APPROVED BY SENATE
02/10/2020

Date Submitted: 01/07/20 11:21 am

Viewing: 10KP0112BS : Computer Science, BS

Last approved: 08/12/19 8:32 am

Last edit: 01/22/20 2:48 pm

Changes proposed by: Brooke Newell

Catalog Pages Using this Program	Computer Science, BS

In Workflow

1. **U Program Review**
2. **1434 Head**
3. **KP Committee Chair**
4. **KP Dean**
5. **University Librarian**
6. **Provost**
7. **Senate EPC**
8. Senate
9. U Senate Conf
10. Board of Trustees
11. IBHE
12. DMI

Approval Path

1. 01/07/20 11:51 am
   Deb Forgacs (dforgacs): Approved for U Program Review
2. 01/08/20 10:53 pm
   Elsa Gunter (egunter): Approved for 1434 Head
3. 01/10/20 8:45 am
   Michael Hirschi (mch): Approved for KP Committee Chair
4. 01/10/20 8:48 am
   Candy Deaville (candyd): Approved for KP Dean
5. 01/10/20 9:47 am
   John Wilkin

(jpwilkin): Approved for University Librarian
6. 01/13/20 11:27 am
Kathy Martensen (kmartens): Rollback to KP Committee Chair for Provost
7. 01/13/20 11:54 am
Michael Hirschi (mch): Approved for KP Committee Chair
8. 01/13/20 12:35 pm
Candy Deaville (candyd): Approved for KP Dean
9. 01/13/20 12:38 pm
John Wilkin (jpwilkin): Rollback to KP Dean for University Librarian
10. 01/13/20 1:25 pm
Candy Deaville (candyd): Approved for KP Dean
11. 01/13/20 3:06 pm
John Wilkin (jpwilkin): Approved for University Librarian
12. 01/22/20 11:05 am
Kathy Martensen (kmartens):

Approved for Provost

History

1. Dec 13, 2018 by Deb Forgacs (dforgacs)
2. Apr 11, 2019 by Deb Forgacs (dforgacs)
3. May 2, 2019 by Deb Forgacs (dforgacs)
4. Aug 9, 2019 by Deb Forgacs (dforgacs)
5. Aug 12, 2019 by Deb Forgacs (dforgacs)

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*

Revised Gen Ed and Elective tables, course lists for technical electives ~~UG course lists~~

EP Control Number	**EP.20.97_original**
Official Program Name	Computer Science, BS
Effective Catalog Term	Fall 2020
Sponsor College	Grainger College of Engineering

Sponsor Department	Computer Science
Sponsor Name	
Sponsor Email	
College Contact	College Contact Email

Program Description and Justification

Justification for proposal change:

Updates for Academic Catalog 2020-21

Corresponding Degree	**BS Bachelor of Science**

Is this program interdisciplinary?

No

Academic Level	Undergraduate
Will you admit to the concentration directly?	
Is a concentration required for graduation?	
CIP Code	110701 - Computer Science.

Is This a Teacher Certification Program?

No

Will specialized accreditation be sought for this program?

No

Admission Requirements

Desired Admissions Term

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.

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

Enrollment

Describe how this revision will impact enrollment and degrees awarded.

None.

Estimated Annual Number of Degrees Awarded

Year One Estimate	5th Year Estimate (or when fully implemented)

What is the matriculation term for this program?

Fall

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

Additional Budget Information

Attach File(s)

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

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.

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.

None.

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 this new program/proposed change result in the replacement of another program?

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?

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

No

Attach letters of support

Will an existing tuition rate be used or continue to be used 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).

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 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.

Statement for Programs of Study Catalog

Graduation Requirements

Minimum Technical GPA: 2.0

TGPA is required for CS and Math courses. See Technical GPA to clarify requirements.

Minimum Overall GPA: 2.0

Minimum hours required for graduation: 128 hours

General education: Students must complete the Campus General Education requirements including the campus general education language requirement.

~~**Overview of Curricular Requirements The curriculum requires 128 hours for graduation and is organized as shownbelow.Orientation and Professional Development These courses introduce the opportunities and resources your college, department, and curriculum can offer you as you work to achieve your careergoals.They also provide the skills to work effectively and successfully in the engineeringprofession.**~~**Orientation** ~~**Foundational Mathematics**~~ **and Professional Development**

Course List

Code	Title	Hours
CS 100	Freshman Orientation (optional course highly recommended may be used to help meet free elective requirements) 1	1
CS 210	Ethical & Professional Issues	2
ENG 100	Engineering Orientation 1	0
Total Hours		3

Foundational Mathematics and Science

Course List

Code	Title	Hours
Total Hours chosen from the following:		25
MATH 221	Calculus I 2	4
MATH 231	Calculus II	3
MATH 241	Calculus III	4
MATH 415	Applied Linear Algebra	3
PHYS 211	University Physics: Mechanics	4
PHYS 212	University Physics: Elec & Mag	4
Science elective, from departmentally approved list below:		3
AE 202	Aerospace Flight Mechanics	3
ANTH 249	Evolution and Human Disease	3
ASTR 210	Introduction to Astrophysics	3
ASTR 350	The Big Bang, Black Holes, and the End of the Universe	3
ATMS 100	Introduction to Meteorology	3
ATMS 120	Severe and Hazardous Weather	3
ATMS 140	Climate and Global Change	3
ATMS 201	General Physical Meteorology	3
BIOE 205	Signals & Systems in Bioengrg	3
BIOE 206	Cellular Bioengineering	3
CEE 201	Systems Engrg & Economics	3
CEE 202	Engineering Risk & Uncertainty	3
CHEM 102	General Chemistry I	3
CHEM 103	General Chemistry Lab I	1
CPSC 112	Introduction to Crop Sciences	4
CPSC 265	Genetic Engineering Lab	3
CPSC 270	Applied Entomology	3
DANC 345	Dance Anatomy and Kinesiology	3
FSHN 101	The Science of Food and How it Relates to You	3
FSHN 120	Contemporary Nutrition	3
GEOL 107	Physical Geology	4
GEOL 111	Emergence of Life	3
GEOL 117	The Oceans	3
GEOL 118	Natural Disasters	3
GEOL 143	History of Life	3
GEOL 208	History of the Earth System	4
IB 103	Introduction to Plant Biology	4
IB 104	Animal Biology	4
IB 150	Organismal & Evolutionary Biol	4
KIN 150	Bioscience of Human Movement	3
MCB 150	Molec & Cellular Basis of Life	4
MCB 244	Human Anatomy & Physiology I	3
NPRE 247	Modeling Nuclear Energy System	3
NRES 100	Fundamentals of Env Sci	3
NRES 102	Introduction to NRES	3
PLPA 204	Introductory Plant Pathology	3
PSYC 204	Intro to Brain and Cognition	3

Code	Title	Hours
PSYC 224	Cognitive Psych	3
PSYC 248	Learning and Memory	3
SHS 240	Intro Sound & Hearing Science	3
SHS 280	Communication Neuroscience	3

Computer Science Technical Core

Course List

Code	Title	Hours
CS 125	Intro 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
CS 361	Probability & Statistics for Computer Science	3
CS 357	Numerical Methods I	3
CS 374	Introduction to Algorithms & Models of Computation	4
CS 421	Programming Languages & Compilers	3
Total Hours		35

Technical Electives

Course List

Code	Title	Hours
Technical electives to be chosen from departmentally approved list below. Students select eight courses, at least six of which must be advanced CS courses. Three courses must be selected from one area of CS and at least one course should satisfy the team project requirement.		24
CS 427	Software Engineering I	3 or 4
CS 428	Software Engineering II	3 or 4
CS 429	Software Engineering II, ACP	3
CS 445	Computational Photography (Until Spring 2018)	3 or 4
CS 465	User Interface Design	3 or 4
CS 467	Social Visualization	3 or 4
CS 493	Senior Project II, ACP	3
CS 494	Senior Project II	3
CS 497	CS Team Project	1 to 3
CS 498	Special Topics (Virtual Reality (Spring 2018 and later); Mobile Interactive Design (Spring 2019 and later); Internet of Things (Fall 2019 and later))	1 to 4

Three of the CS courses must be chosen from a single focus area, from among the areas below:

Software Foundations:

Code	Title	Hours
CS 422	Programming Language Design	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 476	Program Verification	3 or 4
CS 477	Formal Software Devel Methods	3 or 4
CS 492	Senior Project I	3
CS 498	Special Topics (Art and Science of Web Programming; Logic; Applied Cryptography; Software Testing)	1 to 4
CS 522	Programming Language Semantics	4
CS 524	Concurrent Progrmg Languages	4
CS 526	Advanced Compiler Construction	4
CS 527	Topics in Software Engineering	4
CS 528	Obj-Oriented Progrmg & Design	4
CS 576	Topics in Automated Deduction	2 to 4
CS 598	Special Topics (Verification; Languages)	2 to 4
Algorithms and Models of Computation:		
CS 413	Intro to Combinatorics	3 or 4
CS 473	Algorithms	4
CS 475	Formal Models of Computation	3 or 4
CS 476	Program Verification	3 or 4
CS 477	Formal Software Devel Methods	3 or 4
CS 481	Advanced Topics in Stochastic Processes & Applications	3 or 4
CS 482	Simulation	3 or 4
CS 498	Special Topics (Logic; Parallel Algorithms; Computational Geometry)	1 to 4
CS 571	Combinatorial Mathematics	4
CS 572	Extremal Graph Theory	4
CS 573	Algorithms	4
CS 574	Randomized Algorithms	4
CS 575	Methods of Combinatorics	4
CS 576	Topics in Automated Deduction	2 to 4
CS 579	Computational Complexity	4

Code	Title	Hours
CS 583	Approximation Algorithms	4
CS 584	Embedded System Verification	4
CS 598	Special Topics (Crypto)	2 to 4
	Intelligence and Big Data:	
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 414	Multimedia Systems	3 or 4
CS 440	Artificial Intelligence	3 or 4
CS 445	Computational Photography	3 or 4
ECE 470	Introduction to Robotics	4
CS 446	Machine Learning	3 or 4
CS 447	Natural Language Processing	3 or 4
CS 466	Introduction to Bioinformatics	3 or 4
CS 467	Social Visualization	3 or 4
CS 498	Special Topics (Data Visualization; Deep Learning; Applied Machine Learning; Social and Info Networks, Theory II (until Fall 2017); AI for Computer Games (until Fall 2017); Cyber Dystopia; Data Science & Analytics (Spring 2018 and after))	1 to 4
CS 510	Advanced Information Retrieval	4
CS 511	Advanced Data Management	4
CS 512	Data Mining Principles	4
CS 543	Computer Vision	4
CS 544	Optimiz in Computer Vision	4
CS 546	Machine Learning in NLP	4
CS 548	Models of Cognitive Processes	4
CS 576	Topics in Automated Deduction	2 to 4
CS 598	Special Topics (Machine Learning and Signal Processing)	2 to 4
	Human and Social Impact:	
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

Code	Title	Hours
CS 467	Social Visualization	3 or 4
CS 468	Tech and Advertising Campaigns	3
CS 498	Special Topics (Art and Science of Web Prog; Computational Advertising; Data Visualization; Applied Machine Learning; HCI; Social and Information Networks; Virtual Reality; Cyber Dystopia; Cyber Physical Systems; Data Science & Analytics (Spring 2018 and after); Smart Cities; Learning and Computer Science; Intro to Online Learning Sys; Mobile Interactive Design)	1 to 4
CS 563	Advanced Computer Security	4
CS 565	Human-Computer Interaction	4
Media:		
CS 414	Multimedia Systems	3 or 4
CS 418	Interactive Computer Graphics	3 or 4
CS 419	Production Computer Graphics	3 or 4
CS 445	Computational Photography	3 or 4
CS 465	User Interface Design	3 or 4
CS 467	Social Visualization	3 or 4
CS 468	Tech and Advertising Campaigns	3
CS 498	Special Topics (Art and Science of Web Prog; Computational Advertising; Virtual Reality; Data Visualization; Audio Computing Lab)	1 to 4
CS 519	Scientific Visualization	4
CS 565	Human-Computer Interaction	4
CS 598	Special Topics (Machine Learning and Signal Proc.)	2 to 4
Scientific, Parallel, and High Perfomance Computing:		
CS 419	Production Computer Graphics	3 or 4
CS 450	Numerical Analysis	3 or 4
CS 457	Numerical Methods II	3
CS 466	Introduction to Bioinformatics	3 or 4
CS 482	Simulation	3 or 4
CS 483	Applied Parallel Programming	4
CS 484	Parallel Programming	3 or 4
CS 498	Special Topics (Parallel Algorithms)	1 to 4
CS 519	Scientific Visualization	4
CS 554	Parallel Numerical Algorithms	4

Code	Title	Hours
CS 555	Numerical Methods for PDEs	4
CS 556	Iterative & Multigrid Methods	4
CS 558	Topics in Numerical Analysis	4
Distributed Systems, Networking, and Security:		
CS 423	Operating Systems Design	3 or 4
CS 424	Real-Time Systems	3 or 4
CS 425	Distributed Systems	3 or 4
CS 431	Embedded Systems	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 460	Security Laboratory	3 or 4
CS 461	Computer Security I	4
CS 463	Computer Security II	3 or 4
CS 483	Applied Parallel Programming	4
CS 484	Parallel Programming	3 or 4
CS 498	Special Topics (Wireless Network Labs; Digital Forensics; Digital Forensics II; Applied Cryptography; Cyber Physical Systems; Internet of Things (Spring 2019 or after); Smart Cities)	1 to 4
CS 523	Advanced Operating Systems	4
CS 524	Concurrent Progrmg Languages	4
CS 525	Advanced Distributed Systems	4
CS 538	Advanced Computer Networks	4
CS 563	Advanced Computer Security	4
Machines:		
CS 423	Operating Systems Design	3 or 4
CS 424	Real-Time Systems	3 or 4
~~CS 426~~	~~Compiler Construction~~	~~3 or 4~~
CS 426	Compiler Construction	3 or 4
CS 431	Embedded Systems	3 or 4

Code	Title	Hours
CS 433	Computer System Organization	3 or 4
CS 484	Parallel Programming	3 or 4
CS 498	**Special Topics (Internet of Things (Spring 2019 and after); Digital Forensics; Digital Forensics II)**	**3 or 4**
CS 523	Advanced Operating Systems	4
CS 526	**Advanced Compiler Construction**	**4**
CS 533	Parallel Computer Architecture	4
CS 536	Fault-Tolerant Dig Syst Design	4
CS 541	Computer Systems Analysis	4
CS 584	Embedded System Verification	4
CS 598	Special Topics (Parallel)	2 to 4

Computer Science Advanced Electives

Course List

Code	Title	Hours
Students must take at least two courses comprising at least 6 hours of 400-level coursework in ANY area offered at the University (including independent study - CS 397 may also be used to count towards these two additional advanced courses). These might be CS courses but don't have to be. Courses must be taken for a letter grade (CS 491 and other seminar courses do not count). It is expected that students will select these additional advanced courses in a way that best augments their program of study. Consultation with faculty mentor is highly encouraged.		6
Total Hours		6

Electives

Course List

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 3		**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		**18**
Total Hours of Curriculum to Graduate		**128**

1

2 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.*

3 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.

4 The Grainger College of Engineering restrictions to free electives can be found here.

~~These courses stress the basic mathematical and scientific principles upon which the engineering discipline is based. Computer Science Technical Core These courses stress fundamental concepts and basic laboratory techniques that comprise the common intellectual understanding of computer~~

science.Technical Electives These courses stress the rigorous analysis and design principles practiced in major subdisciplines of computer science.Students select eight courses, at least six of which must be advanced CS courses. Three courses must be selected from one area of CS and at least one course should satisfy the team project requirement .Computer Science Advanced Electives Students must take at least two courses comprising at least 6 hours of 400-level coursework in ANY area offered at the University (including independent study - CS 397 may also be used to count towards these two additional advanced courses).These might be CS courses but don't have to be.Courses must be taken for a letter grade (CS 491 and other seminar courses do not count).It is expected that students will select these additional advanced courses in a way that best augments their program of study.Consultation with faculty mentor is highly encouraged.General Education Requirements Non-Primary Language Requirement University Composition These courses teach fundamentals of expository writing. Free Electives

Course List

Code	Title	Hours
Free Electives		
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.		18
Total Hours of Curriculum to Graduate		128

Course List

Code	Title	Hours
Choose one:		
RHET 105	Writing and Research	
CMN 111 & CMN 112	Oral & Written Comm I and Oral & Written Comm II	
ESL 111 & ESL 112	Intro to Academic Writing I and Intro to Academic Writing II	
ESL 115	Principles of Academic Writing	

Advanced Composition. May be satisfied by taking any course in either the liberal education or free elective categories which has the Advanced Composition designation.

Course List

Code	Title	Hours
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.		0-9

Course List

Code	Title	Hours
A minimum of six courses is required, as follows:		18
Social and Behavioral Sciences		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		6
Cultural Studies: Non-Western Cultures (1 course)		
Cultural Studies: U.S. Minorities Cultures (1 course)		
Cultural Studies: Western/Comparative Cultures (1 course)		

EP Documentation

Attach Rollback/Approval Notices

DMI Documentation

Attach Final Approval Notices

Banner/Codebook Name

BS:Computer Science -UIUC

Program Code: 10KP0112BS

Minor Code	Conc Code	Degree Code	BS Major Code
0112			

Senate Approval Date

Senate Conference Approval Date

BOT Approval Date

IBHE Approval Date

Effective Date:

Attached Document

Justification for this request

Program Reviewer Comments

Kathy Martensen (kmartens) (01/13/20 11:27 am): Rollback: Email exchange.
John Wilkin (jpwilkin) (01/13/20 12:38 pm): Rollback: Please provide a statement regarding needs for library resources.

Key: 114

Proposal	Degree	Footnote 1
EP.20.91	BS in Civil Engineering	External transfer students take ENG 300 instead
EP.20.92	BS in Computer Engineering	External transfer students take ENG 300 instead
EP.20.93	BSAG in Agricultural and Biological Engineering	In addition to the Biological and Natural Sciences Elective hours required for Agricultural and Biological Engineering (6 hours), a further 4 hours of biological sciences must be completed to make up a total of 10 hours.
EP.20.94	BS in Agricultural and Biological Engineering	External transfer students take ENG 300 instead
EP.20.95	BS in Agricultural and Biological Engineering: Agricultural Engineering	The extra hour of credit for this course may be used to help meet free elective requirements
EP.20.96	BS in Agricultural and Biological Engineering: Biological Engineering	May be taken for 4 credit hours; the extra hour may be used to help meet free elective requirements
EP.20.97	BS in Computer Science	External transfer students take ENG 300 instead
EP.20.98	BS in Electrical Engineering	External transfer students take ENG 300 instead
EP.20.99	BS in Engineering Mechanics	External transfer students take ENG 300 instead
EP.20.100	BS in Engineering Physics	External transfer students take ENG 300 instead
EP.20.101	BS in Systems Engineering & Design	External transfer students take ENG 300 instead
EP.20.102	BS in Nuclear, Plasma and Radiological Engineering	External transfer students take ENG 300 instead
EP.20.103	BS in Mechanical Engineering	External transfer students take ENG 300 instead
EP.20.104	BS in Materials Science & Engineering	External transfer students take ENG 300 instead
EP.20.105	BS in Industrial Engineering	External transfer students take ENG 300 instead