10KS0329PHD: STATISTICS, PHD

In Workflow

1. U Program Review (dforgacs@illinois.edu; eastuby@illinois.edu; aledward@illinois.edu)
2. 1583 Head (libo@illinois.edu)
3. KV Dean (las-catalog@illinois.edu)
4. University Librarian (jpwilkin@illinois.edu)
5. Grad_College (agrindly@illinois.edu; lowry@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. Fri, 28 Aug 2020 20:51:33 GMT
   Deb Forgacs (dforgacs): Approved for U Program Review
2. Fri, 28 Aug 2020 20:52:59 GMT
   Bo Li (libo): Approved for 1583 Head
3. Tue, 26 Jan 2021 22:33:37 GMT
   Kelly Ritter (ritterk): Approved for KV Dean
4. Tue, 26 Jan 2021 23:03:04 GMT
   John Wilkin (jpwilkin): Approved for University Librarian
5. Fri, 29 Jan 2021 21:58:56 GMT
   Allison McKinney (agrindly): Rollback to KV Dean for Grad_College
6. Tue, 13 Apr 2021 16:39:14 GMT
   Amy Elli (amyelli): Approved for KV Dean
7. Tue, 13 Apr 2021 16:54:48 GMT
   John Wilkin (jpwilkin): Approved for University Librarian
8. Thu, 06 May 2021 19:52:47 GMT
   Allison McKinney (agrindly): Approved for Grad_College
9. Mon, 09 Aug 2021 22:52:44 GMT
   Kathy Martensen (kmartens): Approved for Provost

Date Submitted:Fri, 28 Aug 2020 20:26:34 GMT

Viewing:10KS0329PHD : Statistics, PhD

Changes proposed by: Joseph Zarnsy

This proposal is for a:

Revision

Administration Details

Official Program Name

Statistics, PhD

Sponsor College

Liberal Arts & Sciences

Sponsor Department

Statistics

Sponsor Name

Xiaofeng Shao

Sponsor Email

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College Contact

Kelly Ritter

College Contact Email

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Does this program have inter-departmental administration?

No

Proposal Title

Effective Catalog Term

Fall 2021

Provide a brief, concise description (not justification) of your proposal.

Revision of the Ph.D. degree requirements in the Department of Statistics within the College of Liberal Arts & Sciences

Program Justification

Why are these changes necessary?

With the steady expansion of the department, we now are able to offer some courses specifically tailored for our Ph.D. students who used to learn those topics in the same classes with M.S. students and even undergraduate students. These newly developed courses will provide more rigorous training for our Ph.D. students. In addition, statistics as a discipline has been evolving over time. To adapt to the ongoing change and provide comprehensive training to a new generation of statisticians and data scientists, we need to upgrade our courses and revise the Ph.D. course requirements.

Specifically, we propose the following changes.

1. The regression sequence STAT425-STAT424-STAT426 will be replaced by STAT527-STAT528. The new two-course sequence (i) removes some "easy" contents and therefore is more compact, and (ii) covers some more advanced topics such as LASSO and shrinkage estimators. The old three-course sequence STAT425-424-426 will remain for undergraduate and MS students.

2. The mathematical statistics sequence STAT510-STAT511 were usually taken by our Ph.D. students in their first year. We propose to combine most of the contents of these two courses into one named "STAT511: Advanced Mathematical Statistics", and move some remaining topics to STAT575 (large sample theory, which is required and usually taken by our Ph.D. students in their second year).

Coverage for our Ph.D. qualifying exam, which previously consisted of the old STAT510-STAT511 sequence, needs to be updated too. Now, the STAT511 "Advanced Mathematical Statistics" and some selected topics in STAT575 will be a part of the new qualifying exam.

The new STAT511-STAT575 will be offered each year in the Fall and Spring semesters, respectively, which will enable our Ph.D. students to take them in their first year. This new sequence aims to improve our Ph.D. training by offering a more advanced introduction of mathematical statistics, which will be useful for many contemporary methodological and theoretical research in statistics. More advanced courses such as STAT576 "Weak convergence and empirical processes" will be developed to allow students to get further exposure to more modern theoretical tools, such as empirical processes, in their second year.

3. For computation related courses, we continue to require students to take one out of a list of courses.

We propose to remove STAT428 and STAT530 from the list as those courses are now taught at a level lower than expected due to their large enrollments of undergraduate and MS students.

We propose to add IE521, IE534, CS573, CS574, and CS583 to the list, due to the positive feedback from our Ph.D. students who have taken these courses in the past. We believe exposures to the state-of-the-art computational techniques offered by these courses can enhance our Ph.D. training. Supporting emails from both IE and CS departments are attached.

4. For stochastic processes and time series courses, we continue to require students to take one out of a list of courses.

We propose to remove STAT429 and STAT433 from the list since they are mainly taught at the level for MS and undergraduate students.

We proposed to add STAT556, STAT533, and STAT576 to the list, all of which will be developed in the coming years and aim to cover more advanced materials on stochastic processes and time series.

5. For elective courses, we propose to increase the old 3-course (at least two 500-level courses) requirement to 5-course (all at 500-level), since in our newly proposed Ph.D. curriculum, the number of credit hours for required courses is reduced by 8 (equivalent to two 4-credit courses).

We also update the list of elective courses by removing some 400-level courses and adding some 500-level courses, based on a discussion by all faculty.

6. There is no change with the requirements for Practicum course.

7. The number of credit hours for Thesis and Individual study courses has been changed from 0-32 hours to 0-44 hours to make the total number of hours 96, which is required for our Ph.D. degree.

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

IE 510 - Applied Nonlinear Programming
IE 521 - Convex Optimization
IE 534 - Deep Learning
ECON 536 - Applied Econometrics
ECON 574 - Econometrics I
ECON 575 - Econometrics II
ECON 576 - Time Series

ECON 577 - Topics in Econometrics
CS 512 - Data Mining Principles
CS 543 - Computer Vision
CS 546 - Adv Topics in NLP
CS 573 - Algorithms
CS 574 - Randomized Algorithms
CS 583 - Approximation Algorithms
MATH 540 - Real Analysis
MATH 541 - Functional Analysis
MATH 546 - Hilbert Spaces
MATH 580 - Combinatorial Mathematics
MATH 585 - Probabilistic Combinatorics
MATH 589 - Conjugate Duality and Optim
ECE 543 - Statistical Learning Theory
ECE 547 - Topics in Image Processing
ECE 561 - Statistical Inference ENG & DS
ECE 563 - Information Theory
ECE 566 - Computational Inference
ECE 580 - Optimiz by Vector Space Methds

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

The impact on course enrollment within other units is expected to be minimal. Discussion has taken place with all other affected units and all have been in agreement that having Statistics students within the courses would be of benefit or have minimal impact on the current enrollment and instructions. Courses listed are being added as elective options.

Attach letters of support from other departments.

STAT PhD Revision Supporting Letters.pdf

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).

We will monitor the students' evaluation for all these new and old Ph.D. courses at the end of each semester, To understand students' needs and progress in learning. The annual survey for graduate students who just graduated from Our PhD program also offers an avenue for them to comment on the achievements and potential weakness in our degree program. The PhD committee regularly discusses some of the issues that come up in the admission process and students' progress, and can include These newly developed Ph.D. courses' into discussion in the future to make sure the assessment results are used to improve student learning.

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

STAT PhD Revision Side-by-Side.pdf
STAT PhD Degree Tables entering with BS or MS.docx
State PhD elective course list.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 - Overview Tab

Statement for Programs of Study Catalog

Statistics, PhD

Entering with an approved Baccalaureate degree

Code	Title	Hours
PhD applied regression courses:		
STAT 424	Analysis of Variance	4
STAT 425	Statistical Modeling I	4
STAT 426	Statistical Modeling II	4
STAT 510	Mathematical Statistics	4
STAT 527	Advanced Regression Analysis	4
STAT 528	Advanced Regression Analysis II	4
PhD theory core courses		
STAT 511	Advanced Mathematical Statistics	4
STAT 553	Probability and Measure I	4
STAT 575	Large Sample Theory	4
Practicum course- select one:		**2-4**
STAT 427	Statistical Consulting	
STAT 593	STAT Internship	
STAT 595	Preparing Future Faculty	
Select one Computational Theory and Methods Course:		**4**
STAT 428	Statistical Computing	
Computing-related course- Select one:[1]		**4**
STAT 525	Computational Statistics	
STAT 530	Bioinformatics	
STAT 542	Statistical Learning	
Select one of the Stochastic Processes and Time Series Courses:		**4**
STAT 429	Time Series Analysis	
STAT 433	Stochastic Processes (Stochastic Processes)	
Stochastic processes and time series courses- Select one:		**4**
STAT 533	Advanced Stochastic Processes (Advanced Stochastic Processes)	
STAT 554	Probability and Measure II	
STAT 555/MATH 564	Applied Stochastic Processes	

Select at least 3 elective courses from a list within the department. At leats two courses must be at the 500-level.		**12**
Thesis and Individual Study Courses		**0-32**
STAT 556	Advanced Time Series Analysis	
STAT 576	Empirical Process Theory and Weak Convergence	
Select at least 5 elective courses with at least three 500 level courses, not selected above or from a list of electives maintained by the department.		**20**
Thesis and individual study courses		**0-44**
STAT 590	Individual Study and Research (0-16 hours per term)	
STAT 599	Thesis Research (0-8 hours per term)	
Total Hours		**96**

Other Requirements

Requirement	Description
Prerequisite	MATH 447- Real Variables (*Waived if a course at an equivalent level has been taken at another institution and a grade of B or above is achieved)
Other requirements may overlap	
Required and elective course credits at UIUC	At least 52 hours
Thesis research and individual study courses (min-max applied toward degree)	0-44
Total number of credits required	96 (at least 64 residency credits)

[1] Approved substitutions for Computing:IE 521,IE 534,CS 573,CS 574,CS 583.

Entering with an approved Master's degree

Code	Title	Hours
PhD theory core course		
STAT 553	Probability and Measure I	4
Practicum course: select one		**2-4**
STAT 427	Statistical Consulting	
STAT 593	STAT Internship	
STAT 595	Preparing Future Faculty	
Computing-related course: select one[1]		**4**
STAT 525	Computational Statistics	
STAT 542	Statistical Learning	
Stochastic processes and time series courses- Select one:		
STAT 556	Advanced Time Series Analysis	
STAT 555	Applied Stochastic Processes	
STAT 533	Advanced Stochastic Processes	
STAT 554	Probability and Measure II	
STAT 576	Empirical Process Theory and Weak Convergence	
Select at least 5 elective courses with at least three 500 level courses, not selected above or from a list of electives maintained by the department.		**20**
Thesis and Individual study courses		**0-28**
STAT 590	Individual Study and Research (0-16 hours per term)	
STAT 599	Thesis Research (0-8 hours per term)	
Total Hours		**64**

Other Requirements [2]

Requirement	Description
Other requirements may overlap	
Masters Degree Required for Admission to PhD?	No, but Masters level requirements must be met (32 additional hours min)

For a student who has approved MS degree in Statistics or related fields from peer institutions, the total number of credits required is 64 (at least 64 residency credits). The MS degree needs to be approved by the PhD committee by Oct 1st of the first year of enrollment.

STAT 527/STAT 528/STAT 511/STAT 575can be waived for students who have approved MS degrees from peer institutions AND passed our qualifying exam

At least 36 required and elective course credits at UIUC (including satisfying the requirements on PhD applied regression, theory core, practicum, computing-related and stochastic process and time series courses, subject to waiver)

Minimum 500-level courses required	24
Qualifying Exam Required	Yes
Preliminary Exam Required	Yes
Final Exam/Dissertation Defense Required	Yes
Thesis research and individual study courses (min-max applied toward degree)	0-28 hours
Dissertation Deposit Required	Yes
Minimum GPA:	3.0

[1] Approved substitutions for Computing: IE 521,IE 534,CS 573,CS 574,CS 583.

[2] *For additional details and requirements refer to the department's* Graduate Programs *(*http://www.stat.illinois.edu/students/graduates.shtml*) and the* Graduate College Handbook *(*http://www.grad.illinois.edu/gradhandbook/*).*

Corresponding Degree

PhD Doctor of Philosophy

Program Features

Academic Level

Graduate

Does this major have transcripted concentrations?

No

What is the typical time to completion of this program?

5 years

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

96 (64 w approved MS)

CIP Code

270501 - Statistics, General.

Is This a Teacher Certification Program?

No

Will specialized accreditation be sought for this program?

No

Delivery Method

This program is available:

On Campus - Students are required to be on campus, they may take some online courses.

Admission Requirements

Desired Effective Admissions Term

Fall 2021

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

No

Enrollment

Describe how this revision will impact enrollment and degrees awarded.

With the more rigorous training we offer to our Ph.D. students, we expect to attract a more competitive pool of students, but the enrollment number may depend on the departmental budget and other factors. There is no impact on The degrees awarded.

Estimated Annual Number of Degrees Awarded

What is the matriculation term for this program?

Fall

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

Financial Resources

How does the unit intend to financially support this proposal?

No additional support or resources are needed.

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

Is this program requesting self-supporting status?

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.

The number of faculty is expected to rise in the next few years owing to the consistent plan of expanding the department. There will be more instructors due to the additional courses we develop, and smaller class size for Ph.D. level courses. The student-faculty ratio is expected to go down for Ph.D. level courses, which facilitates the training for our Ph.D. students. Note that there will be greater flexibility for which courses to choose, the same amount of total credit hours are required to obtain the Ph.D. degree.

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 as existing courses from STAT MATH ECON ECE IE and CS are being used in the curricula.

EP Documentation

EP Control Number

EP.22.004

Attach Rollback/Approval Notices

ep22004_email to sponsor and sponsor response.pdf

This proposal requires HLC inquiry

No

DMI Documentation

Banner/Codebook Name

PHD:Statistics -UIUC

Program Code:

10KS0329PHD

Degree Code

PHD

Major Code

0329

Program Reviewer Comments

Kelly Ritter (ritterk) (Thu, 27 Aug 2020 15:57:25 GMT): Rollback: Please explain in the justification *exactly* what changes are being requested. The committees need to see an explanation of what courses are being added, which are no longer required, and why this is happening, to make the attached comparative chart easier to follow. The general justification already included here supports why a change is being made, but details of that change not included.Such details are helpful so that the committees can better see the overall revisions proposed. Please *also* answer the question regarding how the unit will support the changes financially. If the answer is that no additional support or resources are needed, please explain that. KR 8-27-20

Deb Forgacs (dforgacs) (Fri, 28 Aug 2020 19:28:02 GMT): Rollback: update needed.

Allison McKinney (agrindly) (Fri, 29 Jan 2021 21:58:56 GMT): Rollback: Please clarify, are the minimum number of hours changing? The current program of study has a minimum of 64 hours with a note that the MS equivalent must be met (32). What are the requirements for those entering with a Masters degree?

Key: 437

Appendix B:
(Current/Proposed Curriculum Revisions)

Current Requirements:	Current Hours	Revised Requirements:	Revised Hours
STAT424 – Analysis of Variance	4 Hours	Regression core courses: STAT527 Advanced Regression Analysis I	4 Hours
STAT425 – Applied Regresion and Design	4 Hours	STAT528 Advanced Regression Analysis II (pending approval)	4 Hours
STAT426 – Sampling and Categorical Data	4 Hours		
STAT510 --Mathematical Statistics I	4 Hours		
Theory core courses: STAT511– Mathematical Statistics II	4 Hours	Theory core courses: STAT511 -- Advanced Mathematical Statistics	4 Hours
STAT575/ECON578 – Large sample theory	4 Hours	STAT575/ECON578 -- Large Sample Theory	4 Hours
STAT553 – Probability and Measure I	4 Hours	STAT553 – Probability and Measure I	4 Hours
Select one Practicum course: STAT 427 - Statistical Consulting STAT 593 - Internship STAT 595 - Preparing Future Faculty	4 Hours	Select one Practicum course: STAT 427 - Statistical Consulting STAT 593 – Internship STAT 595 - Preparing Future Faculty	4 Hours
Select at least one computational theory and methods course: STAT 428 - Statistical Computing STAT 525 - Computational Statistics STAT 530 - Bioinformatics STAT 542 - Statistical Learning	4 Hours	Select at least one computing-related course: STAT525-Computational Statistics STAT542 - Statistical Learning IE521 - Convex Optimization	4 Hours

		IE 534 - Deep Learning	
		CS 573 - Algorithms	
		CS 574 - Randomized Algorithms	
		CS 583 - Approximation Algorithms	
Select at least one of the stochastic processes and time series courses: STAT429 - Time Series Analysis STAT555 - Applied Stochastic Processes STAT 433 - Stochastic Processes STAT 554 – Probability and Measure II	4 Hours	Select at least one of stochastic processes and time series courses: STAT 556 - Advanced Time Series Analysis (pending approval) STAT 555/MATH 564 - Applied Stochastic Processes STAT 533 – Advanced Stochastic Processes (pending approval) STAT 554 - Probability and Measure II STAT 576 - Weak Convergence and Empirical Processes (pending approval)	4 Hours
Thesis and Individual study courses STAT 590 - Individual Study and Research STAT 599 - Thesis Research	0-32 Hours	Thesis and Individual study courses STAT 590 - Individual Study and Research STAT 599 - Thesis Research	0-44 Hours
Elective courses Select at least 3 elective courses with at least two 500 level courses, not selected above	12 Hours	Elective courses Select at least 5 elective courses with at least three 500 level courses, not selected above	20 Hours
Total Required Hours	96 Hours	**Total Required Hours**	96 Hours

Entering with an approved Baccalaureate degree		
Prerequisites		
MATH 447 - Real Variables (*Waived if a course at an equivalent level has been taken at another institution and a grade of B or above is achieved)	4	
	Total Hours	4
Required courses:		
PhD applied regression courses		
STAT 527 - Advanced Regression Analysis I	4	
STAT 528 - Advanced Regression Analysis II	4	
	Total Hours	**8**
PhD theory core courses		
STAT 511 - Advanced Mathematical Statistics	4	
STAT 575 - Large sample theory	4	
STAT 553 - Probability and Measure I	4	
	Total Hours	12
Practicum course: select one		
STAT 427 - Statistical Consulting	4	
STAT 593 - Internship	4	
STAT 595 - Preparing Future Faculty	2	
	Total Hours	2-4
Computing-related course: select one		
STAT 525 - Computational Statistics	4	
STAT 542 - Statistical Learning	4	
Approved Substitutions for Computing:		
IE 521 - Convex Optimization	4	
IE 534 - Deep Learning	4	
CS 573 - Algorithms	4	
CS 574 - Randomized Algorithms	4	
CS 583 - Approximation Algorithms	4	
	Total Hours	4
Stochastic processes and time series courses: Select One		
STAT 556 - Advanced Time Series Analysis	4	
STAT 555/MATH 564 - Applied Stochastic Processes	4	
STAT 533 – Advanced Stochastic Processes	4	
STAT 554 - Probability and Measure II	4	
STAT 576 - Weak Convergence and Empirical Processes	4	
	Total Hours	4
Select at least five elective courses with at least three 500 levels, not selected above		
STAT 427 - Statistical Consulting	4	
STAT 428 - Statistical Computing	4	
STAT 429 - Time Series Analysis	4	

STAT 431 – Applied Bayesian Analysis	4	
STAT 433 - Stochastic processes	4	
STAT 434 - Survival Analysis	4	
STAT 448 - Advanced Data Analysis	4	
STAT 466 - Image and Neuroimage Analysis	4	
STAT 480 - Data Science Foundations	4	
STAT 525 - Computational Statistics	4	
STAT 530 - Bioinformatics	4	
STAT 534 – Advanced Survival Analysis	4	
STAT 538 - Clinical Trials Methodology	4	
STAT 542 - Statistical Learning	4	
STAT 545 – Spatial Statistics	4	
STAT 546 – Machine Learning in Data Science	4	
STAT 551 - Theory of Probability I	4	
STAT 552 - Theory of Probability II	4	
STAT 554 - Probability and Measure II	4	
STAT 555 - Applied Stochastic Processes	4	
STAT 571 - Multivariate Analysis	4	
STAT 578 - Topics in Statistics	4	
STAT 587 - Hierarchical Linear Models	4	
STAT 588 - Covariance Structures and Factor Models	4	
STAT 593 - Internship	0-4	
STAT 595 - Preparing Future Faculty	2	
Approved Electives		
CS 512 - Data Mining Principles	4	
CS 543 - Computer Vision	4	
CS 546 - Machine Learning in NLP	4	
CS 573 - Algorithms	4	
CS 574 - Randomized Algorithms	4	
CS 583 - Approximation Algorithms	4	
ECE 543 - Statistical Learning Theory	4	
ECE 547 - Topics in Image Processing	4	
ECE 561 - Detection and Estimation Theory	4	
ECE 563 - Information Theory	4	
ECE 566 - Computational Inference and Learning	4	
ECE 580 - Optimization by Vector Space Methods	4	
ECON 536 – Applied Econometrics	4	
ECON 574 – Econometrics I	4	
ECON 575 - Econometrics II	4	
ECON 576 - Time Series	4	
ECON 577 - Topics in Econometrics	4	
IE 510 - Applied Nonlinear Programming	4	
IE 521 - Convex Optimization	4	
IE 534 - Deep Learning	4	
MATH 540 - Real Analysis	4	
MATH 541 - Functional Analysis	4	

MATH 546 - Hilbert Spaces	4	
MATH 580 - Combinatorial Mathematics	4	
MATH 585 - Probabilistic Combinatorics	4	
MATH 589 - Conjugate Duality and Optimization	4	
	Total	20
Thesis and Individual study courses		
STAT 590 - Individual Study and Research	0-16 (per term)	
STAT 599 - Thesis Research	0-8 (per term)	
	Total Hours	0-44
Total Hours		**96**

Entering with an approved Baccalaureate degree

The above requirement applies. At least 52 required and elective course credits at UIUC.

Thesis research and individual study courses (min-max applied toward degree): 0-44

Total number of credits required: 96 (at least 64 residency credits)

Entering with an approved Masters degree		
Prerequisites		
MATH 447 - Real Variables (*Waived if a course at an equivalent level has been taken at another institution and a grade of B or above is achieved)	4	
	Total Hours	4
Required courses:		
PhD theory core courses		
STAT 553 - Probability and Measure I	4	
	Total Hours	4
Practicum course: select one		
STAT 427 - Statistical Consulting	4	
STAT 593 - Internship	4	
STAT 595 - Preparing Future Faculty	2	
	Total Hours	2-4
Computing-related course: select one		
STAT 525 - Computational Statistics	4	
STAT 542 - Statistical Learning	4	
Approved Substitutions for Computing:		
IE 521 - Convex Optimization	4	
IE 534 - Deep Learning	4	
CS 573 - Algorithms	4	
CS 574 - Randomized Algorithms	4	
CS 583 - Approximation Algorithms	4	
	Total Hours	4
Stochastic processes and time series courses: Select One		
STAT 556 - Advanced Time Series Analysis	4	
STAT 555/MATH 564 - Applied Stochastic Processes	4	

STAT 533 – Advanced Stochastic Processes	4	
STAT 554 - Probability and Measure II	4	
STAT 576 - Weak Convergence and Empirical Processes	4	
	Total Hours	4
Select at least five elective courses with at least three 500 levels, not selected above		
STAT 427 - Statistical Consulting	4	
STAT 428 - Statistical Computing	4	
STAT 429 - Time Series Analysis	4	
STAT 431 – Applied Bayesian Analysis	4	
STAT 433 - Stochastic processes	4	
STAT 434 - Survival Analysis	4	
STAT 448 - Advanced Data Analysis	4	
STAT 466 - Image and Neuroimage Analysis	4	
STAT 480 - Data Science Foundations	4	
STAT 525 - Computational Statistics	4	
STAT 530 - Bioinformatics	4	
STAT 534 – Advanced Survival Analysis	4	
STAT 538 - Clinical Trials Methodology	4	
STAT 542 - Statistical Learning	4	
STAT 545 – Spatial Statistics	4	
STAT 546 – Machine Learning in Data Science	4	
STAT 551 - Theory of Probability I	4	
STAT 552 - Theory of Probability II	4	
STAT 554 - Probability and Measure II	4	
STAT 555 - Applied Stochastic Processes	4	
STAT 571 - Multivariate Analysis	4	
STAT 578 - Topics in Statistics	4	
STAT 587 - Hierarchical Linear Models	4	
STAT 588 - Covariance Structures and Factor Models	4	
STAT 593 - Internship	0-4	
STAT 595 - Preparing Future Faculty	2	
Approved Electives		
CS 512 - Data Mining Principles	4	
CS 543 - Computer Vision	4	
CS 546 - Machine Learning in NLP	4	
CS 573 - Algorithms	4	
CS 574 - Randomized Algorithms	4	
CS 583 - Approximation Algorithms	4	
ECE 543 - Statistical Learning Theory	4	
ECE 547 - Topics in Image Processing	4	
ECE 561 - Detection and Estimation Theory	4	
ECE 563 - Information Theory	4	
ECE 566 - Computational Inference and Learning	4	
ECE 580 - Optimization by Vector Space Methods	4	

ECON 536 – Applied Econometrics	4	
ECON 574 – Econometrics I	4	
ECON 575 - Econometrics II	4	
ECON 576 - Time Series	4	
ECON 577 - Topics in Econometrics	4	
IE 510 - Applied Nonlinear Programming	4	
IE 521 - Convex Optimization	4	
IE 534 - Deep Learning	4	
MATH 540 - Real Analysis	4	
MATH 541 - Functional Analysis	4	
MATH 546 - Hilbert Spaces	4	
MATH 580 - Combinatorial Mathematics	4	
MATH 585 - Probabilistic Combinatorics	4	
MATH 589 - Conjugate Duality and Optimization	4	
	Total	20
Thesis and Individual study courses		
STAT 590 - Individual Study and Research	0-16 (per term)	
STAT 599 - Thesis Research	0-8 (per term)	
	Total Hours	0-28
Total Hours		**64**

Entering with an approved Master degree
For a student who has approved MS degree in Statistics or related fields from peer institutions, the total number of credits required is 64 (at least 64 residency credits). The MS degree needs to be approved by the PhD committee by Oct 1st of the first year of enrollment.

Waive policy: STAT527/STAT528/STAT511/STAT575 can be waived for students who have approved MS degrees from peer institutions AND passed our qualifying exam.

At least 36 required and elective course credits at UIUC (including satisfying the requirements on PhD applied regression, theory core, practicum, computing-related and stochastic process and time series courses, subject to waiver).

Thesis research and individual study courses (min-max applied toward degree): 0-28.

Other Requirements: Other requirements may overlap	
Minimum 500-level hours required	24
Qualifying Exam	Yes
Preliminary Exam	Yes
Final Exam/Dissertation Defense	Yes
Dissertation Deposit	Yes
Minimum GPA	3

List of elective courses for Statistics PhD to meet the 20 hour requirement. Courses already taken toward the PhD do not count toward elective requirement

STAT 427 - Statistical Consulting	4
STAT 428 - Statistical Computing	4
STAT 429 - Time Series Analysis	4
STAT 431 – Applied Bayesian Analysis	4
STAT 433 - Stochastic processes	4
STAT 434 - Survival Analysis	4
STAT 448 - Advanced Data Analysis	4
STAT 466 - Image and Neuroimage Analysis	4
STAT 480 - Data Science Foundations	4
STAT 525 - Computational Statistics	4
STAT 530 - Bioinformatics	4
STAT 534 – Advanced Survival Analysis	4
STAT 538 - Clinical Trials Methodology	4
STAT 542 - Statistical Learning	4
STAT 545 – Spatial Statistics	4
STAT 546 – Machine Learning in Data Science	4
STAT 551 - Theory of Probability I	4
STAT 552 - Theory of Probability II	4
STAT 554 - Probability and Measure II	4
STAT 555 - Applied Stochastic Processes	4
STAT 571 - Multivariate Analysis	4
STAT 578 - Topics in Statistics	4
STAT 587 - Hierarchical Linear Models	4
STAT 588 - Covariance Structures and Factor Models	4
STAT 593 - Internship	0-4
STAT 595 - Preparing Future Faculty	2
Approved Electives	
CS 512 - Data Mining Principles	4

List of elective courses for Statistics PhD to meet the 20 hour requirement. Courses already taken toward the PhD do not count toward elective requirement

CS 543 - Computer Vision	4
CS 546 - Machine Learning in NLP	4
CS 573 - Algorithms	4
CS 574 - Randomized Algorithms	4
CS 583 - Approximation Algorithms	4
ECE 543 - Statistical Learning Theory	4
ECE 547 - Topics in Image Processing	4
ECE 561 - Detection and Estimation Theory	4
ECE 563 - Information Theory	4
ECE 566 - Computational Inference and Learning	4
ECE 580 - Optimization by Vector Space Methods	4
ECON 536 – Applied Econometrics	4
ECON 574 – Econometrics I	4
ECON 575 - Econometrics II	4
ECON 576 - Time Series	4
ECON 577 - Topics in Econometrics	4
IE 510 - Applied Nonlinear Programming	4
IE 521 - Convex Optimization	4
IE 534 - Deep Learning	4
MATH 540 - Real Analysis	4
MATH 541 - Functional Analysis	4
MATH 546 - Hilbert Spaces	4
MATH 580 - Combinatorial Mathematics	4
MATH 585 - Probabilistic Combinatorics	4
MATH 589 - Conjugate Duality and Optimization	4

Dear Professor Shao,

My apologies for the delay at my end. I was (and am) in the middle of a lot of exigencies with research/summer-teaching/COVID-19 preparations etc.

ISE supports the proposed revision of the Statistics PhD program that includes

   IE 510 - Applied Nonlinear Programming
   IE 521 - Convex Optimization
   IE 534 - Deep Learning

as elective options. The effect on enrollments is expected to be minimal compared to the overall enrollment in these courses. This will benefit the students in Statistics as well as in our own program through the interdisciplinary interactions that these elective course options will foster.

   Sincerely,

Prof. Ramavarapu "RS" Sreenivas
Arthur Davis Faculty Scholar
Associate Head for Graduate Studies
Industrial and Enterprise Systems Engineering The Grainger College of Engineering
University of Illinois at Urbana-Champaign
Phone: (217) 333-7735
Web: http://rsree.ise.illinois.edu/

#Supporting email from Professor Bruce Hajek, Head of Electrical and Computer Engineering department

Dear Xiaofeng.

   My colleagues and I would be happy to see more students from the Department of Statistics taking these or other courses in ECE, and many of us would be happy to see our own students taking a greater interest in statistics and statistics courses. The effect on enrollments is expected to be minimal compared to the overall enrollment in these courses. This will benefit the students in Statistics as well as in our own program through the interdisciplinary interactions that these elective course options will foster..

Sincerely,

Bruce Hajek, Ph.D.
Professor and Head, Department of Electrical and Computer Engineering Leonard C. and Mary Lou Hoeft Chair, The Grainger College of Engineering

#Supporting email from Professor George Deltas, Associate Head of Economics
department

Dear Professor Shao,

Our department supports the proposed revision of the Statistics PhD program that
includes

    ECON 536 – Applied Econometrics
    ECON 574 – Econometrics I
    ECON 575 - Econometrics II
    ECON 576 - Time Series
    ECON 577 - Topics in Econometrics

as elective options. The effect on enrollments is expected to be small in general and not
anticipated to cause any adverse effects.
This will benefit the students in Statistics as well as in our own program through the
interdisciplinary interactions that these elective course options will foster.

Sincerely,

George Deltas
Professor and Associate Head
Department of Economics

#Supporting Letter from Professor Nancy Amato, Head of Computer Science Department

Dear Professor Shao,

The Department of Computer Science endorses the proposed revision of the Statistics PhD program. In
particular, we support the inclusion of the following computer science courses as elective options in
your PhD program:

• CS 512 - Data Mining Principles
• CS 543 - Computer Vision
• CS 546 - Machine Learning in NLP
• CS 573 - Algorithms
• CS 574 - Randomized Algorithms
• CS 583 - Approximation Algorithms

While we cannot reserve seats for your students, based on your estimate that no more than 5 and
usually fewer students would be interested in enrolling in these courses in a given semester, we
anticipate there will be sufficient capacity in this set of courses to accommodate your students. Hence,
we are pleased to expand the options for your students as will benefit the students in Statistics as well
as in our own program through the interdisciplinary interactions that these elective course options will
foster.

Sincerely,

Nancy M. Amato
Abel Bliss Professor and Head
Department of Computer Science
NANCY M. AMATO
Abel Bliss Professor and Head
2248 Siebel Center
namato@illinois.edu

Supporting Letter from Professor Jeremy Tyson, Chair of Mathematics Department

Dear Professor Shao,

Our department supports the proposed revision of the Statistics PhD program that includes

MATH 540 - Real Analysis
MATH 541 - Functional Analysis
MATH 546 - Hilbert Spaces
MATH 580 - Combinatorial Mathematics
MATH 585 - Probabilistic Combinatorics
MATH 589 - Conjugate Duality and Optimization

as elective options. The effect on enrollments is expected to be minimal compared to the overall enrollment in these courses. This revision will benefit students in Statistics as well as in our own program through the interdisciplinary interactions that these elective course options will foster.

Sincerely,

Jeremy Tyson
Professor and Chair
Department of Mathematics
University of Illinois at Urbana-Champaign

From:	Pahre, Jennie
To:	Shao, Xiaofeng
Cc:	Martensen, Kathy; Lehman, Barbara J
Subject:	Questions on EP Proposal: Revision of the Ph.D. degree requirements in the Department of Statistics within the College of Liberal Arts & Sciences
Date:	Thursday, September 9, 2021 1:45:01 PM
Attachments:	Outlook-thvvxoxe.png

Dear Professor Shao:

I hope that your week is moving towards a happy close.

I'm the chair of subcommittee A of the Senate Educational Policy Committee. A proposal that you sponsor has come to my subcommittee for review. It is EP 22.004, which revises the Statistics PhD requirements within the College of LAS.

The subcommittee thinks that updating this important PhD program to incorporate expanded coursework that will provide more comprehensive training specifically for PhD students is laudable and entirely appropriate. The subcommittee is very supportive.

A member of my subcommittee did have a few questions, and thus I am reaching out. Our next Ed Pol meeting is this coming Monday. I am not sure if it will be possible to clear up these questions before then, but I'd like to try so that I can present your proposal with all pending questions answered to facilitate its swift approval. (If you can't respond by Monday, I will ask that we roll the proposal over to the following week.)

Here are the questions:

From proposal:
4. For stochastic processes and time series courses, we continue to require students to take one out of a list of courses. We propose to remove STAT429 and STAT433 from the list since they are mainly taught at the level for MS and undergraduate students. We propose to add STAT556, STAT533 and STAT576 to the list, all of which will be developed in the coming years and aim to cover more advanced materials on stochastic processes and time series.

1. The current requirement is for one course out of a selection of 4 courses (STAT 429, STAT 555, STAT 433, STAT 554). This change will require one course out of a selection of 5 courses (STAT 556, STAT 555/MATH 564, STAT 533, STAT 554, STAT 576). Three of these courses (STAT 556, STAT 533, and STAT 576) are courses that will be developed, leaving only two options for this requirement (STAT 555/MATH 564 & STAT 554). There are currently only two existing options that satisfy this requirement. The proposal notes that the remaining three options will be developed. However, there is no timeline provided for their development, and it would be good to know when they might be ready.

2. An associated concern is that given that these additional courses need to be developed and will be developed as new faculty are added to the department (as mentioned in

Faculty Resources), there do seem to be some financial resources that will be required. Is there a plan to meet the financial requirements?

I look forward to your thoughts.

With sincere thanks,

Jennie

_____

I ILLINOIS
College of Law

Jennifer N. Pahre

Director of Undergraduate Studies

Teaching Associate Professor

University of Illinois College of Law

504 East Pennsylvania Avenue

Champaign, Illinois 61820

Pronouns: She/her/hers

1.	The current requirement is for one course out of a selection of 4 courses (STAT 429, STAT 555, STAT 433, STAT 554). This change will require one course out of a selection of 5 courses (STAT 556, STAT 555/MATH 564, STAT 533, STAT 554, STAT 576). Three of these courses (STAT 556, STAT 533, and STAT 576) are courses that will be developed, leaving only two options for this requirement (STAT 555/MATH 564 & STAT 554). There are currently only two existing options that satisfy this requirement. The proposal notes that the remaining three options will be developed. However, there is no timeline provided for their development, and it would be good to know when they might be ready.

I want to provide an update to the three new courses. STAT533 is being taught this Fall and will be offered either every fall or every other Fall, depending on the enrollment. STAT556 will be offered in spring 2022 and is expected to be offered every Spring semester afterwards. STAT576 has been offered in Spring 2021, and will be offered in Spring 2022 and later (once per year).

2.	An associated concern is that given that these additional courses need to be developed and will be developed as new faculty are added to the department (as mentioned in Faculty Resources), there do seem to be some financial resources that will be required. Is there a plan to meet the financial requirements?

All these advanced courses are being developed by current faculty (STAT533 by myself, STAT556 by Xiaohui Chen, STAT576 by

Sabyasachi Chatterjee). The department will be hiring multiple faculty in the coming years, so there is no concern regarding the funancial resources.