disciplinary specialist within the University Library.

Current collections and services are adequate for the proposed program.

Instructional Resources

Will there be any reduction in other course offerings, programs or concentrations by your department as a result of this new program/proposed change?

No

Does the program include other courses/subjects impacted by the creation/revision of this program?

Yes

Required courses

MATH 257 - Linear Algebra w Computat Appl

Explain how the inclusion or removal of the courses/subjects listed above impacts the offering departments.

Yes. The proposed revisions were drafted in collaboration with the Department of Computer Science as our two units jointly support this program. All changes on the Statistics side of the requirements have been approved by Elsa Gunter, Director of Undergraduate Programs for Computer Science. Likewise, the Department of Statistics endorses the revisions that CS is submitting on their side of the requirements.

The program will also continue to include the Calculus sequence of MATH 221, 231, and 241 as it always has. The revisions include the addition of MATH 257, which the Department of Mathematics has created to introduce a more programmatic approach to linear algebra for many non-Mathematics majors (including Stat&CS).

Attach letters of support from other departments.

CS_letter_Math_257.pdf

Financial Resources

How does the unit intend to financially support this proposal?

There is no impact on the already existing arrangements that support the Stat&CS program financially. This is a revision of an existing degree program, and for the most part involves only a shift in enrollments of courses taken within the units already.

Will the unit need to seek campus or other external resources?

No

Are you seeking a change in the tuition rate or differential for this program?

No

Program Regulation and Assessment

Briefly describe the plan to assess and improve student learning, including the program's learning objectives; when, how, and where these learning objectives will be assessed; what metrics will be used to signify student's achievement of the stated learning objectives; and the process to ensure assessment results are used to improve student learning. (Describe how the program is aligned with or meets licensure, certification, and/or entitlement requirements, if applicable).

Computer Science: In order to track student progress in achieving the student outcomes of the CS component of the Stat&CS program, the Department of Computer Science has identified a set of "core courses" that ensure student outcomes are being reached. These include the following courses that all students must take: CS 124, CS 128, CS 173, CS 225, CS 222, One of 240 or (CS 233 and CS 241), CS 357, CS 374, and CS 421. The Department of Computer Science tracks, on a rolling three year basis, the student attainment of the Learning Objectives of these core courses and assesses their contributions to the Student Outcomes used for all students in CS courses.

Statistics: We will continue to monitor Student Learning Outcomes for this program as outlined in our Assessment Plan filed with the Provost's Office. In fact, this proposal is an outcome of that effort. Through student performance, student and industry survey, and evaluation of emerging trends in our field, the proposed revisions address opportunities to improve student learning with our BS Statistics program.

Is the career/profession for graduates of this program regulated by the State of Illinois?

No

Program of Study

“Baccalaureate degree requires at least 120 semester credit hours or 180 quarter credit hours and at least 40 semester credit hours (60 quarter credit hours) in upper division courses” (source: https://www.ibhe.org/assets/files/PrivateAdminRules2017.pdf). For proposals for new bachelor’s degrees, if this minimum is not explicitly met by specifically-required 300- and/or 400-level courses, please provide information on how the upper-division hours requirement will be satisfied.

All proposals must attach the new or revised version of the Academic Catalog program of study entry. Contact your college office if you have questions.

Revised programs

MATH 257 option to 225.pdf
StatCS Major Revision Fa21 20210315.docx

Attach a side-by-side comparison with the existing program AND, if the revision references or adds “chose-from” lists of courses students can select from to fulfill requirements, a listing of these courses, including the course rubric, number, title, and number of credit hours.

Catalog Page Text

Statement for Programs of Study Catalog

Departmental distinction: To graduate with distinction requires a specified minimum grade point average in all Computer Science, Statistics, and Mathematics courses listed below. A GPA of 3.25 is required for Distinction, 3.5 for High Distinction, and 3.75 for Highest Distinction.

General education:Students must complete the Campus General Education (https://courses.illinois.edu/)**requirements including the campus general education language requirement.**
Minimum required major and supporting course work:Normally equates to 68-72 hours. At least 12 hours of 300- and 400-level courses must be taken on this campus.
Minimum hours required for graduation:120 hours

Code	Title	Hours
CS 100	Freshman Orientation (recommended)	1
Mathematical Foundation		
Calculus throughMATH 241: Calculus III		11-12
MATH 415	Applied Linear Algebra	3
Required Computer Science Foudation:		32
CS 125	Introduction to Computer Science	
MATH 257	Linear Algebra with Computational Applications	3
or MATH 415	Applied Linear Algebra	
Computer Science Foundation		
CS 124	Introduction to Computer Science I	3
CS 128	Introduction to Computer Science II	3
CS 173	Discrete Structures	3
CS 126	Software Design Studio	
CS 222	Software Design Lab	1
CS 225	Data Structures	4
Choose one of the following combinations:		8-11
CS 233 & CS 241	Computer Architecture and System Programming	

CS 241	System Programming	
OR		
CS 240	Introduction to Computer Systems	
& two CS courses at the 400 level aboveCS 403, excludingCS 421andCS 491. These two courses must be distinct from all other courses used to fulfill program requirements or options.		
CS 357	Numerical Methods I	3
CS 374	Introduction to Algorithms & Models of Computation	4
CS 421	Programming Languages & Compilers	3
Required Probability and Statistics Foundation:		10
Probability and Statistics Foundation		
Choose one of the following:		3-4
STAT 107	Data Science Discovery	
STAT 200	Statistical Analysis	
STAT 212	Biostatistics	
CS 361	Probability & Statistics for Computer Science	
Group II: Mathematical Analysis and Modeling		
MATH 347	Fundamental Mathematics	
MATH 441	Differential Equations	
MATH 444	Elementary Real Analysis	
MATH 447	Real Variables	
Group III: Computational Application Areas		
STAT 385	Statistics Programming Methods	
STAT 400	Statistics and Probability I	4
STAT 410	Statistics and Probability II	3 or 4
STAT 425	Statistical Modeling I	3 or 4
STAT 426	Statistical Modeling II	3 or 4
Statistical Application Electives -Choose one of the following:		**3**
STAT 428	Statistical Computing	
At least four other statistics, computer science, or mathematics courses, with at least one chosen from each of the following groups:		12
STAT 431	Applied Bayesian Analysis	
STAT 432	Basics of Statistical Learning	
STAT 434	Survival Analysis	
STAT 448	Advanced Data Analysis	
Computational Application Elective - Choose one of the following:		**3**
CS 410	Text Information Systems	
CS 411	Database Systems	
CS 412	Introduction to Data Mining	
CS 446	Machine Learning	
CS 481	Advanced Topics in Stochastic Processes & Applications	
CS 482	Simulation	
Group IV: Statistical Analysis and Modeling		
STAT 420	Methods of Applied Statistics	
Total Hours		**68-72**

EP Documentation

DMI Documentation

Banner/Codebook Name

BSLAS:Stats & Comp Sci -UIUC

Program Code:

10KV0464BSLA

Degree Code

BSLAS

Major Code

0464

Program Reviewer Comments

Brooke Newell (bsnewell) (Thu, 08 Apr 2021 01:08:58 GMT): Rollback: per email from Elsa

Key: 257

MATH 257: LINEAR ALGEBRA WITH COMPUTATIONAL APPLICATIONS

Completed Workflow

1. 1257 Head (tyson@illinois.edu)
2. KV Dean (las-catalog@illinois.edu)
3. COTE (bmclvngr@illinois.edu)
4. Provost (kmartens@illinois.edu)
5. Registrar (fms-catalog@illinois.edu)
6. Banner (fms-catalog@illinois.edu)

Approval Path

1. Fri, 11 Sep 2020 16:06:49 GMT
   Jeremy Tyson (tyson): Approved for 1257 Head
2. Wed, 07 Oct 2020 15:10:03 GMT
   Kelly Ritter (ritterk): Approved for KV Dean
3. Wed, 07 Oct 2020 15:20:34 GMT
   Brenda Clevenger (bmclvngr): Approved for COTE
4. Wed, 07 Oct 2020 15:26:44 GMT
   Kathy Martensen (kmartens): Approved for Provost
5. Wed, 07 Oct 2020 20:32:52 GMT
   Deb Forgacs (dforgacs): Approved for Registrar
6. Sat, 10 Oct 2020 08:53:17 GMT
   system: Approved for Banner

History

1. Oct 10, 2020 by Alison Champion (abc)

Viewing:MATH 257 : Linear Algebra with Computational Applications

Changes proposed by: Alison Champion

General Information
Effective Term:

Fall 2021

College:

Liberal Arts & Sciences

Department/Unit Name (ORG Code):

Mathematics (1257)

Course Subject:

Mathematics (MATH)

Course Number:

257

Course Title:

Linear Algebra with Computational Applications

Abbreviated Title:

Linear Algebra w Computat Appl

Course Description:

Introductory course incorporating linear algebra concepts with computational tools, with real world applications to science, engineering and data science. Topics include linear equations, matrix operations, vector spaces, linear transformations, eigenvalues, eigenvectors, inner products and norms, orthogonality, linear regression, equilibrium, linear dynamical systems and the singular value decomposition.

Justification

Justification for change:

This course was developed in cooperation with Grainger College of Engineering to allow undergraduates to use linear algebra at an earlier stage in their studies and also to incorporate modern computational tools. It contains much of the material from MATH 415 but with computational tools and data science topics. It covers applications and topics not included in MATH 225.

In the future, MATH 257 will replace the MATH 415 requirement in many science and engineering curricula, and it will become a second choice or a replacement in curricula which currently require MATH 225, including most CS+X curricula.

Please Note: a syllabus is required for General Education review:

MATH257 Syllabus.pdf

Course Information

Course Credit

Undergraduate:

3

Registrar Use Only:

Banner Credit:

3

Billable Hours:

3

Grading Type

Letter Grade

Available for DFR:

No

Repeatability
No

Credit Restrictions
Credit Restrictions:

Credit is not given for both MATH 257 and any of MATH 125, MATH 225, MATH 227, MATH 415 or ASRM 406.

Advisory Statements
MATH 220 or MATH 221; CS 101 or equivalent programming experience.

Cross-listing

Class Schedule Information

Fees
No

Course Description in the Catalog Entry
This is how the above information will be represented in the Catalog:

Introductory course incorporating linear algebra concepts with computational tools, with real world applications to science, engineering and data science. Topics include linear equations, matrix operations, vector spaces, linear transformations, eigenvalues, eigenvectors, inner products and norms, orthogonality, linear regression, equilibrium, linear dynamical systems and the singular value decomposition. Course Information: Credit is not given for both MATH 257 and any of MATH 125, MATH 225, MATH 227, MATH 415 or ASRM 406. Students must register for a lecture, a lab, and a discussion section. Prerequisite: MATH 220 or MATH 221; CS 101 or equivalent programming experience.

Additional Course Notes
Students must register for a lecture, a lab, and a discussion section.

Course Detail
Frequency of course:

Every Fall
Every Spring
Every Summer

Duration of the course

Full

Anticipated Enrollment:

800

Expected distribution of student registration:

Freshman:
30 %

Sophomore:
50 %

Junior:
10 %

Senior:
10 %

General Education

Additional Course Information

Does this course replace an existing course?

No

Does this course impact other courses?

Yes

Specify the courses affected:

MATH 125, MATH 225, MATH 415, ASRM 406 credit restrictions. This course may also serve as prerequisite for courses currently listing MATH 415 as a prerequisite, both within and outside of MATH rubric courses.

Does the addition of this course impact the departmental curriculum?

No

Has this course been offered as a special topics or other type of experimental course?

Yes

Please indicate the Banner subject, course number, section ID, term and enrollment for each offering:

MATH 299 E1 add-on to Math 415 in Spring 2020, 24;
MATH 415 PL1, Fall 2020, 280.

Will this course be offered on-line?

Face-to-Face

Faculty members who will teach this course:

Philipp Hieronymi

Course ID:

1012152

Course Edits Proposed by:

Philipp Hieronymi

Key: 12299

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Department of Mathematics

273 Altgeld Hall, MC-382
1409 West Green Street
Urbana, IL 61801

Re: Use of Math 257 in Computer Science and related programs

The Mathematics Department, working with the Grainger College of Engineering, has recently created the course MATH 257, *Linear Algebra with Computational Applications*. Quoting from the justification of the approved proposal, "In the future, MATH 257 will replace the MATH 415 requirement in many science and engineering curricula." With this in mind, the department would be pleased to have Computer Science add MATH 257 as a linear algebra option in their programs, specifically in:

10KP0112BS: Computer Science, BS
10KV1438BSLA: Mathematics & Computer Science, BSLAS
10KV0464BSLA: Statistics & Computer Science, BSLAS
10KV5348BSLA: Computer Science & Anthropology, BSLAS
10KV5349BSLA: Computer Science & Astronomy, BSLAS
10KV5350BSLA: Computer Science & Chemistry, BSLAS
10KV5351BSLA: Computer Science & Linguistics, BSLAS
10KV5667BSLA: Computer Science & Economics, BSLAS
10KV5676BSLA: Computer Science & Geography & Geographic Information Science, BSLAS
10KV5679BSLA: Computer Science & Philosophy, BSLAS
10KR5639BS: Computer Science + Music, BS
10KT5673BS: Computer Science & Advertising, BS
10KL5864BS: Computer Science & Animal Sciences, BS
10KL5623BS: Computer Science + Crop Sciences, BS
JP: 10KL5890BS & 1PKS5890MANS: JP: Computer Science & Animal Sciences, BS & Animal Science, MANSC
JP: 10KL5890BS & 1PKS5890MANS(MANU): JP: Computer Science & Animal Sciences, BS & Animal Science, MANSC
JP:10KL5903BS & 10KS5903MS: JP: Computer Science + Crop Sciences, BS & Crop Sciences, MS

As the Mathematics department is reallocating instructional resources from Math 415 to Math 257 as the need shifts, this will not cause any undue difficulties for Mathematics resources.

Sincerely

Randy McCarthy

Randy McCarthy
Professor of Mathematics
Dir of Undergraduate Studies in Math
rmccrthy@illinois.edu

telephone 217-333-3350 • *fax* 217-333-9576
email office@math.uiuc.edu • *url* http://www.math.uiuc.edu/

Proposal for revised curricula (degree, major, concentration, minor)

Submit completed proposals via email to Associate Dean Kelly Ritter (ritterk@illinois.edu). Please obtain Executive Officer and School Director (if applicable) approval via email and forward with the proposal to LAS.

Proposal Title: Proposal to revise the curriculum of the Statistics & Computer Science major degree in LAS.

Proposed effective date: Fall 2021

Sponsor(s): Elsa Gunter, Director of Undergraduate Programs, Department of Computer Science, egunter@illinois.edu

David Unger, Director of Undergraduate Programs, Department of Statistics, dunger@illinois.edu

College contact: Kelly Ritter, Associate Dean for Curricula and Academic Policy, College of Liberal Arts and Sciences, ritterk@illinois.edu

PROGRAM DESCRIPTION and JUSTIFICATION

1) **Provide a brief description but concise description of your proposal.** For example, if proposing revisions to a curriculum, state specifically what is changing. Where applicable, note whether stated program changes include additional requirements in the form of prerequisite courses. Requests for curriculum revisions must be accompanied by a table which clearly outlines the current requirements and the proposed revisions. This information may be submitted as an appendix. See Appendix A for an example. Please provide pertinent information only.

In the CS component, the proposal involves changes to three aspects. The first is a reorganization of the material in the introductory course sequence. The second is adding an alternative to the require systems programming courses, allowing for the flexibility to choose two elective courses in computer science at the senior level. The third is to incorporate an option of a new linear algebra course, MATH 257, into the linear algebra requirement for the program.

These changes are broadly shared, with some degree-specific modifications the suite of undergraduate programs including Computer Science:

10KP0112BS: Computer Science, BS

10KL5623BS: Computer Science + Crop Sciences, BS

10KL5864BS: Computer Science & Animal Sciences, BS

10KR5639BS: Computer Science + Music, BS

10KT5673BS: Computer Science & Advertising, BS

10KV0464BSLA: Statistics & Computer Science, BSLAS

10KV1438BSLA: Mathematics & Computer Science, BSLAS

10KV5348BSLA: Computer Science & Anthropology, BSLAS

10KV5349BSLA: Computer Science & Astronomy, BSLAS

10KV5350BSLA: Computer Science & Chemistry, BSLAS

10KV5351BSLA: Computer Science & Linguistics, BSLAS

10KV5667BSLA: Computer Science & Economics, BSLAS

10KV5676BSLA: Computer Science & Geography & Geographic Information Science, BSLAS

10KV5679BSLA: Computer Science & Philosophy, BSLAS

JP: 10KL5890BS & 1PKS5890MANS: JP: Computer Science & Animal Sciences, BS & Animal Science, MANSC

JP: 10KL5890BS & 1PKS5890MANS(MANU): JP: Computer Science & Animal Sciences, BS & Animal Science, MANSC

JP:10KL5903BS & 10KS5903MS: JP: Computer Science + Crop Sciences, BS & Crop Sciences, MS

In more detail,

1. **A revision to the Computer Science Introductory Sequence:** The revision includes replacing CS 125 (4 hours) and CS 126 (3 hours) with three new courses – CS 124: Intro to Computer Science I (3 hours), CS 128: Intro to Computer Science II (3 hours), and a one-hour code-review course, CS 222: Software Design Lab (1 hour). CS 128 takes about two-thirds of the old CS 126 curriculum and receives an hour from the old CS 125 topics. CS 128 (unlike CS 126) becomes available to students in all majors. CS 222 removes the code reviews from the old CS 126 and can be taken later in the curriculum. CS 125 and CS 126 would be discontinued when no longer essential for students needing to retake them, e.g. for grade replacement.

2. **The addition of an alternate Computer Architecture/System Programming option:** This will change the requirements of CS 233 and CS 241 to the student's choice of (CS 233 and CS 241)

or (CS 240 and two 400-level CS courses). If the student chooses the option to use CS 240, the two 400-level CS courses are in addition to the Computational Application Electives requirement. The two 400-level CS courses must be numbered above CS 403 and must not include CS 491.

3. **Adding new Linear Algebra options:** The newly created MATH 257: Computational Linear Algebra will be added to the list of approved linear algebra course options which currently includes only MATH 415.

4. **A revision to the Statistics Introductory Sequence:** The current Group I requires completion of STAT 200, STAT 212, or CS 361. The newly created STAT 107 will be added to the list. CS 361 will be removed from the list. The remaining courses will no longer be identified as Group I.

5. **A revision to the Probability and Statistics Sequence:** The current Probability and Statistics Foundation core includes STAT 400, 410, and 428. STAT 425 and 426 (Statistical Modeling I and II) will be added to this statistical core. STAT 428 will be relocated to the group of Statistics elective applied courses.

6. **Relabeling the elective groups for greater clarity and organization:**
   - The current Group II: Mathematical Analysis and Modeling will be removed from the program.

   - The current Group IV: Statistical Analysis and Modeling includes STAT 420, 425, 426, and 448. The revision removes STAT 420, moves STAT 425 and 426 to a core sequence, retains STAT 448, and adds several more course options. STAT 428 currently exists as a required course but will now join this group. The updated group will contain STAT 428, 431, 432, 440, and 448. This group will be relabeled as Statistical Application Electives.

   - The current Group III: Computational Application Areas will contain the same list of courses, except for the removal of STAT 385. This group will be relabeled as Computational Application Electives.

2) **Provide a justification of the program**, including how your unit decided to create this program, highlights of the program objectives, and the careers, occupations, or further educational opportunities for which the program will prepare graduates, when appropriate.

As the practice and teaching of both the fields of Statistics and Computer Science have grown and evolved over the past few years, so have our respective curricula. This is particularly true in the area of data science, where applications in Statistics and Computer Science (Stat&CS) intersect. The revisions in this document are the results of a collaboration within and between our departments to assess which courses will benefit our students the most, to involve fewer STAT and CS courses that are less relevant to data science, and to incorporate more that are.

The justifications which follow each address a revision item that appeared in the previous section.

1. **A revision to the Computer Science Introductory Sequence:** Replacing CS 126 with CS 128 makes the path to CS 225 uniform for all students (except those in ECE), including students in Computer Science majors, students wanting to transfer into Computer Science majors, students doing minors and students needing CS 225 to complete a concentration. Adding CS 222 and removing CS 242 eliminates the attempt to distinguish between how freshmen and transfer students take the code-review class.

2. **The addition of an alternate Computer Architecture/System programming option:** This option is already a possibility in several of the CS+X degree programs outside of the LAS programs, and it allows students in Stat&CS to customize their program to better focus on the aspects of CS that impact the Statistics areas most in line with their interests.

3. **Adding new Linear Algebra options:** MATH 257 is designed to be a replacement for MATH 415: Applied Linear Algebra with essentially the theoretical content of MATH 415, but with an emphasis on using programming to perform matrix operations instead of calculating them on paper. The more rigorous MATH 415 will continue to be allowed for students to take in order to better prepare for STAT and CS electives that require a stronger foundation in linear algebra.

4. **A revision to the Statistics Introductory Sequence:** STAT 107: Data Science Discovery is just the first in a sequence of new STAT courses aimed at bringing data science skills and tools to more of the student population. It is only fitting that it be added as a gateway into the Stat&CS major.

   With the inclusion of two STAT courses to the require core (Item 5 below), CS 361 no longer exists as a viable choice for students in STAT&CS. While a worthy complementary course in CS+X programs, CS 361 presents a redundancy with our Statistical Modeling sequence (STAT 425+426). Further, its prerequisites of Calc I and linear algebra (and thus inherently Calc II and Calc III) are a bit heavier than the others offered as an introductory course for first year students. Thus, we propose CS 361 be removed as an option.

5. **A revision to the Probability and Statistics Sequence:** The relocation of both STAT 425 and STAT 426 from optional electives to required core courses will bring the Stat&CS curriculum in alignment with the Statistics major. The current Stat&CS major plan of study does not have a requirement for advanced statistical modeling, but the revision will remedy this omission. The removal of CS 361 (Item 4) addresses a duplication that would occur if all three of these courses remained.

6. **Relabeling the elective groups for greater clarity and organization:**
   - The current Group II: Mathematical Analysis and Modeling will be removed from the program. The removal of Group II is tied to the revision to the Probability and Statistics Sequence (Item 5 above). The revision aims to refocus the program on areas where more regularly utilized methods in computational analysis take place in today's workforce. Further, this more pragmatic curriculum will maintain stronger ties to the CS courses in the program. For those pursuing a post-baccalaureate education, our students will be as strong or stronger candidates for MS and PhD programs in Statistics under the revision, even with the removal of this group. Logistically speaking, the absence of this more abstract set of courses (i.e., the former Group II) and their credit hour contribution to the program provides

the breathing room for the addition of STAT 426 as a required course to align with the Statistics Major and without necessitating a change in total credit hours.

- The current Group IV: Statistical Analysis and Modeling is being updated and renamed. STAT 425 and 426 are moving from the Group IV electives to the required core as described in Item 5. We are removing STAT 420 as it is a less rigorous redundancy to STAT 425+426. It will be a more suitable course intended for our Minor students and non-major graduates. STAT 448 will remain as an elective, but it will be joined by STAT 428 (which was formerly required) and others. As the application of statistics has branched out, so have our course offerings. Along with STAT 428, a newer crop of courses including STAT 431, 432, 440, and 448 offer our students greater variety to add to their foundational skills in computational statistics. For better clarity for students, this group will be relabeled as Statistical Application Electives.

- The current Group III: Computational Application Areas will contain the same list of courses, except for the removal of STAT 385. STAT 385 is somewhat of a redundancy to several CS courses as it contains a variety of Computer Science topics related to statistical analysis. These topics are also found throughout the core of the CS-side of the curriculum. For students in the Stat&CS program, we feel it will be a better experience if they get those topics directly from CS. As with the other electives, for clarity this group will be relabeled as Computational Application Electives.

Our graduates in Stat&CS are moving into careers where skills in advanced modeling and data science are not only encouraged but required. It is only appropriate that the curriculum be updated to reflect this.

3) In addition, please provide an answer as to how your degree (120 hours of coursework) will satisfy this requirement: IBHE requires that all degree programs contain at least 40 credit hours in upper division courses. Upper division courses have been described as 300- and 400- level coursework and some 200-level courses in which multiple prerequisites are required.

This proposed revision does not subtract any credit hours from the major plan of study, nor in the specific area of upper division courses. Thus, the program will maintain the same number of upper division credit hours. This proposed revision only serves to align the foundations of the Stat and Stat&CS programs, to coordinate the CS requirements found in the Stat&CS and CS+X programs, and to provide more options for students to satisfy advanced requirements in Statistics.

Is this program interdisciplinary? Yes. The Stat&CS major is an interdisciplinary program resulting from a partnership between the Department of Statistics and the Department of Computer Science.

If a proposal for a concentration-

will you admit to the concentration directly? NA

is a concentration required for graduation? NA

Will specialized accreditation be sought for this program? No specialized accreditation is being sought.

ADMISSION REQUIREMENTS

1) Desired admissions term: *For LAS units, a fall semester effective term for all curricula will be requested, please indicate the proposed year*

Fall, 2021

2) Provide a brief narrative description of the admission requirements for this program. Where relevant, include information about licensure requirements, student background checks, GRE and TOEFL scores, and admission requirements for transfer students. (degrees, majors, concentrations ONLY)

Not Applicable for this revision as there are no proposed changes to Admission Requirements

3) Describe how critical academic functions such as admissions and student advising are managed.

First-Year student (i.e., "freshman") admissions are primarily determined by the College of Liberal Arts & Sciences (LAS) and Office of Undergraduate Admissions (OUA). There is some input from our department but Computer Science provides most of the guidance to balance our enrollment with fellow programs in Computer Science (ENG), Mathematics & Computer Science (LAS), and the CS+X majors. Students who wish to transfer into Stat&CS must successfully complete a series of introductory courses in both departments prior to submitting an application portfolio which includes essay writing.

Our departments share in the responsibility of mentoring and advising students in Stat&CS. Readiness for entering the program, continued progress in the major, and preparation for post-baccalaureate opportunities (such as graduate school or employment) are monitored by a team of full-time academic and career advisors, faculty, and program directors within our two Departments.

ENROLLMENT

1) Describe how this revision will impact enrollment and degrees awarded.

We anticipate no discernible impact on enrollment and degrees awarded resulting from this revision. If anything, the proposed revision would have a positive impact on enrollment and degrees awarded. Computer Science at Illinois continues to be a national leader, and our undergraduate program in Statistics has grown rapidly in the past five years. Due to hiring limitations, we were unable to provide a supply of courses to meet the demand from outside our program. With many new faculty hires and innovative creation of new courses in Statistics of late, not only are we able to meet the demand, but we can offer a variety of dynamic new courses. With the revision, our majors will have a more structured and clearer path toward degree completion.

2) Estimated Annual Number of Degrees Awarded**(degrees, majors, concentrations ONLY)**

Year 1: 90 – The actual number might be somewhat larger due to students who planned to graduate in AY21, but will defer/be delayed until AY22 due to COVID-19.

Year 5 (or when fully implemented): 100 - There many similar programs on campus with the offerings of Math&CS, CS+X, and the emerging Data Science initiatives we partner with. We anticipate a modest rise, but our students may spread to related areas of Stat and CS as well.

3) What is the matriculation term for this program? Fall

4) What is the typical time to completion of this program? 4 years

5) What are the minimum Total Credit Hours required for this program? 120 credit hours

6) Delivery Method, what is the program's primary delivery method? Face to Face

---

5) MINORS ONLY: NOT APPLICABLE

Will the department limit enrollment in the minor?

Describe how the department will monitor admission to/enrollment in the minor.

Are there any prerequisites for the proposed minor?

Other than certification via the students' degree audits, is there any additional planned mechanism to award/honor successful completion of the minor? If yes, please describe.

BUDGET

1) Please describe any budgetary implications for this revision- addressing applicable personnel, facilities, technology and supply costs.

Computer Science: This revision constitutes a redistribution of existing instructional resources but should not cause a significant change in applicable personnel, technology, and supply costs. Allowing CS 128 to be taken by non-majors, as well as majors, will increase the enrollment over and above that of CS 126 and CS 242 and may have a small impact on scheduling (requiring a larger classroom or additional lectures) but this will be partially offset by eliminating redundancies (e.g., the need to teach both CS 126 and CS 242). The need for additional Teaching Assistants in CS 128 in contrast to CS 126 and CS 242 combined, due to outside enrollment now being allowed, will be offset by the revenue generated by the additional income for the additional IUs.

Statistics: This is a revision of an existing degree program, and for the most part involves only a shift in enrollments of courses currently offered within Statistics. In particular, we will have to increase the availability of the now-required STAT 426, but that is offset by the relocation of STAT 428 from required to elective.

2) Will the revision require staffing (faculty, advisors, etc.) beyond what is currently available? If yes, please describe.

No.

3) Please provide any additional budget information needed to effectively evaluate the proposal.

Not Applicable

RESOURCE IMPLICATIONS

1) Facilities- Will the program require new or additional facilities or significant improvements to already existing facilities? If yes, please outline the specific need and Year 1 and Year 5 cost.

No.

2) Technology- Will the program need additional technology beyond what is currently available for the unit? If yes, please outline the specific need and Year 1 and Year 5 cost.

There is no expected impact beyond the demand that already arises from current Stat&CS students.

3) Non-Technical Resources- Will the program require additional supplies, services or equipment (non-technical)? If yes, please outline the specific need and Year 1 and Year 5 cost.

No.

RESOURCES

1) Faculty Resources: Please address the impact on faculty resources including any changes in numbers of faculty, class size, teaching loads, student-faculty ratios, etc. Describe how the unit will support student advising, including job placement and/or admission to advanced studies.

Computer Science: No significant changes anticipated. As mentioned above, allowing CS 128 to be taken by non-majors, as well as majors, will increase the enrollment over and above that of CS 126 and CS 242 and may have a small impact on scheduling (requiring a larger classroom or additional lectures) but this will be partially offset by eliminating redundancies (e.g., the need to teach both CS 126 and CS 242).

Statistics: Thanks to a recent wave of successful hires for faculty, advising staff, and support staff, Statistics currently has the necessary staffing for the STAT courses involved.

2) Library Resources: Describe your proposal's impact on the University Library's resources, collections, and services. If necessary please consult with the appropriate disciplinary specialist within the University Library.

Current collections and services are adequate for the proposed program.

3) Instructional Resources: Will there be any reduction in other course offerings, programs or concentrations by your department as a result of this new program/proposed change? If yes, please describe.

No.

4) Does this new program/proposed change result in the replacement of another program? If yes, please specify the program.

No.

5) Does the program include any required or recommended subjects that are offered by other departments? If yes, please list the courses. Explain how these additional courses will be used by the program and provide letters of support from the departments.

Yes. The proposed revisions were drafted in collaboration as our two units jointly support this program.

The program will also continue to include the Calculus sequence of MATH 221, 231, and 241 as it always has. The revisions include the addition of MATH 257, which the Department of Mathematics has created to introduce a more programmatic approach to linear algebra for many non-Mathematics majors.

FINANCIAL RESOURCES

1) How does the unit intend to financially support this proposal?

There is no impact on the already existing arrangements that support the Stat&CS program financially. This is a revision of an existing degree program, and for the most part involves only a shift in enrollments of courses taken within the units already.

2) Will the unit need to seek campus or other external resources? If yes, please provide a summary of the sources and an indication of the approved support.

No.

3) Are you seeking a change in the tuition rate or differential for this program?

There are no proposed changes to the existing tuition rate.

4) Is this program requesting self-supporting status? (degrees, majors and concentrations ONLY)? If yes, please explain.

No.

PROGRAM REGULATION

1) **Describe how the program is aligned with or meets licensure, certification, and/or entitlement requirements, if applicable.**
Briefly describe the plan to assess and improve student learning, including the program's learning objectives; when, how, and where these learning objectives will be assessed; what metrics will be used to signify student's achievement of the stated learning objectives; and the process to ensure assessment results are used to improve student learning.

Computer Science: In order to track student progress in achieving the student outcomes of the CS component of the Stat&CS program, the Department of Computer Science has identified a set of "core courses" that ensure student outcomes are being reached. These include the following courses that all students must take: CS 124, CS 128, CS 173, CS 225, CS 222, One of 240 or (CS 233 and CS 241), CS 357, CS 374, and CS 421. The Department of Computer Science tracks, on a rolling three year basis, the student attainment of the Learning Objectives of these core courses and assesses their contributions to the Student Outcomes used for all students in CS courses.

Statistics: We will continue to monitor Student Learning Outcomes for this program as outlined in our Assessment Plan filed with the Provost's Office. In fact, this proposal is an outcome of that effort. Through student performance, student and industry survey, and evaluation of emerging trends in our field, the proposed revisions address opportunities to improve student learning with our BS Statistics program.

2) Is the career/profession for graduates of this program regulated by the State of Illinois? If yes, please describe.

No.

ACADEMIC CATALOG ENTRY

1) All proposals must submit the major requirements (courses, hours) for the proposed curricula. Please see the University of Illinois Academic Catalog- http://catalog.illinois.edu/ for your unit for an example of the entry.

The entry may remain unchanged. It currently reads as follows.

This major is sponsored jointly by the Departments of Statistics and Computer Science. The Statistics and Computer Science major is designed for students who would like a strong foundation in computer science, coupled with significant advanced coursework in statistics. The major prepares students for professional or graduate work in statistics and computer science, and for applications of computing in which knowledge of statistics is particularly important, such as data mining and machine learning.

For the degree of Bachelor of Science in Liberal Arts & Sciences Major in Statistics & Computer Science

Departmental distinction: To graduate with distinction requires a specified minimum grade point average in all Computer Science, Statistics, and Mathematics courses listed below. A GPA of 3.25 is required for Distinction, 3.5 for High Distinction, and 3.75 for Highest Distinction.

General education: Students must complete the Campus General Education requirements including the campus general education language requirement.

Minimum required major and supporting course work: Normally equates to 68-72 hours. At least 12 hours of 300- and 400-level courses must be taken on this campus.

Minimum hours required for graduation: 120 hours.

2) Include a comparative table of the current and proposed requirements.

Current curricula and proposed revisions are listed below. Additions to the program are highlighted in yellow. The updates of courses that are staying in the major but moving from optional elective to required core (or vice versa) are highlight in green. Those in green will appear in both the Current and Proposed columns. Courses being removed from the program are highlighted in blue.

Comparative Table of Proposed Changes

Current Requirements	Current Hours	Proposed Requirements	Proposed Hours
CS 100: Freshman Orientation (recommended)	0-1	[SAME]	0-1
Required Mathematical Foundation	**14-15**	**Mathematical Foundation**	**14-15**
Calculus through MATH 241: Calculus III	11-12	[SAME]	11-12
MATH 415: Applied Linear Algebra	3	MATH 257: Linear Algebra with Computational Applications, or MATH 415: Applied Linear Algebra	3
Required Computer Science Foundation	**32**	**Computer Science Foundation**	**32-33**
---	---	CS 124: Introduction to Computer Science I	3
CS 125: Intro to Computer Science	4	---	---
CS 126: Software Design Studio (or CS 242)	3	---	---
---	---	CS 128: Introduction to Computer Science II	3
CS 173: Discrete Structures	3	[SAME]	3
---	---	CS 222: Software Design Studio	1
CS 225: Data Structures	4	[SAME]	4
CS 233: Computer Architecture (4) and CS 241: System Programming (4)	8	Choose from one of the following course sets: CS 233: Computer Architecture (4) and CS 241: System Programming (4) …OR… CS 240: Introduction to Computer Systems (3) and two CS 400-level electives numbered above CS 403 and not including CS 491. These two courses must be distinct from all other courses used to fulfill program requirements or options. (6)	8-9
CS 357: Numerical Methods I	3	[SAME]	3

CS 374: Introduction to Algorithms & Models of Computation	4	[SAME]	4
CS 421: Programming Languages & Compilers	3	[SAME]	3
Required Probability and Statistics Foundation	**10**	**Probability and Statistics Foundation**	**16-17**
[Current Group I; see below]	---	STAT 107: Data Science Discovery, or STAT 200: Statistical Analysis, or STAT 212: Biostatistics	3-4
STAT 400: Statistics & Probability I	4	[SAME]	4
STAT 410: Statistics & Probability II	3	[SAME]	3
STAT 428: Statistical Computing	3	---	---
---	---	STAT 425: Applied Regression and Design	3
---	---	STAT 426: Sampling and Categorical Data	3
At least four other statistics, computer science, or mathematics courses, with at least one chosen from each of the following groups:	**12**		
Group I: Statistical Methods	**(3)**	**[GROUP I REMOVED]**	**---**
STAT 200: Statistical Analysis		[Relocated above]	
STAT 212: Biostatistics		[Relocated above]	
CS 361: Probability & Statistics for Computer Science		---	
Group II: Mathematical Analysis and Modeling	**(3)**	**[GROUP II REMOVED]**	**---**
MATH 347: Fundamental Mathematics		---	
MATH 441: Differential Equations		---	
MATH 444: Elementary Real Analysis		---	
MATH 447: Real Variables		---	
Group IV: Statistical Analysis and Modeling	**(3)**	**[RELABEL AS…]** **Statistical Application Electives** **(Choose at least one.)**	**3**
STAT 420: Methods of Applied Statistics		---	
STAT 425: Applied Regression and Design		---	
STAT 426: Sampling and Categorical Data		---	
---		STAT 428: Statistical Computing	
---		STAT 431: Applied Bayesian Analysis	
---		STAT 432: Basics of Statistical Learning	
---		STAT 434: Survival Analysis	
STAT 448: Advanced Data Analysis		[SAME]	
Group III: Computational Application Areas	**(3)**	**[RELABEL AS…]**	**3**

		Computational Application Electives (Choose at least one.)	
STAT 385: Statistics Programming Methods		---	
CS 410: Text Information Systems		[SAME]	
CS 411: Database Systems		[SAME]	
CS 412: Introduction to Data Mining		[SAME]	
CS 446: Machine Learning		[SAME]	
CS 481: Advanced Topics in Stochastic Processes & Applications		[SAME]	
CS 482: Simulation		[SAME]	
TOTAL	**68-70**		**68-72**

Mock-up of how the proposed revisions would possibly appear in the Catalog.

Departmental distinction: To graduate with distinction requires a specified minimum grade point average in all Computer Science, Statistics, and Mathematics courses listed below. A GPA of 3.25 is required for Distinction, 3.5 for High Distinction, and 3.75 for Highest Distinction.

General education: Students must complete the Campus General Education requirements including the campus general education language requirement.

Minimum required major and supporting course work: Normally equates to 68-72 hours. At least 12 hours of 300- and 400-level courses must be taken on this campus.

Minimum hours required for graduation: 120 hours

CS 100	Freshman Orientation (recommended)	0-1
Mathematical Foundation:		14-15
Calculus through MATH 241 - Calculus III		
Choose one of the following. MATH 257 or MATH 415	 Linear Algebra with Computational Apps Applied Linear Algebra	
Computer Science Foundation:		32-33
CS 124	Introduction to Computer Science I	
CS 128	Introduction to Computer Science II	
CS 173	Discrete Structures	
CS 222	Software Design Studio	
CS 225	Data Structures	

Choose from one of the following course sets.

CS 233 and CS 241 .....OR..... CS 240 and two CS 400-level electives numbered above CS 403 and not including CS 491	Computer Architecture, System Programming Introduction to Computer Systems	
CS 357	Numerical Methods I	
CS 374	Introduction to Algorithms & Models of Computation	
CS 421	Programming Languages & Compilers	
Probability and Statistics Foundation:		16-17
Choose one of the following. STAT 107, STAT 200, or STAT 212	 Data Science Discovery Statistical Analysis Biostatistics	
STAT 400	Statistics and Probability I	
STAT 410	Statistics and Probability II	
STAT 425	Statistical Modeling I	
STAT 426	Statistical Modeling II	
Statistical Applications Elective:		3
Choose at least one course from the following.		
STAT 428	Statistical Computing	
STAT 431	Applied Bayesian Analysis	
STAT 432	Basics of Statistical Learning	
STAT 434	Survival Analysis	
Computational Application Elective:		3
Choose at least one course from the following.		
CS 410	Text Information Systems	
CS 411	Database Systems	
CS 412	Introduction to Data Mining	
CS 446	Machine Learning	
CS 481	Advanced Topics in Stochastic Processes & Applications	
CS 482	Simulation	

Letters of Support

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Department of Mathematics

273 Altgeld Hall, MC-382
1409 West Green Street
Urbana, IL 61801

Re: Use of Math 257 in Statistics

The Mathematics Department, working with the Grainger College of Engineering, has recently created the course MATH 257, *Linear Algebra with Computational Applications*. Quoting from the justification of the approved proposal, "In the future, MATH 257 will replace the MATH 415 requirement in many science and engineering curricula." With this in mind, the department would be pleased to have Statistics add MATH 257 as an option to MATH 415 in their program, specifically in their Statistics BS, Statistics & Computer Science BS as well as in their Statistics minor. As the Mathematics department is reallocating instructional resources from Math 415 to Math 257 as the need shifts, this will not cause any undue difficulties for Mathematics resources.

Sincerely

Randy McCarthy

Randy McCarthy
Professor of Mathematics
Dir of Undergraduate Studies in Math
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1

10KV1438BSLA: MATHEMATICS & COMPUTER SCIENCE, BSLAS

In Workflow

1. U Program Review (dforgacs@illinois.edu; eastuby@illinois.edu; aledward@illinois.edu)
2. 1257 Head (tyson@illinois.edu)
3. 1434 Head (namato@illinois.edu; vmahesh@illinois.edu; egunter@illinois.edu)
4. KP Committee Chair (bsnewell@illinois.edu; danko@illinois.edu; kcp@illinois.edu; jmakela@illinois.edu)
5. KP Dean (candyd@illinois.edu)
6. KV Dean (las-catalog@illinois.edu)
7. University Librarian (jpwilkin@illinois.edu)
8. Provost (kmartens@illinois.edu)
9. Senate EPC (bjlehman@illinois.edu; moorhouz@illinois.edu; kmartens@illinois.edu)
10. Senate (jtempel@illinois.edu)
11. U Senate Conf (none)
12. Board of Trustees (none)
13. IBHE (none)
14. DMI (eastuby@illinois.edu; aledward@illinois.edu; dforgacs@illinois.edu)

Approval Path

1. Wed, 07 Apr 2021 21:39:34 GMT
   Deb Forgacs (dforgacs): Approved for U Program Review
2. Wed, 07 Apr 2021 21:49:26 GMT
   Jeremy Tyson (tyson): Approved for 1257 Head
3. Thu, 08 Apr 2021 16:12:03 GMT
   Elsa Gunter (egunter): Approved for 1434 Head
4. Thu, 08 Apr 2021 19:08:03 GMT
   Brooke Newell (bsnewell): Approved for KP Committee Chair
5. Thu, 08 Apr 2021 19:23:46 GMT
   Candy Deaville (candyd): Approved for KP Dean
6. Thu, 08 Apr 2021 19:33:45 GMT
   Kelly Ritter (ritterk): Approved for KV Dean
7. Thu, 08 Apr 2021 20:06:51 GMT
   John Wilkin (jpwilkin): Approved for University Librarian
8. Thu, 08 Apr 2021 22:00:22 GMT
   Kathy Martensen (kmartens): Approved for Provost

History

1. Feb 2, 2019 by Deb Forgacs (dforgacs)

Date Submitted:Wed, 07 Apr 2021 19:21:40 GMT

Viewing:10KV1438BSLA : Mathematics & Computer Science, BSLAS

Changes proposed by: Amy Elli

Proposal Type

Proposal Type:

Major (ex. Special Education)

This proposal is for a:

Revision

Proposal Title:

If this proposal is one piece of a multi-element change please include the other impacted programs here.*example: A BS revision with multiple concentration revisions*

Administrative approval: Revision to the BSLAS in Mathematics & Computer Science

EP Control Number

EP.21.115

Official Program Name

Mathematics & Computer Science, BSLAS

Effective Catalog Term

Fall 2021

Sponsor College

Liberal Arts & Sciences

Sponsor Department

Mathematics

Sponsor Name

Jeremy Tyson, Professor and Dept Head

Sponsor Email

tyson@illinois.edu

College Contact

Kelly Ritter

College Contact Email

ritterk@illinois.edu

Program Description and Justification

Justification for proposal change:

In the CS component, the proposal involves changes to three aspects. The first is a reorganization of the material in the introductory course sequence. The second is adding an alternative to the require systems programming courses, allowing for the flexibility to choose two elective courses in computer science at the senior level.
These changes are broadly shared, with some degree-specific modifications the suite of undergraduate programs including Computer Science:
10KP0112BS: Computer Science, BS
10KL5623BS: Computer Science + Crop Sciences, BS
10KL5864BS: Computer Science & Animal Sciences, BS
10KR5639BS: Computer Science + Music, BS
10KT5673BS: Computer Science & Advertising, BS
10KV0464BSLA: Statistics & Computer Science, BSLAS
10KV1438BSLA: Mathematics & Computer Science, BSLAS
10KV5348BSLA: Computer Science & Anthropology, BSLAS
10KV5349BSLA: Computer Science & Astronomy, BSLAS
10KV5350BSLA: Computer Science & Chemistry, BSLAS
10KV5351BSLA: Computer Science & Linguistics, BSLAS
10KV5667BSLA: Computer Science & Economics, BSLAS
10KV5676BSLA: Computer Science & Geography & Geographic Information Science, BSLAS
10KV5679BSLA: Computer Science & Philosophy, BSLAS
JP. 10KL5890BS & 1PKS5890MANS: JP. Computer Science & Animal Sciences, BS & Animal Science, MANSC
JP. 10KL5890BS & 1PKS5890MANS(MANU): JP. Computer Science & Animal Sciences, BS & Animal Science, MANSC
JP.10KL5903BS & 10KS5903MS: JP. Computer Science + Crop Sciences, BS & Crop Sciences, MS
In more detail,

1) (CS 125(4cr) Introduction to Computer Science + CS 126(3cr) Software Design Studio) -> (CS 124(3cr) Introduction to Computer Science I + CS 128(3cr) Introduction to Computer Science II + CS 222(1cr) Software Design Lab), CS 242(3cr) Programming Studio -> CS 222(1cr) Software Design Lab, the CS 225 Data Structures prerequisite of CS 125 is replaced with (CS 126 or CS 128) as the programming prerequisite, CS 128 is open to all, CS 222 is restricted to &CS+ programs. The programming prerequisite for CS 173 is changed from CS 125 to (CS 124 or CS 125).

Justification: CS 128 takes about 2/3 of the material from old CS 126 and receives an hour from the old CS 125 topics, with the remaining topics remaining with CS 124. Replacing CS 126 with CS 128 makes the path to CS 225 uniform for all students (except ECE), including &CS+ majors, students wanting to transfer into one of the &CS+, students doing minors and students needing CS 225 to complete a concentration. It also allows CS 225 to start with an assumption that all students know how to program in C++, and assures all students in the class have a common programming background. Further, the new CS 128 will provide an extended ability for general students to increase their skills in programming and structured program design and development, but without the more specialized material in Data Structures. Adding CS 222 and removing CS 242 eliminates the attempt to discriminate between how students entering as freshmen versus as transfers take the code review class.

2) Change the requirements of CS 233(4cr) Computer Architecture and CS 241(4 cr) System Programming to the student's choice or (CS 233 and CS 241) or (CS 240(3 cr) Introduction to Computer Systems and two 400-level CS courses (not including CS 491))

Justification: This option is already a possibility in several of the CS+X degree programs and it allows students in Math and Computer Science to customize their program to better focus on the aspects of CS that impact the areas of Mathematics most in line with their interests.

3) Replace the CS core course CS 457 Numerical Methods II (3 cr) with CS 450 Numerical Analysis (3 cr)

Justification: CS 457 has been phased out by the CS Department, and replaced by CS 450

The Department of Mathematics is adding/removing course choices from a three different groups within the 18 hours of 400-level courses: Add MATH 413 and MATH 427 to group II; Add MATH 424 to group IV. Remove CS 481 and CS 482 from group V. These revisions do not change the required hours of MATH courses in the major.

Corresponding Degree

BSLAS Bachelor of Science in Liberal Arts and Sciences

Is this program interdisciplinary?

Yes

Interdisciplinary Colleges and Departments (list other colleges/departments which are involved other than the sponsor chose above)

College

Grainger College of Engineering

Department

Computer Science

Do you need to add an additional interdisciplinary relationship?

No

Academic Level

Undergraduate

Will you admit to the concentration directly?

No

Is a concentration required for graduation?

No

CIP Code

300801 - Mathematics and Computer Science.

Is This a Teacher Certification Program?

No

Will specialized accreditation be sought for this program?

No

Admission Requirements

Desired Effective Admissions Term

Fall 2021

Is this revision a change to the admission status of the program?

No

Provide a brief narrative description of the admission requirements for this program. Where relevant, include information about licensure requirements, student background checks, GRE and TOEFL scores, and admission requirements for transfer students.

N/A

Describe how critical academic functions such as admissions and student advising are managed.

N/A

Enrollment

Describe how this revision will impact enrollment and degrees awarded.

The department does not anticipate any impact to enrollment or degrees awarded.

Estimated Annual Number of Degrees Awarded

What is the matriculation term for this program?

Fall

What is the typical time to completion of this program?

4 years

What are the minimum Total Credit Hours required for this program?

120

Delivery Method

Is this program available on campus and online?

No

This program is available:

On Campus

Budget

Are there budgetary implications for this revision?

No

Will the program or revision require staffing (faculty, advisors, etc.) beyond what is currently available?

No

Resource Implications

Facilities

Will the program require new or additional facilities or significant improvements to already existing facilities?

No

Technology

Will the program need additional technology beyond what is currently available for the unit?

No

Non-Technical Resources

Will the program require additional supplies, services or equipment (non-technical)?

No

Resources

For each of these items, be sure to include in the response if the proposed new program or change will result in replacement of another program(s). If so, which program(s), what is the anticipated impact on faculty, students, and instructional resources? Please attach any letters of support/ acknowledgement from faculty, students, and/or other impacted units as appropriate.

Faculty Resources

Please address the impact on faculty resources including any changes in numbers of faculty, class size, teaching loads, student-faculty ratios, etc. Describe how the unit will support student advising, including job placement and/or admission to advanced studies.

N/A

Library Resources

Describe your proposal's impact on the University Library's resources, collections, and services. If necessary please consult with the appropriate disciplinary specialist within the University Library.

Current collections and services are adequate for the proposed program.

Instructional Resources

Will there be any reduction in other course offerings, programs or concentrations by your department as a result of this new program/proposed change?

No

Does the program include other courses/subjects impacted by the creation/revision of this program?

No

Financial Resources

How does the unit intend to financially support this proposal?

No impact.

Will the unit need to seek campus or other external resources?

No

Are you seeking a change in the tuition rate or differential for this program?

No

Program Regulation and Assessment

Briefly describe the plan to assess and improve student learning, including the program's learning objectives; when, how, and where these learning objectives will be assessed; what metrics will be used to signify student's achievement of the stated learning objectives; and the process to ensure assessment results are used to improve student learning. (Describe how the program is aligned with or meets licensure, certification, and/or entitlement requirements, if applicable).

N/A

Is the career/profession for graduates of this program regulated by the State of Illinois?

No

Program of Study

"Baccalaureate degree requires at least 120 semester credit hours or 180 quarter credit hours and at least 40 semester credit hours (60 quarter credit hours) in upper division courses" (source: https://www.ibhe.org/assets/files/PrivateAdminRules2017.pdf). For proposals for new bachelor's degrees, if this minimum is not explicitly met by specifically-required 300- and/or 400-level courses, please provide information on how the upper-division hours requirement will be satisfied.

All proposals must attach the new or revised version of the Academic Catalog program of study entry. Contact your college office if you have questions.

Revised programs

MATH CS revisions side-by-side comparative table April2021.xlsx

Attach a side-by-side comparison with the existing program AND, if the revision references or adds "chose-from" lists of courses students can select from to fulfill requirements, a listing of these courses, including the course rubric, number, title, and number of credit hours.

Catalog Page Text

Statement for Programs of Study Catalog

General education:Students must complete the Campus General Education (https://courses.illinois.edu/)**requirements including the campus general education language requirement.**
Minimum required major and supporting course work:Normally equates to 70 hours. Twelve hours of 300- and 400-level in the major must be taken on this campus.
Minimum hours required for graduation:120 hours.

Requirements

Code	Title	Hours
CS 100	Freshman Orientation (recommended)	1
Calculus throughMATH 241-Calculus III		11-12
CS 124	Introduction to Computer Science I	3
CS 128	Introduction to Computer Science II	3
MATH 347	Fundamental Mathematics	3
or MATH 348	Fundamental Mathematics-ACP	
CS 125	Introduction to Computer Science	4
CS 126	Software Design Studio	3
CS 173	Discrete Structures	3
CS 225	Data Structures	4
CS 222	Software Design Lab	1
Choose one of the following combinations		8-11
CS 233 & CS 241	Computer Architecture and System Programming	
CS 241	System Programming	4
OR		
CS 240	Introduction to Computer Systems	
& two CS courses at the 400 level aboveCS 403, excludingCS 421andCS 491. These two courses must be distinct from all other courses used to fulfill program requirements or options.		
CS/MATH 357	Numerical Methods I	3
CS 374	Introduction to Algorithms & Models of Computation	4
CS 421	Programming Languages & Compilers	3
CS 457	Numerical Methods II	3
CS 450	Numerical Analysis	3 or 4
MATH 415	Applied Linear Algebra	3
or MATH 416	Abstract Linear Algebra	
400-level mathematics and computer science requirements:		18
Students must select at least six 400-level mathematics and computer science courses, including one from each of the following groups:		
GROUP I		
CS 361	Probability & Statistics for Computer Science (recommended)	
MATH 461	Probability Theory	
STAT 400/MATH 463	Statistics and Probability I	
GROUP II		

MATH 412	Graph Theory
MATH 413	Intro to Combinatorics
MATH 417	Intro to Abstract Algebra
MATH 427	Honors Abstract Algebra
GROUP III	
MATH 441	Differential Equations
MATH 446	Applied Complex Variables
MATH 484	Nonlinear Programming
GROUP IV	
MATH 424	Honors Real Analysis
MATH 444	Elementary Real Analysis
MATH 447	Real Variables
GROUP V	
MATH 414	Mathematical Logic
CS/MATH 473	Algorithms
CS/MATH 475	Formal Models of Computation
CS 476	Program Verification
CS 477	Formal Software Development Methods
CS 481	Advanced Topics in Stochastic Processes & Applications
CS 482	Simulation
Total Hours	68-76

EP Documentation

DMI Documentation

Banner/Codebook Name

BSLAS:Math&Computer Sci -UIUC

Program Code:

10KV1438BSLA

Degree Code

BSLAS

Major Code

1438

Program Reviewer Comments

Kathy Martensen (kmartens) (Thu, 08 Apr 2021 21:55:43 GMT): Administrative approval: No change to total hours required/restriction of options.

Key: 229

Key

GREEN HIGHLIGHT = Course addition, requirement replacement or updated hours

RED HIGHLIGHT = Course to be removed from listed requirements.

Current Requirem	Current Hours		Revised Requir	Revised Hours	
CS 100	Freshman Orientation (recommended) 1	1	CS 100	Freshman Orientation (recommended) 1	1
	Calculus through MATH 241-Calculus III	11-12		Calculus through MATH 241-Calculus III	11-12
MATH 347 or MATH 348	Fundamental Math or Fundamental Math- ACP	3	MATH 347 or MATH 348	Fundamental Math or Fundamental Math- ACP	3
CS 125	Introduction to Computer Science	4			
CS 126	Software Design Studio	3			
			CS 124	Introduction to Computer Science I	3
			CS 128	Introduction to Computer Science II	3
CS 173	Discrete Structures	3	CS 173	Discrete Structures	3
CS 225	Data Structures	4	CS 225	Data Structures	4
			CS 222	Software Design Lab	1
CS 233	Computer Architecture	4			
CS 241	System Programming	4			
			Choose one of the following combinations:		8 to 11
			CS 233 & CS 241	Computer Architecture System Programming	
			OR		
			CS 240 & Two CS 4XX	Introduction to Computer Systems Any two (2) 400-level CS courses above CS 403, excluding CS 421 and CS 491. These two courses must be distinct from all other courses used to fulfill program requirements or options.	
MATH 357	Numerical Methods I	3	MATH 357	Numerical Methods I	3
CS 374	Introduction to Algorithms & Models of Computation	4	CS 374	Introduction to Algorithms & Models of Computation	4
CS 421	Programming Languages & Compilers	3 or 4	CS 421	Programming Languages & Compilers	3 or 4
CS 457	Numerical Methods II	3			
			CS 450	Numerical Analysis	3 or 4
MATH 415	Applied Linear Algebra	3	MATH 415	Applied Linear Algebra	3
or MATH 416	Abstract Linear Algebra		or MATH 416	Abstract Linear Algebra	
	400-level mathematics and computer science requirements: Students must select at least six 400-level mathematics and computer science courses, including one from each of the following groups:	18		400-level mathematics and computer science requirements: Students must select at least six 400-level mathematics and computer science courses, including one from each of the following groups:	18
GROUP I			GROUP I		
CS 361	Probability & Statistics for Computer Science (recommended)		CS 361	Probability & Statistics for Computer Science (recommended)	
MATH 461	Probability Theory		MATH 4	Probability Theory	
STAT 400/MATH 463	Statistics and Probability I		STAT 400/MATH 463	Statistics and Probability I	
GROUP II			GROUP II		
MATH 412	Graph Theory		MATH 4	Graph Theory	
			MATH	Intro to Combinatorics	
MATH 417	Intro to Abstract Algebra		MATH 4	Intro to Abstract Algebra	
			MATH	Honors Abstract Algebra	
GROUP III			GROUP III		
MATH 441	Differential Equations		MATH 4	Differential Equations	
MATH 446	Applied Complex Variables		MATH 4	Applied Complex Variables	
MATH 484	Nonlinear Programming		MATH 4	Nonlinear Programming	
GROUP IV			GROUP IV		
			MATH	Honors Real Analysis	
MATH 444	Elementary Real Analysis		MATH 4	Elementary Real Analysis	
MATH 447	Real Variables		MATH 4	Real Variables	
GROUP V			GROUP V		
MATH 414	Mathematical Logic		MATH 4	Mathematical Logic	
CS/MATH 473	Algorithms		CS/MATH 473	Algorithms	
CS/MATH 475	Formal Models of Computation		CS/MATH 475	Formal Models of Computation	
CS 476	Program Verification		CS 476	Program Verification	
CS 477	Formal Software Development Methods		CS 477	Formal Software Development Methods	
CS 481	Advanced Topics in Stochastic Processes & Applications				
CS 482	Simulation				

10KV5667BSLA: COMPUTER SCIENCE & ECONOMICS, BSLAS

In Workflow

1. U Program Review (dforgacs@illinois.edu; eastuby@illinois.edu; aledward@illinois.edu)
2. 1405 Head (lagrift@illinois.edu)
3. 1434 Head (namato@illinois.edu; vmahesh@illinois.edu; egunter@illinois.edu)
4. KP Committee Chair (bsnewell@illinois.edu; danko@illinois.edu; kcp@illinois.edu; jmakela@illinois.edu)
5. KP Dean (candyd@illinois.edu)
6. KV Dean (las-catalog@illinois.edu)
7. University Librarian (jpwilkin@illinois.edu)
8. Provost (kmartens@illinois.edu)
9. Senate EPC (bjlehman@illinois.edu; moorhouz@illinois.edu; kmartens@illinois.edu)
10. Senate (jtempel@illinois.edu)
11. U Senate Conf (none)
12. Board of Trustees (none)
13. IBHE (none)
14. DMI (eastuby@illinois.edu; aledward@illinois.edu; dforgacs@illinois.edu)

Approval Path

1. Wed, 07 Apr 2021 16:38:49 GMT
   Deb Forgacs (dforgacs): Approved for U Program Review
2. Thu, 08 Apr 2021 15:34:06 GMT
   George Deltas (deltas): Approved for 1405 Head
3. Thu, 08 Apr 2021 18:12:25 GMT
   Elsa Gunter (egunter): Approved for 1434 Head
4. Thu, 08 Apr 2021 19:32:21 GMT
   Brooke Newell (bsnewell): Approved for KP Committee Chair
5. Thu, 08 Apr 2021 19:41:07 GMT
   Candy Deaville (candyd): Approved for KP Dean
6. Thu, 08 Apr 2021 19:41:57 GMT
   Kelly Ritter (ritterk): Approved for KV Dean
7. Thu, 08 Apr 2021 20:06:59 GMT
   John Wilkin (jpwilkin): Approved for University Librarian
8. Thu, 08 Apr 2021 22:02:18 GMT
   Kathy Martensen (kmartens): Approved for Provost

History

1. Feb 22, 2019 by Deb Forgacs (dforgacs)

Date Submitted:Wed, 07 Apr 2021 12:59:03 GMT

Viewing:10KV5667BSLA : Computer Science & Economics, BSLAS

Changes proposed by: Amy Elli

Proposal Type

Proposal Type:

Major (ex. Special Education)

This proposal is for a:

Revision

Proposal Title:

If this proposal is one piece of a multi-element change please include the other impacted programs here.*example: A BS revision with multiple concentration revisions*

Administrative approval: Revision to the BSLAS in Computer Science & Economics, College of Liberal Arts & Sciences

EP Control Number

EP.21.115

Official Program Name

Computer Science & Economics, BSLAS

Effective Catalog Term

Fall 2021

Sponsor College

Liberal Arts & Sciences

Sponsor Department

Economics

Sponsor Name

Jamie Thomas-Ward, Associate Director for UG Study, Economics

Sponsor Email

thomas99@illinois.edu

College Contact

Kelly Ritter

College Contact Email

ritterk@illinois.edu

Program Description and Justification

Justification for proposal change:

In the CS component, the proposal involves changes to three aspects. The first is a reorganization of the material in the introductory course sequence. The second is adding an alternative to the require systems programming courses, allowing for the flexibility to choose two elective

courses in computer science at the senior level. The third is to incorporate an option of a new linear algebra course, MATH 257, into the linear algebra requirement for the program.
These changes are broadly shared, with some degree-specific modifications the suite of undergraduate programs including Computer Science:
10KP0112BS: Computer Science, BS
10KL5623BS: Computer Science + Crop Sciences, BS
10KL5864BS: Computer Science & Animal Sciences, BS
10KR5639BS: Computer Science + Music, BS
10KT5673BS: Computer Science & Advertising, BS
10KV0464BSLA: Statistics & Computer Science, BSLAS
10KV1438BSLA: Mathematics & Computer Science, BSLAS
10KV5348BSLA: Computer Science & Anthropology, BSLAS
10KV5349BSLA: Computer Science & Astronomy, BSLAS
10KV5350BSLA: Computer Science & Chemistry, BSLAS
10KV5351BSLA: Computer Science & Linguistics, BSLAS
10KV5667BSLA: Computer Science & Economics, BSLAS
10KV5676BSLA: Computer Science & Geography & Geographic Information Science, BSLAS
10KV5679BSLA: Computer Science & Philosophy, BSLAS
JP. 10KL5890BS & 1PKS5890MANS: JP. Computer Science & Animal Sciences, BS & Animal Science, MANSC
JP. 10KL5890BS & 1PKS5890MANS(MANU): JP. Computer Science & Animal Sciences, BS & Animal Science, MANSC
JP.10KL5903BS & 10KS5903MS: JP. Computer Science + Crop Sciences, BS & Crop Sciences, MS
In more detail,
1) (CS 125(4cr) Introduction to Computer Science + CS 126(3cr) Software Design Studio) -> (CS 124(3cr) Introduction to Computer Science I + CS 128(3cr) Introduction to Computer Science II + CS 222(1cr) Software Design Lab), CS 242(3cr) Programming Studio -> CS 222(1cr) Software Design Lab, the CS 225 Data Structures prerequisite of CS 125 is replaced with (CS 126 or CS 128) as the programming prerequisite, CS 128 is open to all, CS 222 is restricted to &CS+ programs. The programming prerequisite for CS 173 is changed from CS 125 to (CS 124 or CS 125).
Justification: CS 128 takes about 2/3 of the material from old CS 126 and receives an hour from the old CS 125 topics, with the remaining topics remaining with CS 124. Replacing CS 126 with CS 128 makes the path to CS 225 uniform for all students (except ECE), including &CS+ majors, students wanting to transfer into one of the &CS+, students doing minors and students needing CS 225 to complete a concentration. It also allows CS 225 to start with an assumption that all students know how to program in C++, and assures all students in the class have a common programming background. Further, the new CS 128 will provide an extended ability for general students to increase their skills in programming and structured program design and development, but without the more specialized material in Data Structures. Adding CS 222 and removing CS 242 eliminates the attempt to discriminate between how students entering as freshmen versus as transfers take the code review class.
2) Change the requirements of CS 233(4cr) Computer Architecture and CS 241(4 cr) System Programming to the student's choice or (CS 233 and CS 241) or (CS 240(3 cr) Introduction to Computer Systems and two 400-level CS courses (not including CS 491))
Justification: This option is already a possibility in several of the CS+X degree programs and it allows students in Computer Science + Economics to customize their program to better focus on the aspects of CS that impact the areas of Economics most in line with their interests.

3) Change the linear algebra requirement from MATH 225 to (Math 225 or Math 257).

Justification: The Math department is developing MATH 257 as the eventual replacement for MATH 415, with the same theoretical content, but with an emphasis on using programming to perform matrix operations instead of calculating them on paper. Students in Economics and Computer Science should have the option of a stronger linear algebra class with stronger ties to programming.

Corresponding Degree

BSLAS Bachelor of Science in Liberal Arts and Sciences

Is this program interdisciplinary?

Yes

Interdisciplinary Colleges and Departments (list other colleges/departments which are involved other than the sponsor chose above)

College

Grainger College of Engineering

Department

Computer Science

Do you need to add an additional interdisciplinary relationship?

No

Academic Level

Undergraduate

Will you admit to the concentration directly?

No

Is a concentration required for graduation?

No

CIP Code

110199 - Computer and Information Sciences, Other.

Is This a Teacher Certification Program?

No

Will specialized accreditation be sought for this program?

No

Admission Requirements

Desired Effective Admissions Term

Fall 2021

Is this revision a change to the admission status of the program?

No

Provide a brief narrative description of the admission requirements for this program. Where relevant, include information about licensure requirements, student background checks, GRE and TOEFL scores, and admission requirements for transfer students.

N/A

Describe how critical academic functions such as admissions and student advising are managed.

N/A

Enrollment

Describe how this revision will impact enrollment and degrees awarded.

The department does not anticipate any impact to enrollment or degrees awarded

Estimated Annual Number of Degrees Awarded

What is the matriculation term for this program?

Fall

What is the typical time to completion of this program?

4 years

What are the minimum Total Credit Hours required for this program?

120

Delivery Method

Is this program available on campus and online?

No

This program is available:

On Campus

Budget

Are there budgetary implications for this revision?

No

Will the program or revision require staffing (faculty, advisors, etc.) beyond what is currently available?

No

Resource Implications

Facilities

Will the program require new or additional facilities or significant improvements to already existing facilities?

No

Technology

Will the program need additional technology beyond what is currently available for the unit?

No

Non-Technical Resources

Will the program require additional supplies, services or equipment (non-technical)?

No

Resources

For each of these items, be sure to include in the response if the proposed new program or change will result in replacement of another program(s). If so, which program(s), what is the anticipated impact on faculty, students, and instructional resources? Please attach any letters of support/ acknowledgement from faculty, students, and/or other impacted units as appropriate.

Attach File(s)

CS_letter_Math_257.pdf

Faculty Resources

Please address the impact on faculty resources including any changes in numbers of faculty, class size, teaching loads, student-faculty ratios, etc. Describe how the unit will support student advising, including job placement and/or admission to advanced studies.

N/A

Library Resources

Describe your proposal's impact on the University Library's resources, collections, and services. If necessary please consult with the appropriate disciplinary specialist within the University Library.

Current collections and services are adequate for the proposed program.

Instructional Resources

Will there be any reduction in other course offerings, programs or concentrations by your department as a result of this new program/proposed change?

No

Does the program include other courses/subjects impacted by the creation/revision of this program?

No

Financial Resources

How does the unit intend to financially support this proposal?

N/A

Will the unit need to seek campus or other external resources?

No

Are you seeking a change in the tuition rate or differential for this program?

No

Program Regulation and Assessment

Briefly describe the plan to assess and improve student learning, including the program's learning objectives; when, how, and where these learning objectives will be assessed; what metrics will be used to signify student's achievement of the stated learning objectives; and the process to ensure assessment results are used to improve student learning. (Describe how the program is aligned with or meets licensure, certification, and/or entitlement requirements, if applicable).

N/A

Is the career/profession for graduates of this program regulated by the State of Illinois?

No

Program of Study

"Baccalaureate degree requires at least 120 semester credit hours or 180 quarter credit hours and at least 40 semester credit hours (60 quarter credit hours) in upper division courses" (source: https://www.ibhe.org/assets/files/PrivateAdminRules2017.pdf). For proposals for new bachelor's degrees, if this minimum is not explicitly met by specifically-required 300- and/or 400-level courses, please provide information on how the upper-division hours requirement will be satisfied.

All proposals must attach the new or revised version of the Academic Catalog program of study entry. Contact your college office if you have questions.

Revised programs

MATH 257 option to 225.pdf
CS Econ revisions side-by-side comparative table April2021.xlsx

Attach a side-by-side comparison with the existing program AND, if the revision references or adds "chose-from" lists of courses students can select from to fulfill requirements, a listing of these courses, including the course rubric, number, title, and number of credit hours.

Catalog Page Text

Statement for Programs of Study Catalog

General education:Students must complete the Campus General Education (https://courses.illinois.edu/)**requirements including the campus general education language requirement.**
Minimum required major and supporting course work:Normally equates to 66 hours. Twelve hours of 300- and 400-level in the major must be taken on this campus.
Minimum hours required for graduation:120 hours.

Code	Title	Hours
Required Computer Science Courses:		
CS 100	Freshman Orientation (recommended)[1]	1
CS 125	Introduction to Computer Science	4
CS 126	Software Design Studio	3
CS 124	Introduction to Computer Science I	3
CS 128	Introduction to Computer Science II	3
CS 173	Discrete Structures	3
CS 225	Data Structures	4
CS 222	Software Design Lab	1
Choose one of the following combinations		8-11
CS 233 & CS 241	Computer Architecture and System Programming	
CS 241	System Programming	4
OR		
CS 240	Introduction to Computer Systems	
& two CS courses at the 400 level aboveCS 403, excludingCS 421andCS 491. These two courses must be distinct from all other courses used to fulfill program requirements or options.		
Choose one of the following:		3
ECON 202	Economic Statistics I	
STAT 200	Statistical Analysis	
STAT 212	Biostatistics	
CS 361	Probability & Statistics for Computer Science	
CS 374	Introduction to Algorithms & Models of Computation	4
CS 421	Programming Languages & Compilers	3
Mathematics (may also fulfill the General Education Quantitative Reasoning I and II requirements):		
MATH 220	Calculus	4-5
or MATH 221	Calculus I	
MATH 225	Introductory Matrix Theory	2 or 3
or MATH 257	Linear Algebra with Computational Applications	
MATH 231	Calculus II	3
Required Economics Coursework -- minimum 24 hours		
ECON 102	Microeconomic Principles	3
ECON 103	Macroeconomic Principles	3
ECON 203	Economic Statistics II	3
ECON 302	Inter Microeconomic Theory	3
Four 400-level courses in Economics selected from an approval list of computation-focused courses		12
Total Hours		66-71

[1] CS 100 (http://catalog.illinois.edu/search/?P=CS%20100) is an orientation course aimed at first-year students, so students who declare the major after the freshman year are not required to complete it.

EP Documentation

DMI Documentation

Banner/Codebook Name

BSLAS: Comp Sci & Econ - UIUC

Program Code:

10KV5667BSLA

Degree Code

BSLAS

Major Code

5667

Program Reviewer Comments

Kathy Martensen (kmartens) (Thu, 08 Apr 2021 22:01:00 GMT): Administrative approval: No change to total hours required/restriction in electives.

Key: 284

MATH 257: LINEAR ALGEBRA WITH COMPUTATIONAL APPLICATIONS

Completed Workflow

1. 1257 Head (tyson@illinois.edu)
2. KV Dean (las-catalog@illinois.edu)
3. COTE (bmclvngr@illinois.edu)
4. Provost (kmartens@illinois.edu)
5. Registrar (fms-catalog@illinois.edu)
6. Banner (fms-catalog@illinois.edu)

Approval Path

1. Fri, 11 Sep 2020 16:06:49 GMT
   Jeremy Tyson (tyson): Approved for 1257 Head
2. Wed, 07 Oct 2020 15:10:03 GMT
   Kelly Ritter (ritterk): Approved for KV Dean
3. Wed, 07 Oct 2020 15:20:34 GMT
   Brenda Clevenger (bmclvngr): Approved for COTE
4. Wed, 07 Oct 2020 15:26:44 GMT
   Kathy Martensen (kmartens): Approved for Provost
5. Wed, 07 Oct 2020 20:32:52 GMT
   Deb Forgacs (dforgacs): Approved for Registrar
6. Sat, 10 Oct 2020 08:53:17 GMT
   system: Approved for Banner

History

1. Oct 10, 2020 by Alison Champion (abc)

Viewing:MATH 257 : Linear Algebra with Computational Applications

Changes proposed by: Alison Champion

General Information
Effective Term:

Fall 2021

College:

Liberal Arts & Sciences

Department/Unit Name (ORG Code):

Mathematics (1257)

Course Subject:

Mathematics (MATH)

Course Number:

257

Course Title:

Linear Algebra with Computational Applications

Abbreviated Title:

Linear Algebra w Computat Appl

Course Description:

Introductory course incorporating linear algebra concepts with computational tools, with real world applications to science, engineering and data science. Topics include linear equations, matrix operations, vector spaces, linear transformations, eigenvalues, eigenvectors, inner products and norms, orthogonality, linear regression, equilibrium, linear dynamical systems and the singular value decomposition.

Justification

Justification for change:

This course was developed in cooperation with Grainger College of Engineering to allow undergraduates to use linear algebra at an earlier stage in their studies and also to incorporate modern computational tools. It contains much of the material from MATH 415 but with computational tools and data science topics. It covers applications and topics not included in MATH 225.

In the future, MATH 257 will replace the MATH 415 requirement in many science and engineering curricula, and it will become a second choice or a replacement in curricula which currently require MATH 225, including most CS+X curricula.

Please Note: a syllabus is required for General Education review:

MATH257 Syllabus.pdf

Course Information

Course Credit

Undergraduate:

3

Registrar Use Only:

Banner Credit:

3

Billable Hours:

3

Grading Type

Letter Grade

Available for DFR:

No

Repeatability
No

Credit Restrictions
Credit Restrictions:

Credit is not given for both MATH 257 and any of MATH 125, MATH 225, MATH 227, MATH 415 or ASRM 406.

Advisory Statements
MATH 220 or MATH 221; CS 101 or equivalent programming experience.

Cross-listing

Class Schedule Information

Fees
No

Course Description in the Catalog Entry
This is how the above information will be represented in the Catalog:

Introductory course incorporating linear algebra concepts with computational tools, with real world applications to science, engineering and data science. Topics include linear equations, matrix operations, vector spaces, linear transformations, eigenvalues, eigenvectors, inner products and norms, orthogonality, linear regression, equilibrium, linear dynamical systems and the singular value decomposition. Course Information: Credit is not given for both MATH 257 and any of MATH 125, MATH 225, MATH 227, MATH 415 or ASRM 406. Students must register for a lecture, a lab, and a discussion section. Prerequisite: MATH 220 or MATH 221; CS 101 or equivalent programming experience.

Additional Course Notes
Students must register for a lecture, a lab, and a discussion section.

Course Detail
Frequency of course:

Every Fall
Every Spring
Every Summer

Duration of the course

Full

Anticipated Enrollment:

800

Expected distribution of student registration:

Freshman:
30 %

Sophomore:
50 %

Junior:
10 %

Senior:
10 %

General Education

Additional Course Information

Does this course replace an existing course?

No

Does this course impact other courses?

Yes

Specify the courses affected:

MATH 125, MATH 225, MATH 415, ASRM 406 credit restrictions. This course may also serve as prerequisite for courses currently listing MATH 415 as a prerequisite, both within and outside of MATH rubric courses.

Does the addition of this course impact the departmental curriculum?

No

Has this course been offered as a special topics or other type of experimental course?

Yes

Please indicate the Banner subject, course number, section ID, term and enrollment for each offering:

MATH 299 E1 add-on to Math 415 in Spring 2020, 24;
MATH 415 PL1, Fall 2020, 280.

Will this course be offered on-line?

Face-to-Face

Faculty members who will teach this course:

Philipp Hieronymi

Course ID:

1012152

Course Edits Proposed by:

Philipp Hieronymi

Key: 12299

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Department of Mathematics

273 Altgeld Hall, MC-382
1409 West Green Street
Urbana, IL 61801

Re: Use of Math 257 in Computer Science and related programs

The Mathematics Department, working with the Grainger College of Engineering, has recently created the course MATH 257, *Linear Algebra with Computational Applications*. Quoting from the justification of the approved proposal, "In the future, MATH 257 will replace the MATH 415 requirement in many science and engineering curricula." With this in mind, the department would be pleased to have Computer Science add MATH 257 as a linear algebra option in their programs, specifically in:

10KP0112BS: Computer Science, BS
10KV1438BSLA: Mathematics & Computer Science, BSLAS
10KV0464BSLA: Statistics & Computer Science, BSLAS
10KV5348BSLA: Computer Science & Anthropology, BSLAS
10KV5349BSLA: Computer Science & Astronomy, BSLAS
10KV5350BSLA: Computer Science & Chemistry, BSLAS
10KV5351BSLA: Computer Science & Linguistics, BSLAS
10KV5667BSLA: Computer Science & Economics, BSLAS
10KV5676BSLA: Computer Science & Geography & Geographic Information Science, BSLAS
10KV5679BSLA: Computer Science & Philosophy, BSLAS
10KR5639BS: Computer Science + Music, BS
10KT5673BS: Computer Science & Advertising, BS
10KL5864BS: Computer Science & Animal Sciences, BS
10KL5623BS: Computer Science + Crop Sciences, BS
JP: 10KL5890BS & 1PKS5890MANS: JP: Computer Science & Animal Sciences, BS & Animal Science, MANSC
JP: 10KL5890BS & 1PKS5890MANS(MANU): JP: Computer Science & Animal Sciences, BS & Animal Science, MANSC
JP:10KL5903BS & 10KS5903MS: JP: Computer Science + Crop Sciences, BS & Crop Sciences, MS

As the Mathematics department is reallocating instructional resources from Math 415 to Math 257 as the need shifts, this will not cause any undue difficulties for Mathematics resources.

Sincerely

Randy McCarthy

Randy McCarthy
Professor of Mathematics
Dir of Undergraduate Studies in Math
rmccrthy@illinois.edu

telephone 217-333-3350 • *fax* 217-333-9576
email office@math.uiuc.edu • *url* http://www.math.uiuc.edu/

Key

GREEN HIGHLIGHT = Course addition, requirement replacement or updated hours

RED HIGHLIGHT = Course to be removed from listed requirements.

Current Requirc	Current Hours	
CS 100	Freshman Orientation (recommended) 1	1
CS 125	Introduction to Computer Science	4
CS 126	Software Design Studio	3
CS 173	Discrete Structures	3
CS 225	Data Structures	4
CS 233	Computer Architecture	4
CS 241	System Programming	4
Choose one of the following:		3
STAT 200	Statistical Analysis	
STAT 212	Biostatistics	
CS 361	Probability & Statistics for Computer Science (recommended)	
CS 374	Introduction to Algorithms & Models of Computation	4
CS 421	Programming Languages & Compilers	3 or 4
Mathematics (may also fulfill the General Education QR I and II requirements)		
MATH 220 or MATH 221	Calculus Calculus I	5
MATH 225	Introductory Matrix Theory	3
MATH 231	Calculus II	

Revised Requir	Revised Hours	
CS 100	Freshman Orientation (recommended) 1	1
CS 124	Introduction to Computer Science I	3
CS 128	Introduction to Computer Science II	3
CS 173	Discrete Structures	3
CS 225	Data Structures	4
CS 222	Software Design Lab	1
Choose one of the following combinations:		8 to 11
CS 233 & CS 241	Computer Architecture System Programming	
OR		
CS 240 & Two CS 4XX	Introduction to Computer Systems Any two (2) 400-level CS courses above CS 403, excluding CS 421 and CS 491. These two courses must be distinct from all other courses used to fulfill program requirements or options.	
Choose one of the following:		3
STAT 200	Statistical Analysis	
STAT 212	Biostatistics	
CS 361	Probability & Statistics for Computer Science (recommended)	
CS 374	Introduction to Algorithms & Models of Computation	4
CS 421	Programming Languages & Compilers	3 or 4
Mathematics (may also fulfill the General Education QR I and II requirements)		
MATH 220 or MATH 221	Calculus Calculus I	5
MATH 225 or MATH 257	Introductory Matrix Theory Linear Algebra with Computational Applications	2 or 3
MATH 231	Calculus II	

No change in the Economics coursework

10KV5679BSLA: COMPUTER SCIENCE & PHILOSOPHY, BSLAS

Completed Workflow

1. U Program Review (dforgacs@illinois.edu; eastuby@illinois.edu; aledward@illinois.edu)
2. 1715 Head (ksanders@illinois.edu)
3. KV Dean (las-catalog@illinois.edu)
4. University Librarian (jpwilkin@illinois.edu)
5. Provost (kmartens@illinois.edu)
6. Senate EPC (bjlehman@illinois.edu; moorhouz@illinois.edu; kmartens@illinois.edu)
7. Senate (jtempel@illinois.edu)
8. U Senate Conf (none)

Approval Path

1. Mon, 13 Jan 2020 17:00:56 GMT
   Deb Forgacs (dforgacs): Approved for U Program Review
2. Mon, 13 Jan 2020 17:18:01 GMT
   Kirk Sanders (ksanders): Approved for 1715 Head
3. Mon, 13 Jan 2020 17:21:56 GMT
   Kelly Ritter (ritterk): Approved for KV Dean
4. Mon, 13 Jan 2020 17:41:06 GMT
   John Wilkin (jpwilkin): Approved for University Librarian
5. Mon, 13 Jan 2020 18:13:55 GMT
   Kathy Martensen (kmartens): Approved for Provost
6. Wed, 29 Jan 2020 17:03:14 GMT
   Barbara Lehman (bjlehman): Approved for Senate EPC
7. Wed, 12 Feb 2020 22:22:39 GMT
   Jennifer Roether (jtempel): Approved for Senate
8. Wed, 26 Feb 2020 23:42:41 GMT
   Kathy Martensen (kmartens): Approved for U Senate Conf

History

1. Mar 22, 2019 by Deb Forgacs (dforgacs)
2. Feb 26, 2020 by Kelly Ritter (ritterk)

Date Submitted:Wed, 07 Apr 2021 13:07:42 GMT

Viewing:10KV5679BSLA : Computer Science & Philosophy, BSLAS

Changes proposed by: Kelly Ritter

Proposal Type

Proposal Type:

Major (ex. Special Education)

This proposal is for a:

Revision

Proposal Title:

If this proposal is one piece of a multi-element change please include the other impacted programs here.*example: A BS revision with multiple concentration revisions*

Administrative approval: Revisions to the BSLAS in Computer Science & Philosophy, College of Liberal Arts & Sciences

EP Control Number

EP.21.115

Official Program Name

Computer Science & Philosophy, BSLAS

Effective Catalog Term

Fall 2021

Sponsor College

Liberal Arts & Sciences

Sponsor Department

Philosophy

Sponsor Name

Kirk Sanders

Sponsor Email

ksanders@illinois.edu

College Contact

Kelly Ritter

College Contact Email

ritterk@illinois.edu

Program Description and Justification

Justification for proposal change:

In the CS component, the proposal involves changes to three aspects. The first is a reorganization of the material in the introductory course sequence. The second is adding an alternative to the require systems programming courses, allowing for the flexibility to choose two elective courses in computer science at the senior level. The third is to incorporate an option of a new linear algebra course, MATH 257, into the linear algebra requirement for the program.
These changes are broadly shared, with some degree-specific modifications the suite of undergraduate programs including Computer Science:
10KP0112BS: Computer Science, BS
10KL5623BS: Computer Science + Crop Sciences, BS
10KL5864BS: Computer Science & Animal Sciences, BS

10KR5639BS: Computer Science + Music, BS
10KT5673BS: Computer Science & Advertising, BS
10KV0464BSLA: Statistics & Computer Science, BSLAS
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10KV5349BSLA: Computer Science & Astronomy, BSLAS
10KV5350BSLA: Computer Science & Chemistry, BSLAS
10KV5351BSLA: Computer Science & Linguistics, BSLAS
10KV5667BSLA: Computer Science & Economics, BSLAS
10KV5676BSLA: Computer Science & Geography & Geographic Information Science, BSLAS
10KV5679BSLA: Computer Science & Philosophy, BSLAS
JP. 10KL5890BS & 1PKS5890MANS: JP. Computer Science & Animal Sciences, BS & Animal Science, MANSC
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JP.10KL5903BS & 10KS5903MS: JP. Computer Science + Crop Sciences, BS & Crop Sciences, MS
In more detail,
1) (CS 125(4cr) Introduction to Computer Science + CS 126(3cr) Software Design Studio) -> (CS 124(3cr) Introduction to Computer Science I + CS 128(3cr) Introduction to Computer Science II + CS 222(1cr) Software Design Lab), CS 242(3cr) Programming Studio -> CS 222(1cr) Software Design Lab, the CS 225 Data Structures prerequisite of CS 125 is replaced with (CS 126 or CS 128) as the programming prerequisite, CS 128 is open to all, CS 222 is restricted to &CS+ programs. The programming prerequisite for CS 173 is changed from CS 125 to (CS 124 or CS 125).
Justification: CS 128 takes about 2/3 of the material from old CS 126 and receives an hour from the old CS 125 topics, with the remaining topics remaining with CS 124. Replacing CS 126 with CS 128 makes the path to CS 225 uniform for all students (except ECE), including &CS+ majors, students wanting to transfer into one of the &CS+, students doing minors and students needing CS 225 to complete a concentration. It also allows CS 225 to start with an assumption that all students know how to program in C++, and assures all students in the class have a common programming background. Further, the new CS 128 will provide an extended ability for general students to increase their skills in programming and structured program design and development, but without the more specialized material in Data Structures. Adding CS 222 and removing CS 242 eliminates the attempt to discriminate between how students entering as freshmen versus as transfers take the code review class.
2) Change the requirements of CS 233(4cr) Computer Architecture and CS 241(4 cr) System Programming to the student's choice or (CS 233 and CS 241) or (CS 240(3 cr) Introduction to Computer Systems and two 400-level CS courses (not including CS 491))
Justification: This option is already a possibility in several of the CS+X degree programs and it allows students in Computer Science + Philosophy to customize their program to better focus on the aspects of CS that impact the areas of Philosophy most in line with their interests.

3) Change the linear algebra requirement from MATH 225 to (Math 225 or Math 257).

Justification: The Math department is developing MATH 257 as the eventual replacement for MATH 415, with the same theoretical content, but with an emphasis on using programming to perform matrix operations instead of calculating them on paper. Students in Philosophy and Computer Science should have the option of a stronger linear algebra class with stronger ties to programming.

Corresponding Degree

BSLAS Bachelor of Science in Liberal Arts and Sciences

Is this program interdisciplinary?

Yes

Interdisciplinary Colleges and Departments (list other colleges/departments which are involved other than the sponsor chose above)

College

Grainger College of Engineering

Department

Computer Science

Do you need to add an additional interdisciplinary relationship?

No

Academic Level

Undergraduate

Will you admit to the concentration directly?

No

Is a concentration required for graduation?

No

CIP Code

110199 - Computer and Information Sciences, Other.

Is This a Teacher Certification Program?

No

Will specialized accreditation be sought for this program?

No

Admission Requirements

Desired Effective Admissions Term

Fall 2021

Is this revision a change to the admission status of the program?

No

Provide a brief narrative description of the admission requirements for this program. Where relevant, include information about licensure requirements, student background checks, GRE and TOEFL scores, and admission requirements for transfer students.

N/A

Describe how critical academic functions such as admissions and student advising are managed.

N/A

Enrollment

Describe how this revision will impact enrollment and degrees awarded.

The department does not anticipate any impact to enrollment or degrees awarded.

Estimated Annual Number of Degrees Awarded

What is the matriculation term for this program?

Fall

What is the typical time to completion of this program?

4 years

What are the minimum Total Credit Hours required for this program?

120

Delivery Method

Is this program available on campus and online?

No

This program is available:

On Campus

Budget

Are there budgetary implications for this revision?

No

Will the program or revision require staffing (faculty, advisors, etc.) beyond what is currently available?

No

Resource Implications

Facilities

Will the program require new or additional facilities or significant improvements to already existing facilities?

No

Technology

Will the program need additional technology beyond what is currently available for the unit?

No

Non-Technical Resources

Will the program require additional supplies, services or equipment (non-technical)?

No

Resources

For each of these items, be sure to include in the response if the proposed new program or change will result in replacement of another program(s). If so, which program(s), what is the anticipated impact on faculty, students, and instructional resources? Please attach any letters of support/ acknowledgement from faculty, students, and/or other impacted units as appropriate.

Attach File(s)

CS_letter_Math_257.pdf

Faculty Resources

Please address the impact on faculty resources including any changes in numbers of faculty, class size, teaching loads, student-faculty ratios, etc. Describe how the unit will support student advising, including job placement and/or admission to advanced studies.

N/A

Library Resources

Describe your proposal's impact on the University Library's resources, collections, and services. If necessary please consult with the appropriate disciplinary specialist within the University Library.

The proposed revisions should not have any effect on University Library resources.

Instructional Resources

Will there be any reduction in other course offerings, programs or concentrations by your department as a result of this new program/proposed change?

No

Does the program include other courses/subjects impacted by the creation/revision of this program?

No

Financial Resources

How does the unit intend to financially support this proposal?

No new financial resources are required for implementation of the proposed changes.

Will the unit need to seek campus or other external resources?

No

Are you seeking a change in the tuition rate or differential for this program?

No

Program Regulation and Assessment

Briefly describe the plan to assess and improve student learning, including the program's learning objectives; when, how, and where these learning objectives will be assessed; what metrics will be used to signify student's achievement of the stated learning objectives; and the process to ensure assessment results are used to improve student learning. (Describe how the program is aligned with or meets licensure, certification, and/or entitlement requirements, if applicable).

The proposed revisions do not affect any changes in existing assessment plans or metrics.

Is the career/profession for graduates of this program regulated by the State of Illinois?

No

Program of Study

"Baccalaureate degree requires at least 120 semester credit hours or 180 quarter credit hours and at least 40 semester credit hours (60 quarter credit hours) in upper division courses" (source: https://www.ibhe.org/assets/files/PrivateAdminRules2017.pdf). For proposals for new bachelor's degrees, if this minimum is not explicitly met by specifically-required 300- and/or 400-level courses, please provide information on how the upper-division hours requirement will be satisfied.

All proposals must attach the new or revised version of the Academic Catalog program of study entry. Contact your college office if you have questions.

Revised programs

MATH 257 option to 225.pdf
CS PHIL revisions side-by-side comparative table April2021.xlsx

Attach a side-by-side comparison with the existing program AND, if the revision references or adds "chose-from" lists of courses students can select from to fulfill requirements, a listing of these courses, including the course rubric, number, title, and number of credit hours.

Catalog Page Text

Statement for Programs of Study Catalog

General education:Students must complete the Campus General Education (https://courses.illinois.edu/)**requirements including the campus general education language requirement.**
Minimum required major and supporting course work:Normally equates to 71-73 hours. Twelve hours of 300- and 400-level Philosophy courses must be taken on this campus.
Minimum hours required for graduation:120 hours

Code	Title	Hours
Required Computer Science Courses		
CS 100	Freshman Orientation (recommended)[1]	1
CS 125	Introduction to Computer Science	4
CS 126	Software Design Studio	3
CS 124	Introduction to Computer Science I	3
CS 128	Introduction to Computer Science II	3
CS 173	Discrete Structures	3
CS 225	Data Structures	4
CS 222	Software Design Lab	1
Choose one of the following combinations		8-11
CS 233 & CS 241	Computer Architecture and System Programming	
CS 241	System Programming	4
OR		
CS 240	Introduction to Computer Systems	
& two CS courses at the 400 level aboveCS 403, excludingCS 421andCS 491. These two courses must be distinct from all other courses used to fulfill program requirements or options.		
Choose one of the following:		
STAT 200	Statistical Analysis	
STAT 212	Biostatistics	
CS 361	Probability & Statistics for Computer Science	
CS 374	Introduction to Algorithms & Models of Computation	4
CS 421	Programming Languages & Compilers	3
Mathematics (may also fulfill the General Education Quantitative Reasoning I and II requirements)		
MATH 220	Calculus	4-5
or MATH 221	Calculus I	
MATH 225	Introductory Matrix Theory	2 or 3
or MATH 257	Linear Algebra with Computational Applications	
MATH 231	Calculus II	3
Required Philosophy coursework		
PHIL 222	Philosophical Foundations of Computer Science	3
PHIL 223	Minds & Machines	3
PHIL 421	Ethical Theories	3
Choose one of the following:		3
PHIL 426	Metaphysics	
PHIL 430	Theory of Knowledge	
Choose one of the following:		3
PHIL 425	Philosophy of Mind	
PHIL 438	Philosophy of Language	
PHIL 439	Philosophy of Mathematics	
PHIL 477	Philosophy of Psychology	
PHIL 454	Advanced Symbolic Logic	3
PHIL 499	Capstone Seminar	3

In consultation with an advisor, choose at least 9 additional hours of coursework in philosophy, with at least 6 of those hours being at the 300- or 400-level.	9
Total Hours	68-74

[1] *CS 100 is an orientation course aimed at first-year students, so students who declare the major after the freshman year are not required to complete it.*

EP Documentation

DMI Documentation

Banner/Codebook Name

BSLAS: Comp Sci & Phil - UIUC

Program Code:

10KV5679BSLA

Degree Code

BSLAS

Major Code

5679

Program Reviewer Comments

Kathy Martensen (kmartens) (Thu, 08 Apr 2021 22:02:59 GMT): Administrative approval: No change to total hours required/restriction of options.

Key: 287

MATH 257: LINEAR ALGEBRA WITH COMPUTATIONAL APPLICATIONS

Completed Workflow

1. 1257 Head (tyson@illinois.edu)
2. KV Dean (las-catalog@illinois.edu)
3. COTE (bmclvngr@illinois.edu)
4. Provost (kmartens@illinois.edu)
5. Registrar (fms-catalog@illinois.edu)
6. Banner (fms-catalog@illinois.edu)

Approval Path

1. Fri, 11 Sep 2020 16:06:49 GMT
   Jeremy Tyson (tyson): Approved for 1257 Head
2. Wed, 07 Oct 2020 15:10:03 GMT
   Kelly Ritter (ritterk): Approved for KV Dean
3. Wed, 07 Oct 2020 15:20:34 GMT
   Brenda Clevenger (bmclvngr): Approved for COTE
4. Wed, 07 Oct 2020 15:26:44 GMT
   Kathy Martensen (kmartens): Approved for Provost
5. Wed, 07 Oct 2020 20:32:52 GMT
   Deb Forgacs (dforgacs): Approved for Registrar
6. Sat, 10 Oct 2020 08:53:17 GMT
   system: Approved for Banner

History

1. Oct 10, 2020 by Alison Champion (abc)

Viewing:MATH 257 : Linear Algebra with Computational Applications

Changes proposed by: Alison Champion

General Information
Effective Term:

Fall 2021

College:

Liberal Arts & Sciences

Department/Unit Name (ORG Code):

Mathematics (1257)

Course Subject:

Mathematics (MATH)

Course Number:

257

Course Title:

Linear Algebra with Computational Applications

Abbreviated Title:

Linear Algebra w Computat Appl

Course Description:

Introductory course incorporating linear algebra concepts with computational tools, with real world applications to science, engineering and data science. Topics include linear equations, matrix operations, vector spaces, linear transformations, eigenvalues, eigenvectors, inner products and norms, orthogonality, linear regression, equilibrium, linear dynamical systems and the singular value decomposition.

Justification

Justification for change:

This course was developed in cooperation with Grainger College of Engineering to allow undergraduates to use linear algebra at an earlier stage in their studies and also to incorporate modern computational tools. It contains much of the material from MATH 415 but with computational tools and data science topics. It covers applications and topics not included in MATH 225.

In the future, MATH 257 will replace the MATH 415 requirement in many science and engineering curricula, and it will become a second choice or a replacement in curricula which currently require MATH 225, including most CS+X curricula.

Please Note: a syllabus is required for General Education review:

MATH257 Syllabus.pdf

Course Information

Course Credit

Undergraduate:

3

Registrar Use Only:

Banner Credit:

3

Billable Hours:

3

Grading Type

Letter Grade

Available for DFR:

No

Repeatability
No

Credit Restrictions
Credit Restrictions:

Credit is not given for both MATH 257 and any of MATH 125, MATH 225, MATH 227, MATH 415 or ASRM 406.

Advisory Statements
MATH 220 or MATH 221; CS 101 or equivalent programming experience.

Cross-listing

Class Schedule Information

Fees
No

Course Description in the Catalog Entry
This is how the above information will be represented in the Catalog:

Introductory course incorporating linear algebra concepts with computational tools, with real world applications to science, engineering and data science. Topics include linear equations, matrix operations, vector spaces, linear transformations, eigenvalues, eigenvectors, inner products and norms, orthogonality, linear regression, equilibrium, linear dynamical systems and the singular value decomposition. Course Information: Credit is not given for both MATH 257 and any of MATH 125, MATH 225, MATH 227, MATH 415 or ASRM 406. Students must register for a lecture, a lab, and a discussion section. Prerequisite: MATH 220 or MATH 221; CS 101 or equivalent programming experience.

Additional Course Notes
Students must register for a lecture, a lab, and a discussion section.

Course Detail
Frequency of course:

Every Fall
Every Spring
Every Summer

Duration of the course

Full

Anticipated Enrollment:

800

Expected distribution of student registration:

Freshman:
30 %

Sophomore:
50 %

Junior:
10 %

Senior:
10 %

General Education

Additional Course Information

Does this course replace an existing course?

No

Does this course impact other courses?

Yes

Specify the courses affected:

MATH 125, MATH 225, MATH 415, ASRM 406 credit restrictions. This course may also serve as prerequisite for courses currently listing MATH 415 as a prerequisite, both within and outside of MATH rubric courses.

Does the addition of this course impact the departmental curriculum?

No

Has this course been offered as a special topics or other type of experimental course?

Yes

Please indicate the Banner subject, course number, section ID, term and enrollment for each offering:

MATH 299 E1 add-on to Math 415 in Spring 2020, 24;
MATH 415 PL1, Fall 2020, 280.

Will this course be offered on-line?

Face-to-Face

Faculty members who will teach this course:

Philipp Hieronymi

Course ID:

1012152

Course Edits Proposed by:

Philipp Hieronymi

Key: 12299

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Department of Mathematics

273 Altgeld Hall, MC-382
1409 West Green Street
Urbana, IL 61801

Re: Use of Math 257 in Computer Science and related programs

The Mathematics Department, working with the Grainger College of Engineering, has recently created the course MATH 257, *Linear Algebra with Computational Applications*. Quoting from the justification of the approved proposal, "In the future, MATH 257 will replace the MATH 415 requirement in many science and engineering curricula." With this in mind, the department would be pleased to have Computer Science add MATH 257 as a linear algebra option in their programs, specifically in:

10KP0112BS: Computer Science, BS
10KV1438BSLA: Mathematics & Computer Science, BSLAS
10KV0464BSLA: Statistics & Computer Science, BSLAS
10KV5348BSLA: Computer Science & Anthropology, BSLAS
10KV5349BSLA: Computer Science & Astronomy, BSLAS
10KV5350BSLA: Computer Science & Chemistry, BSLAS
10KV5351BSLA: Computer Science & Linguistics, BSLAS
10KV5667BSLA: Computer Science & Economics, BSLAS
10KV5676BSLA: Computer Science & Geography & Geographic Information Science, BSLAS
10KV5679BSLA: Computer Science & Philosophy, BSLAS
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10KT5673BS: Computer Science & Advertising, BS
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10KL5623BS: Computer Science + Crop Sciences, BS
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JP:10KL5903BS & 10KS5903MS: JP: Computer Science + Crop Sciences, BS & Crop Sciences, MS

As the Mathematics department is reallocating instructional resources from Math 415 to Math 257 as the need shifts, this will not cause any undue difficulties for Mathematics resources.

Sincerely

Randy McCarthy

Randy McCarthy
Professor of Mathematics
Dir of Undergraduate Studies in Math
rmccrthy@illinois.edu

telephone 217-333-3350 • *fax* 217-333-9576
email office@math.uiuc.edu • *url* http://www.math.uiuc.edu/

Key

GREEN HIGHLIGHT = Course addition, requirement replacement or updated hours

RED HIGHLIGHT = Course to be removed from listed requirements.

Current Requirc	Current Hours	
CS 100	Freshman Orientation (recommended) 1	1
CS 125	Introduction to Computer Science	4
CS 126	Software Design Studio	3
CS 173	Discrete Structures	3
CS 225	Data Structures	4
CS 233	Computer Architecture	4
CS 241	System Programming	4
Choose one of the following:		3
STAT 200	Statistical Analysis	
STAT 212	Biostatistics	
CS 361	Probability & Statistics for Computer Science (recommended)	
CS 374	Introduction to Algorithms & Models of Computation	4
CS 421	Programming Languages & Compilers	3 or 4
Mathematics (may also fulfill the General Education QR I and II requirements)		
MATH 220 or MATH 221	Calculus Calculus I	5
MATH 225	Introductory Matrix Theory	3
MATH 231	Calculus II	

Revised Requir	Revised Hours	
CS 100	Freshman Orientation (recommended) 1	1
CS 124	Introduction to Computer Science I	3
CS 128	Introduction to Computer Science II	3
CS 173	Discrete Structures	3
CS 225	Data Structures	4
CS 222	Software Design Lab	1
Choose one of the following combinations: CS 233 & CS 241 OR CS 240 & Two CS 4XX	Computer Architecture System Programming Introduction to Computer Systems Any two (2) 400-level CS courses above CS 403, excluding CS 421 and CS 491. These two courses must be distinct from all other courses used to fulfill program requirements or options.	8 to 11
Choose one of the following:		3
STAT 200	Statistical Analysis	
STAT 212	Biostatistics	
CS 361	Probability & Statistics for Computer Science (recommended)	
CS 374	Introduction to Algorithms & Models of Computation	4
CS 421	Programming Languages & Compilers	3 or 4
Mathematics (may also fulfill the General Education QR I and II requirements)		
MATH 220 or MATH 221	Calculus Calculus I	5
MATH 225 or MATH 257	Introductory Matrix Theory Linear Algebra with Computational Applications	2 or 3
MATH 231	Calculus II	

No change in the Philosophy coursework

Re: Proposed revisions to the PHIL side of CS+PHIL

Gunter, Elsa

Sun 11/3/2019 6:22 PM

To: Sanders, Kirk <ksanders@illinois.edu>
Cc: Foster, Christy Ann <foste@illinois.edu>

Dear Kirk,

I have reviewed and approve the proposed revision to the Philosophy of the CS+Philosophy BSLAS degree program.

---Elsa

--
Elsa L Gunter
Research Professor
Director of Undergraduate Programs
Department of Computer Science
University of Illinois at Urbana - Champaign