

NORTHERN ILLINOIS UNIVERSITY
COLLEGE OF LIBERAL ARTS AND SCIENCES
CURRICULUM COMMITTEE
Meeting #8 - October 24, 2018
Approved Minutes

Present: Dave Ballantine (Chair/CLAS), Amanda Durik (PSYC), Trude Jacobsen (HIST/SEAS),
Kristen Myers (WGST), Deepak Naidu (MATH), Alicia Schatteman (PSPA), Carol
Thompson (PHYS)

Suzanne Hogan (CLAS)

Absent: Steve Estes (Ex-Officio)

Meeting called to order at 1:38 PM

A. Action on Minutes

Minutes from the #7 meeting on October 17, 2018, have been approved electronically and forwarded to the catalog editor.

B. Miscellaneous

A consent agenda was assembled for the following items: revision of JOUR 652; revision of ECON 484X (*crosslisted as STAT 484*), revisions to the ECON Ph.D. program; deletion of STAT 550, STAT 573A, STAT 574, STAT 579, STAT 581, STAT 583, STAT 585, STAT 586, STAT 591, STAT 668, STAT 669, STAT 672, STAT 674, STAT 677, STAT 679, and STAT 785; new course STAT 511; revisions to STAT 572 (change to STAT 510), STAT 573 (change to STAT 535), STAT 578 (change to 538), STAT 665 (change to STAT 635), STAT 666 (change to STAT 637), STAT 667, STAT 670 (change to STAT 600), STAT 671 (change to STAT 601), STAT 673 (change to STAT 643), STAT 675 (change to STAT 645), STAT 676 (change to STAT 646), STAT 678 (change to STAT 638), STAT 680 (change to STAT 625), STAT 681 (change to STAT 617), STAT 691 (change to STAT 695), STAT 693 (change to STAT 697), STAT 699, STAT 775, and STAT 790; deletion of LGBT 600, LGBT 602, LGBT 610X (*crosslisted as WGST 610*), LGBT 620, and WGST 605 - Feminist Theory); revisions to WGST 524 (change to WGSS 524), WGST 530 (change to WGSS 530), WGST 534 (change to WGSS 534), WGST 602 (change to WGSS 602), WGST 610 (change to WGSS 610), WGST 620 (change to WGSS 620), WGST 625X (change to WGSS 625X) (*crosslisted as ART 625*), and WGST 639 (change to WGSS 639). **Motion of approval** moved by Carol Thompson, seconded by Kristen Myers, and approved by all members.

C. Curriculum - Old Business

None

D. Curriculum - New Business

Department of Communication

Revisions to JOUR 652 were approved.

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Department of Economics

Revisions to ECON 484X (*crosslisted as STAT 484X*), and ECON 584X (*crosslisted as STAT 584*) were approved. Revisions to the CGS in Financial Engineering, the M.S. program, and the Ph.D. program were also approved.

Division of Statistics

The following course deletions were approved: STAT 550, STAT 573A, STAT 574, STAT 579, STAT 581, STAT 583, STAT 584, STAT 585, STAT 586, STAT 591, STAT 668, STAT 669, STAT 672, STAT 674, STAT 677, STAT 679, and STAT 785. The following new courses were approved: STAT 511, STAT 515, STAT 517, STAT 536, STAT 537, STAT 610, STAT 611, STAT 617, STAT 639, STAT 640, STAT 642, STAT 644, and STAT 795. Revisions to the following courses were approved: STAT 570 (change to STAT 500), STAT 572 (change to STAT 510), STAT 573 (change to STAT 535), STAT 578 (change to 538), STAT 665 (change to STAT 635), STAT 666 (change to STAT 637), STAT 667, STAT 670 (change to STAT 600), STAT 671 (change to STAT 601), STAT 673 (change to STAT 643), STAT 675 (change to STAT 645), STAT 676 (change to STAT 646), STAT 678 (change to STAT 638), STAT 680 (change to STAT 625), STAT 681 (change to STAT 617), STAT 691 (change to STAT 695), STAT 693 (change to STAT 697), STAT 699, STAT 775, and STAT 790. The program proposal for the new Department of Statistics was approved.

Center for the Study of Women, Gender, and Sexuality

The following course deletions were approved: LGBT 600, LGBT 602, LGBT 610X (*crosslisted as WGST 610*), LGBT 620, and WGST 605 (Feminist Theory). The new course, WGST 605 (Feminist and Queer Theories) was approved. Revisions to WGST 524 (change to WGSS 524), WGST 530 (change to WGSS 530), WGST 534 (change to WGSS 534), WGST 602 (change to WGSS 602), WGST 610 (change to WGSS 610), WGST 620 (change to WGSS 620), WGST 625X (change to WGSS 625X) (*crosslisted as ART 625*), and WGST 639 (change to WGSS 639). Revisions to the CGS in LGBTQ+ and CGS in Women's and Gender Studies were also approved.

Meeting adjourned at 2:40 PM

TABLED:

None

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Center for the Study of Women, Gender, and Sexuality

Course Deletions Page 201, 2018-19 Graduate Catalog

~~**Lesbian, Gay, Bisexual, Transgender Studies (LGBT)**~~

LGBT 600. LESBIAN, GAY, BISEXUAL, AND TRANSGENDER STUDIES (3).

LGBT 602. INTERNSHIP (3).

LGBT 610X. RESEARCH IN WOMEN'S, GENDER, AND SEXUALITY STUDIES (3).
Crosslisted as WGST 610.

LGBT 620. SPECIAL TOPICS IN LGBT STUDIES (3).

Rationale: The LGBT designator is being eliminated.

Course Deletion Page 202, 2018-19 Graduate Catalog

WGST 605. FEMINIST THEORY (3).

Rationale: A new course in feminist and queer theories is being proposed which will absorb the content of this current course.

New Course Page 202, 2018-19 Graduate Catalog

CIP: 05.0299

WGSS 605. FEMINIST AND QUEER THEORIES (3). Concepts, methods, and development of feminist and queer theories; systematic overview of schools of feminist theory and queer studies as they are grounded in different social identities and epistemological perspectives; implications of these theories for scholarly research and social change.

Rationale: Feminist and queer theories form the backbone of the field of Women, Gender, and Sexuality Studies. We currently offer a Feminist and Queer Theories course at the undergraduate level, but not at the Graduate Level (we offer a Feminist Theories course only). The revised course would put the graduate program on par with the undergraduate program. This revised course would be required for both LGBTQ+ Studies and Women's and Gender Studies graduate certificate students.

Non-Duplication: None. This is exclusive to the Center for the Study of Women, Gender, and Sexuality.

Course Revision Page 201, 2018-19 Graduate Catalog

WGSS 524. TOPICS IN GENDER AND STEM (3). Selected issues

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Rationale: We are eliminating separate course designators for WGST and LGBT, and combining them into the new WGSS designator.

Course Revision Page 201, 2018-19 Graduate Catalog

WGSS 530. SPECIAL TOPICS IN WOMEN'S AND GENDER, AND SEXUALITY STUDIES (3). May be repeated to a maximum

Rationale: We are eliminating separate course designators for WGST and LGBT, and combining them into the new WGSS designator. The change in course title reflects the change to WGSS.

Course Revision Page 201, 2018-19 Graduate Catalog

WGSS 534. LANGUAGE AND GENDER (3). Examination of empirical

Rationale: We are eliminating separate course designators for WGST and LGBT, and combining them into the new WGSS designator.

Course Revision Page 201, 2018-19 Graduate Catalog

WGSS 602. INTERNSHIP IN WOMEN'S AND GENDER, AND SEXUALITY STUDIES (3-6). Work as an intern in activities related to women's

Rationale: We are eliminating separate course designators for WGST and LGBT, and combining them into the new WGSS designator. The change in course title reflects the change to WGSS.

Course Revision Page 201, 2018-19 Graduate Catalog

WGSS 610. RESEARCH METHODS IN WOMEN'S, GENDER, AND SEXUALITY STUDIES (3). ~~Crosslisted as LGBT 610X.~~ Interdisciplinary analysis of

Rationale: Updating course designator to WGSS as the program is being reorganized under one subheading as opposed to LGBT and WGST. Adding "Methods" to better describe the course. LGBT 610X is being deleted since the LGBT designator will no longer be used.

Course Revision Page 201, 2018-19 Graduate Catalog

WGSS 620. TOPICS IN WOMEN'S AND GENDER, AND SEXUALITY STUDIES (3). Topics announced. May be repeated to a maximum of 6 semester hours when topic varies. PRQ: Consent of director.

Rationale: We are eliminating separate course designators for WGST and LGBT, and combining them into the new WGSS designator. The change in course title reflects the change to WGSS.

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WGSTS 625X. MUSEUMS: GENDER, RACE, AND CLASS (3). *Crosslisted as ART 625.*
Interdisciplinary, multicultural study of

Rationale: We are eliminating separate course designators for WGST and LGBT, and combining them into the new WGSS designator.

Course Revision Page 201, 2018-19 Graduate Catalog

WGSTS 639. INDEPENDENT STUDY IN WOMEN, ~~WOMEN'S AND GENDER,~~ AND SEXUALITY STUDIES (1-3). Student must present research

Rationale: We are eliminating separate course designators for WGST and LGBT, and combining them into the new WGSS designator. The change in course title reflects the change to WGSS.

Other Catalog Change Page 197, 2018-19 Graduate Catalog

College of Liberal Arts and Sciences

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Certificates of Graduate Study

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Law and Women's and Gender Studies

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Requirements (12)

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I. WGSTS 605 - **Feminist and Queer** Theories (3)

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II. One of the following (3-4)

LAW 800^{1,2} - Externship (4)

LAW 805¹ - Domestic Abuse Clinic (4)

WGSTS 602³ - Internship in Women, ~~WOMEN'S AND GENDER,~~ **and Sexuality** Studies (3)

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IV. One of the following (2-4) or an additional course from Section II

ANTH 522 - Gender in Southeast Asia (3)

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SOCI 587 - Gender and Crime (3)

WGSTS 530 - Special Topics in Women, ~~WOMEN'S AND GENDER,~~ **and Sexuality** Studies (3) (Requires advance approval of the director of Women's, Gender, and Sexuality Studies.)

WGSTS 534 - ~~Women, Men, and Language~~ **and Gender** (3)

WGSTS 610 - Research **Methods** in Women's, Gender, and Sexuality Studies (3)

WGSTS 620⁵ - Topics in Women, ~~WOMEN'S AND GENDER,~~ **and Sexuality** Studies (3)

WGSTS 625X - Museums: Gender, Race, and Class (3)

OR ART 625 - Museums: Gender, Race, and Class (3)

WGSTS 639⁵ - Independent Study in Women, ~~WOMEN'S AND GENDER,~~ **and Sexuality** Studies (1-3)

Rationale: Updating the requirements with the new and revised course info.

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Other Catalog Change

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College of Liberal Arts and Sciences

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Certificates of Graduate Study

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Lesbian, Gay, Bisexual, and Transgender, and Queer Studies (12)

Coordinator: Kristen Myers (Center for the Study of Women's, Gender, and Sexuality)

This interdisciplinary certificate fosters research and teaching related to sexual orientation and gender identity. Course work leading to this certificate includes study of sexuality and gender identity and their significance, through a systematic engagement with theories and methods in lesbian, gay, bisexual, and transgender, and queer studies and their application

This certificate of graduate study is available to any graduate-level student in good standing. Students interested in pursuing this certificate are advised to must consult with the coordinator of lesbian, gay, bisexual, and transgender studies for approval of the course of study director of the Center for the Study of Women, Gender, and Sexuality or the program adviser as early as possible in their graduate studies to determine the program of courses to be used toward the certificate.

Requirements (12)

~~LGBT 600~~ **WGSS 605** - Lesbian, Gay, Bisexual, Feminist and Transgender Studies **Queer Theories** (3)

One of the following (3)

~~ILAS~~ **WGSS 602** - Internship **in Women, Gender, and Sexuality Studies** (3-6), or an equivalent internship course approved by the coordinator **or adviser**. The internship experience must include activities related to LGBTQ+ Studies.

~~LGBT~~ **WGSS 610X** - Research **Methods** in Women's, Gender and Sexuality Studies (3)

Two of the following³ (6)

ANTH 522 - Gender in Southeast Asia (3)

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PHHE 506 - Dimensions of Human Sexuality (3)

~~WGST 605~~ **Feminist Theory** (3)

~~WGST~~ **620²** - Topics in Women, ~~s~~ and Gender, **and Sexuality** Studies (3)

Rationale: Addition of "Q" to make the program more inclusive of sexual orientations. Updating the contact information for students who wish to pursue this certificate. Updating the revised courses.

Other Catalog Change

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Certificates of Graduate Study

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Women's and Gender Studies (12)

Coordinator: Kristen Myers (Center for the Study of Women, Gender and Sexuality)

Women's and Gender Studies is an interdisciplinary program which Since the Center for the Study of Women, Gender and Sexuality is not a degree-offering unit, all graduate degrees are obtained through the student's major department, whose special requirements must be met. ~~The certificate is available to students in good standing in any graduate program in the university. Students at large in good standing may also pursue the certificate.~~ Faculty who regularly teach courses which contribute to the certificate or participate in the core courses come from a variety of departments.

A student who wishes to pursue this certificate should consult early in graduate studies with both her or his major department faculty adviser and the Women's and Gender Studies coordinator, **or the program adviser**. Students may earn transcript

The certificate is available to students in good standing in any graduate program in the university. Students-at-large in good standing may also pursue the certificate. Students interested in pursuing this certificate are advised to consult with the director of the Center for the Study of Women, Gender and Sexuality **or the program adviser** as early as possible in their graduate ~~program~~ **studies** to determine the program of courses to be used toward the certificate.

Requirements (12)

WGSTS 605 - Feminist **and Queer** Theories (3)

WGSTS 610 - Research **Methods** in Women's, Gender, and Sexuality Studies (3)

Two of the following (6)

ANTH 522 - Gender in Southeast Asia (3)

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CAHA 759 - Critical and Feminist Pedagogies in Adult and Higher Education (3)

CAHC 592¹ - Special Topics in Counseling (1-3)

CAHC 594 - Counseling the Lesbian, Gay, Bisexual, Transgender and Queer Community (3)

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COMS 656 - Feminist Film Theory (3)

ENGL 602D - Literary Theory and Criticism **D. Feminist Literary Theory and Criticism** (3)

ENGL 607¹ - Topics in Literature (3)

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FLFR 545 - French Women Writers (3)

FLSP 539 - Women Authors in Hispanic Literature (3)

FLSP 545 - Latin American Women Writers (3)

HDFS 600¹ - Seminar: In Contemporary Issues in Applied Human Development and Family Sciences (3 **1-12**)

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- HDFS 674 - Clothing and Human Behavior (3)
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HIST 610¹ - Reading Seminar in U.S. History (3)
~~LGBT 600 - Lesbian, Gay, Bisexual, and Transgender Studies (3)~~
MGMT 528 - Equal Opportunity and Employment (3)
NUTR 602 - Issues in Eating Disorders and Obesity (3)
NUTR 616 - Nutritional Factors in Obesity and Eating Disorders (3)
~~PHHE 506 - Dimensions of Human Sexuality (3)~~
PSYC 595¹ - Seminar in Special Topics (3)
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TLCI 540 - The Gender Sensitive Curriculum (3)
WGSTS 524 - Topics in Gender and STEM (3)
WGSTS 530 - Special Topics in Women, ~~s~~ and Gender, and Sexuality Studies (3)
WGSTS 534 - Language and Gender (3)
WGSTS 602 - Internship in Women, ~~s~~ and Gender, and Sexuality Studies (3-6)
WGSTS 620 - Topics in Women, ~~s~~ and Gender, and Sexuality Studies (3)
WGSTS 625X - Museums: Gender, Race, and Class (3)
OR ART 625 - Museums: Gender, Race, and Class (3)
WGSTS 639 - Independent Study in Women, ~~s~~ and Gender, and Sexuality Studies (1-3)

Independent study and topics courses in a variety of departments may meet the certificate requirements, with the approval of the director of the Center for the Study of Women, Gender and Sexuality **or the program adviser**, when substantial treatment of women, ~~s~~ **gender, and sexuality** studies is included in the course.

Secondary Educator Licensure

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Rationale: Updating the contact information for students who wish to pursue this certificate. Updating the revised courses and adding FLSP 539 to the list of optional courses.

Impact Statement: The Department of World Languages and Cultures was consulted regarding FLSP 539 being added to the list of course options. They did not identify any negative impact on course availability or enrollment with this change.

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ART 625. MUSEUMS: GENDER, RACE, AND CLASS (3). *Crosslisted as WGSTS 625X.*
Interdisciplinary, multicultural study of

Rationale: Revision of WGST 625X (change to WGSS 625X).

Notification: The School of Art was notified of this change via email on [DATE].

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Inter-College Interdisciplinary Certificates

Certificates of Graduate Study

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Museum Studies (15-18)

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Additional electives (3) chosen from the following, in consultation with Museum Studies program coordinator:

ART 625/WGSTS 625X - Museums: Gender, Race and Class (3)

ART 656 - Advanced Curatorial Practice

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HIST 592 - Introduction to Public History (3)

Elective course substitution is possible with the approval of the Museum Studies program coordinator.

Rationale: Revision of WGST designator (now WGSS 625X).

Notification: The coordinator for the Museum Studies certificate was notified of this change via email on [DATE].

Department of Communication

Course Revision

Page 222, 2018-19 Graduate Catalog

JOUR 652. SEMINAR IN MEDIA CONVERGENCE (3). ~~Development, structure, Philosophy and theory~~ **future of the intersection of media and technology in relation to the production, distribution, and consumption of content** ~~print-broadcast-online journalism. Examination of how news media have changed and are changing, with focus on economic, political, and social systems~~ **the evolution of media in conjunction with the progression of technology and the individual, organizational, and societal implications.** ~~Advanced techniques for reporting, producing, and managing news for multiple platforms.~~

Rationale: The faculty member who originally developed and taught this course left for another university several years ago. The professor who replaced her a few years ago would like to update the name and description of the course to better reflect the contemporary world. The name and description changes are being proposed to reflect changes in media theory and practice. The term “convergence” has fallen out of favor and is no longer used by researchers or practitioners; however, scholars remain interested in how technology affects media work and media industries. The new name is written to purposely avoid jargon or buzzwords so that the course does not have to be rewritten in the future. The description also has been updated to reflect the course’s status as a graduate seminar with an emphasis on research and theory instead of skill development.

Department of Economics

Course Revision

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484X. FINANCIAL DERIVATIVES (3). *Crosslisted with STAT 484 as ACSC 460.* Review of financial derivatives including futures, European and American options, and Exotic options. Greeks, trading and hedging strategies. Pricing derivative securities with appropriate boundary conditions, including Black-Scholes formula, binomial trees, lattice models and finite difference methods. Simulation and variance reduction techniques. Interest rate models. **Covers the learning outcomes regarding financial models in the exam MFE of the Society of Actuaries (SOA), which is also the Exam 3F of the Casualty Actuarial Society (CAS).** PRQ: ACSC 405 STAT 483 or consent of department.

Rationale: Revision of parent course, ACSC 460 (formerly STAT 484).

Course Revision

Page 231, 2018-19 Graduate Catalog

584X. FINANCIAL DERIVATIVES (3). *Crosslisted with STAT 584.* Review of financial derivatives including futures, European and American options, and Exotic options. Greeks, trading and hedging strategies. Pricing derivative securities with appropriate boundary conditions, including Black-Scholes formula, binomial trees, lattice models and finite difference methods. Simulation and variance reduction techniques. Interest rate models. **Covers the learning outcomes regarding financial models in the exam MFE of the Society of Actuaries (SOA), which is also the Exam 3F of the Casualty Actuarial Society (CAS).** PRQ: STAT 583 or eConsent of department.

Rationale: Deletion of parent course, STAT 584. The Department of Economics will continue to offer this course since it's a requirement for their programs. STAT 583 is also being deleted, so it will no longer be a part of the PRQ.

Other Catalog Change

Page 229, 2018-19 Graduate Catalog

Master of Arts in Economics

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The M.A. program in economics requires a minimum of 30 semester hours of graduate credit. **The core courses have the prerequisites of ECON 590 - Economic Statistics and Econometrics (3) and ECON 591 - Mathematical Methods for Economics (3). Students are highly encouraged to take those courses as part of their graduate studies regardless of their background.**

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Course Requirements

ECON 660 - Microeconomic Analysis I (3)

ECON 661 - Macroeconomic Analysis I (3)

ECON 690 - Econometrics I (3) ~~A - Econometrics~~ *Online catalog needs to be corrected - the A was deleted

ECON 691 - Research Tools for Economists (3)

ECON 692A - Methods in Economics: **Econometrics (1-2)** *Online catalog needs correcting - course was revised

ECON 699A - **Master's Research Component:** Master's Thesis (1-6), *PDF catalog needs correcting

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OR ECON 699B - **Master's Research Component:** Master's Research Paper (3), *PDF
needs correcting

OR a substantial research paper written in a 500- or 600-level economics course and approved by the professor teaching the course.

Students must choose at least 17 credit elective hours from courses numbered 500 or greater and only six of those 17 credits may be from outside the department with the approval of the Director of Graduate Studies.

Credits from ECON 590, ECON 591, and ECON 798 can not be counted toward the 17 hours of electives.

~~Students with an interest in applied economics are expected to choose elective courses in applied fields such as public economics, labor economics, or financial economics for the remaining hours. Those whose interests are in general economics or who plan to enter the Ph.D. program may elect work in nonapplied areas. In either case, with the prior written consent of the director of graduate studies, students may elect to enroll in up to 6 semester hours of courses related to the student's field of study offered outside the department.~~

Students with an interest in the Concentration in Financial Economics

Students may earn a Concentration in Financial Economics by taking the following courses as part of their 17 hours of electives. ~~are expected to complete the following courses: ECON 584, ECON 740, ECON 742, ECON 791 and STAT 583.~~

ECON 584 - Financial Derivatives (3)

ECON 740 - Financial Economics I (3)

ECON 743 - Financial Economics II (3)

ECON 791 - Computational Economics (2)

STAT 601 - Stochastic Processes (3)

Comprehensive Examinations

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Rationale: These changes reflect three goals. The first is to update the language of the catalog entry and to assist when the catalog is “translated” to MyNIU. We have taken course requirements out of the paragraphs and placed them in the more traditional list form for the catalog. Secondly, we are correcting a couple of mistakes from previous catalogs (the addition of the A to ECON 692) and reflecting changes being proposed by the newly formed Department of Statistics. Finally, we are included the proposed new course, ECON 691, into our program of study.

Other Catalog Change

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Doctor of Philosophy in Economics

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Course Requirements

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All doctoral students must satisfactorily complete a minimum of 60 semester hours of graduate course work, and no more than 12 credit hours may be from 500-level courses, including ECON 648, Introduction to Game Theory (3), ECON 690, Econometrics I (3), ECON 692A, Methods in Economics: Econometrics, ECON 760, Microeconomic Analysis II (3), and ECON 761, Macroeconomic Analysis II (3). Prerequisites for these courses include ECON 590, ECON 591, ECON 660, and ECON 661. Students who have not satisfactorily completed these courses or their equivalents will normally be required to do so.

In addition, each student must take two courses at the 700-level in each of two applied fields and must earn at least a B in each field course. Courses in the applied fields that are the primary focus of the department will be offered on a regular basis. Information about the availability of course work in other applied fields may be obtained by consulting the department's director of graduate studies.

All doctoral students must earn at least 3 credits in ECON 796, Ph.D. Research Seminar in Economics, and 6 semester hours in ECON 798, Current Research Colloquium (at least 2 of the hours in ECON 798 must be taken after the student has passed the candidacy examinations). No more than 12 credits may be counted toward the Ph.D. from 500-level courses.

Prerequisites:

- ECON 590 - Economic Statistics and Econometrics (3)
- ECON 591 - Mathematical Methods for Economics (3)
- ECON 660 - Microeconomic Analysis I (3)
- ECON 661 - Macroeconomic Analysis II (3)

Core Courses:

- ECON 648 - Introduction to Game Theory (3)
- ECON 690 - Econometrics I (3)
- ECON 691 - Research Tools for Economics (3)
- ECON 692A - Methods in Economics: Econometrics (1)
- ECON 760 - Microeconomic Analysis II (3)
- ECON 761 - Macroeconomic Analysis II (3)
- ECON 796 - Research Seminar in Economics (3)
- ECON 798 - Current research Colloquium (8)
- ECON 799 - Dissertation Research (12)

Field Requirements

Student must complete two of the following fields:

Labor Economics

- ECON 700 - Labor Market Analysis I (3)
- ECON 701 - Labor Market Analysis II (3)

Financial Economics

- ECON 740 - Financial Economics I (3)
- ECON 742 - Financial Economics II (3)

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Public Sector Economics

ECON 750 - Public Sector Economics I (3)
ECON 751 - Public Sector Economics II (3)

Econometrics

ECON 790 - Econometrics II (3)
ECON 793 - Financial and Time-Series Economics (3)

Course work in other applied fields may be obtained by consulting the department's Director of Graduate Studies.

Research-Tool Requirement

The Department of Economics research-tool requirement is fulfilled by successfully completing ECON 590, ECON 591, ECON 690, ECON 691, and ECON 692A, which are required in the doctoral program.

Joint M.S. in Statistics

Students in good standing in the Ph.D. in Economics program may request approval by the Department of Statistics to also earn an M.S. in Statistics while they work toward their Ph.D. in Economics. These students must fulfill the requirements for the Econometrics field above in addition to the course work listed below and any thesis or comprehensive exam requirement within the Department of Statistics.

STAT 515 - Statistical Computing (3)
STAT 610 - Theory of Statistics I (3)
STAT 611 - Theory of Statistics II (3)
Two STAT courses 500 level or above (6)
Two STAT courses 600 level or above (6)

Admission to Candidacy

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After successfully completing the candidacy examinations and two courses in an applied field, a Ph.D. student is required to enroll in the Ph.D. Research Seminar in Economics (ECON 796) to write a professional and original research paper in one of his or her their fields of study under the guidance of a research adviser chosen by the student. This paper generally serves as a basis for the student's dissertation. The paper will be evaluated by the research adviser and two additional faculty members approved by the research adviser a committee of three faculty members. Upon receiving a satisfactory evaluation, the student will be admitted to candidacy. The Ph.D. research paper must be successfully evaluated within one year of the initial enrollment in ECON 796 and must will be presented in the weekly research seminar (ECON 798) within one year after completing course work for the applied fields. The student must enroll in ECON 796 every semester until he or she has completed the Ph.D. Research Paper and the presentation in ECON 798. Failure to complete the Ph.D. Research Paper and Presentation within one year after the

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initial enrollment in ECON 796, ~~completing the course work for the applied fields~~ will result in dismissal from the doctoral program. Under exceptional circumstances, **the student and their research adviser may submit a written request to the department's Graduate Committee requesting an extension of this time limit** ~~this time limit may be extended by the department's Graduate Committee.~~

Rationale: The **first** reason for these changes is, again, to bring the catalog language more in line with what is expected in a catalog. Additionally, we are listing the fields separately to make sure the MyNIU set up is correct. Currently students taking courses such as independent studies are having those courses count toward an Econometrics field, no matter the topic, and this is not acceptable. The **second** major addition is the formalization of the joint degree between the PhD in Economics and the MS in Statistics. This has previously been an understanding between the two departments and we are simply formalizing it in the catalog and reflecting the changes being proposed by the newly formed Department of Statistics both in the name of the degree and the course requirements. I have included prints of emails with the department of Statistics chair indicating they are okay with this language for your reference. **Third**, we are changing two course related aspects. The first is the addition of the proposed new course ECON 691 into the requirements and Language Research Tools. Secondly, we are changing the required number of credits for ECON 798 (our seminar series) from six to eight credit hours (it is a one credit class) to ensure that our senior PhD students (who should be attending anyway) actually attend the seminars. **Finally**, we are updating the language for our candidacy requirements.

Other Catalog Change

Page 230, 2018-19 Graduate Catalog

Certificate of Graduate Study

Financial Engineering (15)

Coordinator: Jeremy Groves, Director of Graduate Studies, Department of Economics

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Requirements (9)

~~STAT 583 - Stochastic Processes I (4)~~

ECON 584X - Financial Derivatives (3)

~~OR STAT 584 - Financial Derivative for Actuaries (3)~~

ECON 791 - Computational Economics (2)

STAT 601 - Stochastic Processes (3)

(MATH 535 - Numerical Analysis may be substituted for ECON 791 with consent of department.)

Electives (6)

↓

Rationale: This is simply reflecting changes being proposed by the Department of Statistics in their renumbering of STAT 583 and the removal of STAT 584. Since the course is an existing course already taught by economics, ECON 584X, the department of economics is simply taking over the course and dropping the X designation.

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Division of Statistics

Course Deletion Page 269, 2018-19 Graduate Catalog

STAT 550. BASIC PROBABILITY MODELS AND STATISTICAL INFERENCE (3).

Rationale: This course has not been taught in a long time, and we don't see it being offered in the future.

Course Deletions Page 269-270, 2018-19 Graduate Catalog

STAT 573A. STATISTICAL COMPUTING PACKAGES (1).

STAT 574. STATISTICAL METHODS AND MODELS II (3).

STAT 579. PRACTICE OF BAYESIAN STATISTICS (3).

STAT 591. PROGRAMMING AND COMPUTING IN STATISTICS (3)

STAT 669. METHODS FOR QUALITY CONTROL AND IMPROVEMENT (3).

STAT 674. DESIGN AND ANALYSIS OF EXPERIMENTS (3).

STAT 677. SAMPLING TECHNIQUES (3).

STAT 679. ADVANCED STATISTICAL METHODS (3).

STAT 785. ASYMPTOTIC THEORY OF STATISTICS (3).

Rationale: These courses are outdated and will be replaced by a variety of new courses that are more up-to-date.

Course Deletions Page 269, 2018-19 Graduate Catalog

STAT 581. PROBABILISTIC FOUNDATIONS OF ACTUARIAL SCIENCE (3).

STAT 583. STOCHASTIC PROCESSES I (4).

STAT 584. FINANCIAL DERIVATIVES FOR ACTUARIES (3). *Crosslisted with ECON 584X.*

STAT 585. LIFE CONTINGENCIES AND PAYMENT MODELS I (3).

STAT 586. LIFE CONTINGENCIES AND PAYMENT MODELS II (3).

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Rationale: These courses are actuarial courses, and we currently only offer actuarial degrees at the undergraduate level.

Course Deletion Page 269, 2018-19 Graduate Catalog

STAT 668. METHODS IN BIOSTATISTICS (3).

Rationale: STAT 668 is being merged with STAT 667 into the new and updated STAT 639.

Course Deletion Page 270, 2018-19 Graduate Catalog

STAT 672. THEORY OF STATISTICS (3).

Rationale: STAT 672 is being replaced by STAT 610 and STAT 611.

New Course Page 269, 2018-19 Graduate Catalog

CIP: 27.0502

STAT 511. MATHEMATICAL STATISTICS II (3). Principles of statistical hypothesis testing including the likelihood ratio test, uniformly most powerful tests and Bayesian testing techniques, theory of linear models including multiple linear regression and ANOVA. PRQ: STAT 510.

Rationale: To provide a strong foundation in mathematical development of statistical inference methodology.

Non-Duplication: The Department of Mathematical Sciences was notified with regard to this course and has indicated there is no significant duplication with any of their current course offerings.

New Course Page 269, 2018-19 Graduate Catalog

CIP: 27.0501

STAT 515. STATISTICAL COMPUTING (3). Theory and assessment of commonly used numerical methods in statistical research such as (a) numerical optimization: Newton-Raphson, quasi-Newton, and other methods; (b) numerical integration: adaptive methods, Gauss quadrature, Monte Carlo; (c) Monte Carlo simulation: algorithms and methods for non-standard probability distributions; (d) numerical linear algebra: solving linear and non-linear systems of equations, SVD, Cholesky and other decompositions; (e) numerical roundoff and computer representation of numbers; (f) possibly numerical inversions of probability generating functions and Laplace transforms. PRQ: STAT 510, and either CSCI 230 or CSCI 240, or consent of the department.

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Rationale: The lectures aim at numerical methods useful for statistical research, and numerical analysis useful for writing statistical software (e.g. numerical linear algebra, optimization, generation of pseudo-random numbers).

Non-Duplication: The Departments of Computer Science and Mathematical Sciences were notified with regard to this course and have indicated there is no significant duplication with any of their current course offerings.

New Course Page 269, 2018-19 Graduate Catalog

CIP: 27.0501

STAT 517. APPLIED STATISTICAL LEARNING (3). Modern statistical methods for supervised and unsupervised learning with an emphasis on model assessment, selection, and regularization. Practical problems are solved using statistical software packages. A particular emphasis is placed on high dimensional problems. PRQ: STAT 510 or consent of department.

Rationale: By the advancement of technology, data-driven statistical decision-makings are showing desirable and nice performance. This course will provide a chance to learn statistical methods to utilize the data in decision-making and also to apply the methods to some practical problems using available software packages. In particular, this course will make students meet the expectation of statisticians for the emerging fields of big data analysis and deep learning.

Non-Duplication: The Departments of Computer Science, Operations Management and Information Systems, and Mathematical Sciences were notified with regard to this course and have indicated there is no significant duplication with any of their current course offerings.

New Course Page 269, 2018-19 Graduate Catalog

CIP: 27.0501

STAT 536. DESIGN AND ANALYSIS OF EXPERIMENTS (3). Design and analysis of single, multifactor, factorial, nested, and randomized block designs. PRQ: STAT 535.

Rationale: This is a new course introduced for the revised M.S. in Statistics. It is a replacement of part of the contents in the current course STAT 574.

Non-Duplication: The Department of Mathematical Sciences was notified with regard to this course and has indicated there is no significant duplication with any of their current course offerings.

New Course Page 269, 2018-19 Graduate Catalog

CIP: 27.0501

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STAT 537. CATEGORICAL DATA ANALYSIS (3). Contingency tables. Poisson, binomial, and multinomial regression techniques. PRQ: STAT 535.

Rationale: This is a new course introduced for the revised M.S. in Statistics. It is a replacement of part of the contents in the current course STAT 574.

Non-Duplication: The Department of Mathematical Sciences was notified with regard to this course and has indicated there is no significant duplication with any of their current course offerings.

New Course Page 269, 2018-19 Graduate Catalog

CIP: 27.0501

STAT 610. THEORY OF STATISTICS I (3). Axiomatic foundations of probability, random variables and vectors, expectation, families of distributions, and transformations of random variables and vectors, convergence of distributions, convergence of random variables, derived distributions, distribution of the sample mean and variance. PRQ: STAT 500 or consent of the department.

Rationale: The course STAT 672 is to be deleted from the graduate catalog and replaced by two courses STAT 610 and STAT 611 to allow more detailed coverage of the foundations of statistical theory in support of the revised M. S. program in statistics.

Non-Duplication: The Department of Mathematical Sciences was notified with regard to this course and has indicated there is no significant duplication with any of their current course offerings.

New Course Page 269, 2018-19 Graduate Catalog

CIP: 27.0501

STAT 611. THEORY OF STATISTICS II (3). Principles of data reduction, sufficiency, point estimation including method of moments, Bayesian and likelihood methods, evaluation of point estimators, developing and evaluating statistical hypothesis tests including likelihood ratio and Bayesian tests, interval estimation, asymptotic considerations. PRQ: STAT 610 or consent of the department.

Rationale: The course STAT 672 is to be deleted from the graduate catalog and replaced by two courses STAT 610 and STAT 611 to allow more detailed coverage of the foundations of statistical theory in support of the revised M. S. program in statistics.

Non-Duplication: The Department of Mathematical Sciences was notified with regard to this course and has indicated there is no significant duplication with any of their current course offerings.

New Course Page 269, 2018-19 Graduate Catalog

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CIP: 27.0501

STAT 617. STATISTICAL LEARNING (3). Supervised learning algorithms such as classification, regression, splines, lasso and other shrinkage methods, bootstrap, boosting, tree based methods and support vector machines, and unsupervised learning algorithms such as clustering and principal components analysis. PRQ: STAT 510 or STAT 537 or consent of department.

Rationale: This course is the same as STAT 681 in the old catalog. This proposal is to update the catalog.

Non-Duplication: The Departments of Computer Science, Economics, and Mathematical Sciences were notified with regard to this course and have indicated there is no significant duplication with any of their current course offerings.

New Course Page 269, 2018-19 Graduate Catalog

CIP: 27.0501

STAT 639. SURVIVAL ANALYSIS (3). Censoring, Kaplan-Meier estimator, log-rank tests, Cox proportional hazards and accelerated failure time regression models, diagnostics, competing risks and frailty models. PRQ: STAT 510 or consent of department.

Rationale: To introduce fundamental concepts and statistical methods are useful in medical follow-up studies and in general time-to-event studies.

Non-Duplication: The Department of Mathematical Sciences was notified with regard to this course and has indicated there is no significant duplication with any of their current course offerings.

New Course Page 269, 2018-19 Graduate Catalog

CIP: 27.0501

STAT 640. LONGITUDINAL DATA ANALYSIS (3). Repeated measure ANOVA and MANOVA, linear mixed models, generalized linear mixed models, generalized estimating equations. Possible additional topics include analysis of data from crossover designs, and statistical validation of questionnaires. PRQ: STAT 510 and STAT 535, or consent of department.

Rationale: This is a new graduate course introduced for the new Master's degree in Statistics at the Division of Statistics.

Non-Duplication: The Department of Mathematical Sciences was notified with regard to this course and has indicated there is no significant duplication with any of their current course offerings.

New Course Page 269, 2018-19 Graduate Catalog

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CIP: 27.0501

STAT 642. QUANTITATIVE RISK MANAGEMENT (3). Risk measures; statistical methods in extreme value theory; multivariate distributions and dependence; elliptical distributions and copulas; credit risk modeling; operational risk and insurance analytics. PRQ: STAT 500 or consent of department.

Rationale: The lectures aim at motivating and explaining key concepts and technical skills that the financial and/or insurance industries require for those quantitatively oriented positions.

Non-Duplication: The Department of Mathematical Sciences was notified with regard to this course and has indicated there is no significant duplication with any of their current course offerings.

New Course Page 269, 2018-19 Graduate Catalog

CIP: 27.0501

STAT 644. GENERALIZED LINEAR MODELS (3). Topics on generalized linear models, such as the exponential family of distributions, maximum likelihood estimation and inference, normal linear models, logistic regression for binary outcomes, nominal and ordinal logistic models, and Poisson regression and log-linear models. PRQ: STAT 611 or consent of department.

Rationale: This is a new graduate course introduced for the new Master's degree in Statistics at the Division of Statistics.

Non-Duplication: The Department of Mathematical Sciences was notified with regard to this course and has indicated there is no significant duplication with any of their current course offerings.

Course Revision Page 269, 2018-19 Graduate Catalog

STAT ~~570~~ 500. INTRODUCTION TO PROBABILITY THEORY (3). Includes probability spaces, random variables, discrete, continuous, mixed probability distributions, moment generating functions, multivariate distributions, conditional probability, conditional expectation, special distributions, laws of large numbers, and central limit theorem. PRQ: MATH 232 and STAT 350, or consent of ~~division~~ department. CRQ: MATH 240 or consent of ~~division~~ department.

Rationale: Course revisions related to the creation of the new Department of Statistics and Actuarial Sciences are being accomplished by copying over much of the current language, and updating course numbering and language for accuracy and consistency with the creation of the new department and degree programs. Updating “Consent of division” to “Consent of department.”

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STAT 572 ~~510~~. ~~INTRODUCTION TO MATHEMATICAL STATISTICS I~~ (3). ~~Includes~~
~~d~~Distributions of functions of random variables, ~~laws of large numbers, central limit theorem,~~
interval estimation, sufficiency, completeness, point estimation, ~~and principles of Bayesian~~
~~estimation~~ ~~statistical hypotheses, analysis of variance, and the multivariate normal distribution.~~
PRQ: ~~STAT 400 or ACSC 400X, or~~ STAT 570 ~~500;~~ or consent of ~~division~~ department.

Rationale: Course revisions related to the creation of the new Department of Statistics and Actuarial Sciences are being accomplished by copying over much of the current language, and updating course numbering and language for accuracy and consistency with the creation of the new department and degree programs. Updating “Consent of division” to “Consent of department.”

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STAT 573 ~~535~~ ~~STATISTICAL METHODS AND MODELS I~~ ~~APPLIED REGRESSION~~
~~ANALYSIS~~ (3). ~~A first course in statistical methods and models including~~ ~~In-depth~~ exploratory
data analysis and graphical techniques, ~~and statistical methods for~~ regression analysis;
experimental design, and basic sampling techniques. ~~Extensive use of statistical computer~~
~~packages. Includes techniques for model selection, assessment of influential observations, and~~
~~verification of model assumptions.~~ PRQ: ~~MATH 211 and STAT 301~~ 300, or STAT 350, or
consent of ~~division~~ department. CRQ: STAT 573A.

Rationale: Course revisions related to the creation of the new Department of Statistics and Actuarial Sciences are being accomplished by copying over much of the current language, and updating course numbering and language for accuracy and consistency with the creation of the new department and degree programs. Updating “Consent of division” to “Consent of department.”

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STAT 578 ~~538~~. ~~STATISTICAL METHODS~~ ~~APPLIED ANALYSIS~~ OF ~~TIME SERIES~~
~~FORECASTING~~ (3). ~~Introduction to forecasting including use of regression in forecasting;~~
~~r~~Removal and estimation of trend and seasonality; ~~exponential smoothing; stochastic time series~~
~~models; stochastic difference equations;~~ autoregressive, moving average, and mixed models;
model identification and estimation; diagnostic checking; and the use of time series models in
forecasting. PRQ: STAT ~~573~~ 535 or consent of ~~division~~ department.

Rationale: Course revisions related to the creation of the new Department of Statistics and Actuarial Sciences are being accomplished by copying over much of the current language, and updating course numbering and language for accuracy and consistency with the creation of the new department and degree programs. Updating “Consent of division” to “Consent of department.”

Course Revision Page 269, 2018-19 Graduate Catalog

STAT ~~665~~ 635. REGRESSION ANALYSIS (3). Simple and multiple linear regression,
estimation, confidence intervals and tests, and prediction. ~~Theoretical analysis of the effect of~~
~~departures from assumptions. Theoretical development of~~ ~~D~~diagnostic methods using residuals,

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transformations, outliers, and influence analysis. ~~Polynomial regression, stepwise variable selection, and collinearity.~~ Remedies for departures from assumptions. Theory of model selection. Regularization methods including ridge regression and lasso techniques. PRQ: STAT 574 611 or consent of ~~division~~ department.

Rationale: Course revisions related to the creation of the new Department of Statistics and Actuarial Sciences are being accomplished by copying over much of the current language, and updating course numbering and language for accuracy and consistency with the creation of the new department and degree programs. Updating “Consent of division” to “Consent of department.”

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STAT ~~666~~ 637. MODELS FOR DISCRETE MULTIVARIATE DATA ANALYSIS (3). A first course in the analysis of discrete data including two-dimensional tables, the log linear model, goodness-of-fit of the model, measures of dependence, three and higher dimensional tables, hierarchical models, model selection, ordered categories, logit model, zero frequency problem, and introduction to Bayesian analysis of categorical data. In addition, multivariate version of Binomial and Poisson distribution will be reviewed. PRQ: STAT 572 510 and STAT 574 537, or consent of ~~division~~ department.

Rationale: Course revisions related to the creation of the new Department of Statistics and Actuarial Sciences are being accomplished by copying over much of the current language, and updating course numbering and language for accuracy and consistency with the creation of the new department and degree programs. Updating “Consent of division” to “Consent of department.”

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STAT 667. RELIABILITY AND LIFE TESTING (3). Survival function, failure rate, types of censored data, estimation for parametric models, accelerated life tests, competing risks, and Bayesian analysis of survival data. PRQ: STAT 572 510 and STAT 574, or consent of ~~division~~ department.

Rationale: Course revisions related to the creation of the new Department of Statistics and Actuarial Sciences are being accomplished by copying over much of the current language, and updating course numbering and language for accuracy and consistency with the creation of the new department and degree programs. Updating “Consent of division” to “Consent of department.”

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STAT ~~670~~ 600. PROBABILITY THEORY (3). Review of measures, measurable functions, and algebras of events. Random variables and their moments and characteristic function. Sequences of random variables and various modes of convergence. Borel-Cantelli Lemma and Kolmogorov 0-1 law. Weak and strong laws of large numbers. Convergence in distributions and central limit theorems. Conditional expectation and martingales. Brownian motion and stochastic processes. PRQ: MATH 630 and STAT 570 500, or consent of ~~division~~ department.

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Rationale: Course revisions related to the creation of the new Department of Statistics and Actuarial Sciences are being accomplished by copying over much of the current language, and updating course numbering and language for accuracy and consistency with the creation of the new department and degree programs. Updating “Consent of division” to “Consent of department.”

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STAT ~~674~~ 601. STOCHASTIC PROCESSES II (3). Markov chains and processes. Brownian motion and Gaussian processes. Point processes and renewal processes. Martingales and weakly dependent stochastic processes. Convergence of stochastic processes. PRQ: STAT ~~670~~ 600 or consent of ~~division~~ department.

Rationale: Course revisions related to the creation of the new Department of Statistics and Actuarial Sciences are being accomplished by copying over much of the current language, and updating course numbering and language for accuracy and consistency with the creation of the new department and degree programs. Updating “Consent of division” to “Consent of department.”

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STAT ~~673~~ 643. LINEAR MODELS (3). Theory of linear models with applications to the analysis of variance and regression and to the design of experiments. PRQ: ~~STAT 572 and STAT 574, or consent of division.~~ CRQ: STAT 611 or consent of department.

Rationale: Course revisions related to the creation of the new Department of Statistics and Actuarial Sciences are being accomplished by copying over much of the current language, and updating course numbering and language for accuracy and consistency with the creation of the new department and degree programs. Updating “Consent of division” to “Consent of department.”

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STAT ~~675~~ 645. MULTIVARIATE ~~METHODS OF~~ STATISTICS (3). Introduction to the techniques of multivariate analysis including description of multivariate data, reducing the dimension, principal components, factor analysis, estimation and testing for the parameters in multinormal populations, and multivariate analysis of variance. Problems which involve the use of computers will be treated. PRQ: STAT ~~510~~ 572 ~~or STAT 574,~~ or consent of ~~division~~ department.

Rationale: Course revisions related to the creation of the new Department of Statistics and Actuarial Sciences are being accomplished by copying over much of the current language, and updating course numbering and language for accuracy and consistency with the creation of the new department and degree programs. Updating “Consent of division” to “Consent of department.”

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STAT ~~676~~ **646**. ~~DISTRIBUTION FREE~~ **NON-PARAMETRIC** STATISTICS (3). ~~Survey of nonparametric statistical techniques and their logical foundations including the distributions of~~ **Order statistics and ranks, distribution free statistics, tests of hypotheses, confidence intervals and Hodges-Lehmann estimators for one sample, two sample, and paired sample location problems, the two sample dispersion problem, analysis of one-way and two-way layouts, tests of independence, goodness-of-fit tests, linear rank statistics, and U-statistics. Asymptotic relative efficiency. Nonparametric density estimation and regression, kernel methods, bandwidth selection, roughness penalties. Nonparametric resampling methods, standard error estimation, bootstrap confidence intervals, bootstrap tests. Nonparametric observed confidence levels.** PRQ: STAT ~~611~~ **572** or STAT ~~574~~, or consent of ~~division~~ **department**.

Rationale: Course revisions related to the creation of the new Department of Statistics and Actuarial Sciences are being accomplished by copying over much of the current language, and updating course numbering and language for accuracy and consistency with the creation of the new department and degree programs. Updating “Consent of division” to “Consent of department.”

Course Revision

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STAT ~~678~~ **638**. TIME SERIES ANALYSIS (3). Models for analysis of time series data including mean and covariance functions of stationary time series, moving average, autoregressive and mixed models, identification and estimation in ARMA (p,q) models, asymptotic properties of estimators, periodogram and spectral analysis, and regression with time series error. PRQ: STAT ~~510~~ **572** and STAT ~~574~~, or consent of ~~division~~ **department**.

Rationale: Course revisions related to the creation of the new Department of Statistics and Actuarial Sciences are being accomplished by copying over much of the current language, and updating course numbering and language for accuracy and consistency with the creation of the new department and degree programs. Updating “Consent of division” to “Consent of department.”

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STAT ~~680~~ **625**. BAYESIAN STATISTICS (3). ~~Topics include~~ Bayesian inference, **L**oss function and **R**isk, **O**ne parameter models and posterior inference, conjugate priors, non-informative priors, **M**ulti-parameter models, Bayesian computation, Gibbs sampling and Markov **C**hain Monte Carlo **M**ethods and **A**pplications in different areas. Additional topics may include **D**ecision theory, **T**heoretical and convergence properties of the Markov chain samplers, Bayesian model checking, selection and assessment criteria, **H**ierarchical models, Bayesian survival analysis. PRQ: STAT ~~510~~ **572** and STAT ~~579~~, or consent of ~~division~~ **department**.

Rationale: Course revisions related to the creation of the new Department of Statistics and Actuarial Sciences are being accomplished by copying over much of the current language, and updating course numbering and language for accuracy and consistency with the creation of the new department and degree programs. Updating “Consent of division” to “Consent of department.”

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Course Revision

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~~STAT 694~~ 695. STATISTICAL CONSULTING (3). Content varies and involves participation in actual consulting projects; Topics may include statistical techniques commonly used in solving real life problems, model for problem formulation; given specific data and research questions, identification of parameters and solutions; client-consultant interaction techniques; ill-posed problems and their formulation; management of consulting time, facilities, and personnel. Participation under supervision in actual consulting projects. PRQ: STAT 574 or eConsent of division ~~department~~. CRQ: STAT 572.

Rationale: Course revisions related to the creation of the new Department of Statistics and Actuarial Sciences are being accomplished by copying over much of the current language, and updating course numbering and language for accuracy and consistency with the creation of the new department and degree programs. Updating “Consent of division” to “Consent of department.”

Course Revision

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~~STAT 693~~ 697. GRADUATE READING IN PROBABILITY AND STATISTICS INDEPENDENT STUDY (1-9). May be repeated to a maximum of 9 semester hours. PRQ: Consent of ~~division~~ department.

Rationale: Course revisions related to the creation of the new Department of Statistics and Actuarial Sciences are being accomplished by copying over much of the current language, and updating course numbering and language for accuracy and consistency with the creation of the new department and degree programs. Updating “Consent of division” to “Consent of department.”

Course Revision

Page 270, 2018-19 Graduate Catalog

STAT 699. MASTER’S THESIS (1-6). May be repeated to a maximum of 6 semester hours. PRQ: Consent of ~~division~~ department.

Rationale: Course revisions related to the creation of the new Department of Statistics and Actuarial Sciences are being accomplished by copying over much of the current language, and updating course numbering and language for accuracy and consistency with the creation of the new department and degree programs. Updating “Consent of division” to “Consent of department.”

Course Revision

Page 270, 2018-19 Graduate Catalog

STAT 775. TOPICS IN STATISTICS (3). Content varies; may include courses in linear models, estimation, hypothesis testing, decision theory, and Bayesian inference. May be repeated to a maximum of 15 semester hours. PRQ: Consent of ~~division~~ department.

Rationale: Course revisions related to the creation of the new Department of Statistics and Actuarial Sciences are being accomplished by copying over much of the current language, and updating course

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numbering and language for accuracy and consistency with the creation of the new department and degree programs. Updating “Consent of division” to “Consent of department.”

Course Revision

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STAT 790. SEMINAR IN STATISTICS (1-9). Discussions on topics in advanced probability and statistics as scheduled. Topics include but are not limited to probability theory, stochastic processes, statistical inference, nonparametric statistics, multivariate analysis, linear and nonlinear models, discrete data analysis, time series. One to 9 semester hours as scheduled. May be repeated to a maximum of 24 semester hours, not more than 15 of which may be on a single topic. PRQ: Consent of ~~division~~ department.

Rationale: Course revisions related to the creation of the new Department of Statistics and Actuarial Sciences are being accomplished by copying over much of the current language, and updating course numbering and language for accuracy and consistency with the creation of the new department and degree programs. Updating “Consent of division” to “Consent of department.”

Other Catalog Change

Page 149, 2018-19 Graduate Catalog

Department of Industrial and Systems Engineering (ISYE)

↓

Master of Science in Industrial and Systems Engineering

↓

Specialization in Engineering Management (30)

↓

Choose Track 1 OR Track 2

Track 1- Engineering Decision Analysis

Three of the following (9)

ISYE 535 - Experimental Design for Engineering (3)

ISYE 575 - Decision Analysis for Engineering (3)

ISYE 635 - Advanced Experimental Design for Engineering (3),

~~OR STAT 674 - Design and Analysis of Experiments (3)~~

ISYE 670 - Data Analytics for Engineers (3)

↓

Certificates of Graduate Study

↓

Lean Six Sigma (12)

↓

Four of the following (12)

ISYE 535 - Experimental Design for Engineering (3),

~~OR STAT 674 - Design and Analysis of Experiments (3)~~

ISYE 539 - Six Sigma Excellence and Modern Problem Solving (3)

↓

Rationale: Deletion of STAT 674.

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Notification: The Department of Industrial and Systems Engineering was notified of this change via email on DATE.

Other Catalog Change Page 209, 2018-19 Graduate Catalog

Department of Biological Sciences (BIOS)

↓

Specialization in Bioinformatics

↓

Requirements

↓

Two of the following² (6-7)

BIOS 513 - Microbial Physiology (4)

↓

MATH 560 - Modeling Dynamical Systems (3)

STAT 573 **535** - ~~Statistical Methods and Models I~~ **Applied Regression Analysis** (3)

and ~~STAT 573A - Statistical Computing Packages~~ (1)

~~STAT 574 - Statistical Methods and Models II~~ (3)

Specialization in Human Anatomical Sciences

↓

Rationale: Deletion of STAT 573A and 574. Revision of STAT 573 (now 535).

Notification: The Department of Biological Sciences was notified of this change via email on DATE.

Other Catalog Change Page 211, 2018-19 Graduate Catalog

Department of Biological Sciences (BIOS)

↓

Certificate of Graduate Study

Bioinformatics (16-17)

↓

Two of the following² (6-7)

BIOS 513 - Microbial Physiology (4)

↓

MATH 560 - Modeling Dynamical Systems (3)

STAT 573 **535** - ~~Statistical Methods and Models I~~ **Applied Regression Analysis** (3)

and ~~STAT 573A - Statistical Computing Packages~~ (1)

~~STAT 574 - Statistical Methods and Models II~~ (3)

If the student has completed the equivalent of BIOS 567,

Course List (BIOS)

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Rationale: Deletion of STAT 573A and 574. Revision of STAT 573 (now 535).

Notification: The Department of Biological Sciences was notified of this change via email on DATE.

Other Catalog Change

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Department of Mathematical Sciences (MATH, STAT)

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Master of Science in Applied Probability and Statistics

~~At the time of admission each student is expected to have completed a standard three-course sequence in calculus and a course in elementary linear algebra. Courses equivalent to CSCI 230 and one from STAT 470 and STAT 473, must also have been completed. Any deficiencies should be removed at the beginning of the student's program.~~

~~The student learning outcomes for this degree are located at <http://www.niu.edu/assessment/clearinghouse/outcomes/index.shtml>.~~

Requirements

~~Complete at least 33 semester hours of graduate work, not more than 50 percent of which may be in courses numbered 500-599. At least 15 semester hours must be courses offered by the Department of Mathematical Sciences and numbered 600 or above.~~

~~Follow a program of study approved by the Department of Mathematical Sciences.~~

~~Pass a comprehensive examination based upon his or her plan of study. Usually, a student pursuing full-time graduate study will be required to take the comprehensive examination within two academic years of admission to the Graduate School. A student who fails the examination may, with the permission of the department, repeat it once.~~

Course Requirements

~~With the consent of the department, a student may include STAT 699, Master's Thesis, for 3 semester hours of credit, in the 33 semester hours required for a master's degree.~~

~~STAT 572—Introduction to Mathematical Statistics (3)~~

~~STAT 574—Statistical Methods and Models II (3)~~

~~STAT 672—Theory of Statistics (3)~~

~~STAT 673—Linear Models (3)~~

~~STAT 691—Statistical Consulting (3)~~

~~Four of the following (12-13)~~

~~STAT 578—Statistical Methods of Forecasting (3)~~

~~STAT 579—Practice of Bayesian Statistics (3)~~

~~STAT 583—Stochastic Processes I (4)~~

~~STAT 665—Regression Analysis (3)~~

~~STAT 666—Discrete Multivariate Data Analysis (3)~~

~~STAT 667—Reliability and Life Testing (3)~~

~~STAT 668—Methods in Biostatistics (3)~~

~~STAT 669—Methods for Quality Control and Improvement (3)~~

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~~STAT 674—Design and Analysis of Experiments (3)~~
~~STAT 675—Multivariate Methods of Statistics (3)~~
~~STAT 676—Distribution Free Statistics (3)~~
~~STAT 677—Sampling Techniques (3)~~
Two additional courses as follows (6)
One STAT course numbered above 600 (3)
One STAT course numbered 500 or above, or a graduate level course that has been approved by the Division of Statistics (3)

Rationale: Program is not being deleted. It will be housed in the new Department of Statistics.

Other Catalog Change Page 265, 2018-19 Graduate Catalog

Department of Mathematical Sciences (MATH, STAT)

↓

Certificates of Graduate Study

~~Applied Statistics (12)~~

~~This certificate is designed for graduate students in a variety of disciplines, including engineering, the humanities, social sciences, and sciences, who seek to advance their skills and expertise in data analyses, statistical modeling, and quantitative research. Courses taken to meet the requirements of the certificate may be applied towards the M.S. degree in applied probability and statistics with approval of the department.~~

~~Four of the following (12)~~

- ~~STAT 665—Regression Analysis (3)~~
- ~~STAT 666—Discrete Multivariate Data Analysis (3)~~
- ~~STAT 669—Methods for Quality Control and Improvement (3)~~
- ~~STAT 674—Design and Analysis of Experiments (3)~~
- ~~STAT 675—Multivariate Methods of Statistics (3)~~
- ~~STAT 677—Sampling Techniques (3)~~

Rationale: Program is not being deleted. It will be housed in the new Department of Statistics.

Other Catalog Change Page 269-270, 2018-19 Graduate Catalog

Course List (MATH)

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Statistics (STAT)

~~Statistics (STAT)~~

~~550. BASIC PROBABILITY MODELS AND STATISTICAL INFERENCE (3). Topics include probability, probability distributions and models, introduction to elementary stochastic processes and elementary statistical inference. Not open to students who have taken STAT 350 or its equivalent. PRQ: MATH 230 or consent of division.~~

~~570. INTRODUCTION TO PROBABILITY THEORY (3). Includes probability spaces, random variables, discrete, continuous, mixed probability distributions, moment generating functions,~~

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~~multivariate distributions, conditional probability, conditional expectation, special distributions, laws of large numbers, and central limit theorem. PRQ: MATH 232 and STAT 350, or consent of division. CRQ: MATH 240 or consent of division.~~

~~572. INTRODUCTION TO MATHEMATICAL STATISTICS (3). Includes distributions of functions of random variables, interval estimation, sufficiency, completeness, point estimation, statistical hypotheses, analysis of variance, and the multivariate normal distribution. PRQ: STAT 570 or consent of division.~~

~~573. STATISTICAL METHODS AND MODELS I (3). A first course in statistical methods and models including exploratory data analysis and graphical techniques, regression analysis, experimental design, and basic sampling techniques. Extensive use of statistical computer packages. PRQ: MATH 211 and STAT 301, or STAT 350, or consent of division. CRQ: STAT 573A.~~

~~573A. STATISTICAL COMPUTING PACKAGES (1). Introduction to statistical computing with the aid of software packages. Data entry, transformations, simple plots, summary statistics, and statistical procedures. No previous computer experience is required. PRQ: MATH 211 and STAT 301, or STAT 350, or consent of division. CRQ: STAT 573 or consent of division.~~

~~574. STATISTICAL METHODS AND MODELS II (3). Continuation of STAT 573. Topics include factorial experiments: interactions, nested models, and randomized block designs. Categorical response data analysis: ordinal data, measures of association, Cochran-Mantel-Haenszel Test, logistic regression, and measures of agreement. PRQ: STAT 573 and STAT 573A, or consent of division.~~

~~578. STATISTICAL METHODS OF FORECASTING (3). Introduction to forecasting including use of regression in forecasting; removal and estimation of trend and seasonality; exponential smoothing; stochastic time series models; stochastic difference equations; autoregressive, moving average, and mixed models; model identification and estimation; diagnostic checking; and the use of time series models in forecasting. PRQ: STAT 573 or consent of division.~~

~~579. PRACTICE OF BAYESIAN STATISTICS (3). Introduction to Bayesian data analysis and applications with appropriate software. Topics include Bayes Theorem, discrete and continuous single parameter models, comparison of Bayesian and non-Bayesian inference, multiparameter and hierarchical models, Bayesian computation including Markov chain simulation, mixture models, Bayesian sample size determination and applications to modeling data from a wide variety of areas in business, engineering, and science. PRQ: STAT 350 and STAT 573, or consent of division.~~

~~581. PROBABILISTIC FOUNDATIONS OF ACTUARIAL SCIENCE (3). Actuarial populations. Univariate parametric actuarial distributions including Weibull and Pareto. Multivariate actuarial distributions. Exact and asymptotic relationships among these distributions. Mixtures of distributions. Jointly discrete, continuous, and mixed distributions. Moment, cumulant, and probability generating functions. Transformations of variables, and in-depth study of conditioning, for multivariate distributions. Basic theory of individual and collective risk models for aggregate loss from insurance policies. PRQ: STAT 570 or consent of division.~~

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~~583. STOCHASTIC PROCESSES I (4). Review of probabilistic tools including conditioning for joint distributions. Random sums. Finite dimensional properties of discrete time Markov chains. Homogeneous, and nonhomogeneous, Poisson and compound Poisson processes. Thinning and summing of independent Poisson processes. Brownian motion processes. Introduction to the SDE and Ito's lemma. PRQ: STAT 570 or consent of division.~~

~~584. FINANCIAL DERIVATIVES FOR ACTUARIES (3). *Crosslisted with ECON 584X.* Review of financial derivatives including futures, European and American options, Exotic options. Greeks, trading and hedging strategies. Pricing derivative security with appropriate boundary conditions, including Black Scholes formula, binomial trees, lattice models and finite difference methods. Simulation and variance reduction techniques. Interest rate models. Covers all the learning outcomes regarding financial models of the exam MFE of the Society of Actuaries (SOA), which is also the Exam 3F of the Casualty Actuarial Society (CAS). PRQ: STAT 583 or consent of division.~~

~~585. LIFE CONTINGENCIES AND PAYMENT MODELS I (3). Survival time distributions and their curtate versions, for one or two lives, possibly dependent, truncated, or censored. Mortality tables, aggregate, select and ultimate, and their use in modeling continuous life time data. Present value of benefit distributions for life insurances and annuities in the single and multiple-decrement models. PRQ: STAT 382 and STAT 570, or consent of division.~~

~~586. LIFE CONTINGENCIES AND PAYMENT MODELS II (3). Premium calculations for life insurances and annuities via percentiles and the equivalence principle. Liability calculations for life insurances and annuities via the prospective, retrospective methods. Calculation of reserves for fully discrete life insurances. Discussions of the above for single and multiple decrement models. Extend the present value of benefit, present value of loss at issue, present value of future loss random variables and liabilities to discrete time Markov Chain models. PRQ: STAT 585 or consent of division.~~

~~591. PROGRAMMING AND COMPUTING IN STATISTICS (3). A study of algorithms useful for implementing computer intensive techniques in statistical inference and probability. Topics include computation of maximum likelihood estimators, bootstrap approximation, randomization and permutation testing techniques, Bayesian techniques, approximation of distribution functions and quantiles, simulation of random variables and stochastic processes. Implementation of the algorithms is achieved using the C++ (or C or FORTRAN) and R programming languages, as well as other specialized statistical computation software. PRQ: STAT 572 and either CSCI 230 or CSCI 240, or consent of division.~~

~~665. REGRESSION ANALYSIS (3). Simple and multiple linear regression, estimation, confidence intervals and tests, and prediction. Diagnostic methods using residuals, transformations, outliers, and influence analysis. Polynomial regression, stepwise variable selection, and collinearity. PRQ: STAT 574 or consent of division.~~

~~666. DISCRETE MULTIVARIATE DATA ANALYSIS (3). A first course in the analysis of discrete data including two dimensional tables, the log linear model, goodness of fit of the model, measures of dependence, three and higher dimensional tables, hierarchical models, model selection, ordered categories, logit model, zero frequency problem, and introduction to Bayesian analysis of categorical data. PRQ: STAT 572 and STAT 574, or consent of division.~~

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~~667. RELIABILITY AND LIFE TESTING (3). Survival function, failure rate, types of censored data, estimation for parametric models, accelerated life tests, competing risks, and Bayesian analysis of survival data. PRQ: STAT 572 and STAT 574, or consent of division.~~

~~668. METHODS IN BIOSTATISTICS (3). Survival function, failure rate, types of censored data, life tables, regression models for life time data, bioassay, direct assay, indirect assays with quantitative response, and clinical trials. PRQ: STAT 572 and STAT 574, or consent of division.~~

~~669. METHODS FOR QUALITY CONTROL AND IMPROVEMENT (3). Control charts for attributes and variables, special control charts, process control techniques, acceptance sampling, process capability, Taguchi's approach to improving quality of a product, and the philosophy of Deming. PRQ: STAT 572 and STAT 574, or consent of division.~~

~~670. PROBABILITY THEORY (3). Review of measures, measurable functions, and algebras of events. Random variables and their moments and characteristic function. Sequences of random variables and various modes of convergence. Borel-Cantelli Lemma and Kolmogorov 0-1 law. Weak and strong laws of large numbers. Convergence in distributions and central limit theorems. Conditional expectation and martingales. Brownian motion and stochastic processes. PRQ: MATH 630 and STAT 570, or consent of division.~~

~~671. STOCHASTIC PROCESSES II (3). Markov chains and processes. Brownian motion and Gaussian processes. Point processes and renewal processes. Martingales and weakly dependent stochastic processes. Convergence of stochastic processes. PRQ: STAT 670 or consent of division.~~

~~672. THEORY OF STATISTICS (3). Exponential class, elements of decision theory, unbiased estimation, shrinkage estimators, methods for estimating standard errors, multiparameter estimation, generalized likelihood ratio tests, sequential probability ratio test, and linear models. PRQ: STAT 572 or consent of division.~~

~~673. LINEAR MODELS (3). Theory of linear models with applications to the analysis of variance and regression and to the design of experiments. PRQ: STAT 572 and STAT 574, or consent of division.~~

~~674. DESIGN AND ANALYSIS OF EXPERIMENTS (3). Intermediate course in the design and analysis of experiments including linear models of less than full rank, distributions of quadratic forms, estimable functions; confounding, fractional replication; incomplete block, hierarchical, Latin square, cross-over, split plot, repeated measures and related designs, response surface methods, covariance analysis. PRQ: STAT 572 and STAT 574, or consent of division.~~

~~675. MULTIVARIATE METHODS OF STATISTICS (3). Introduction to the techniques of multivariate analysis including description of multivariate data, reducing the dimension, principal components, factor analysis, estimation and testing for the parameters in multinormal populations, and multivariate analysis of variance. Problems which involve the use of computers will be treated. PRQ: STAT 572 or STAT 574, or consent of division.~~

~~676. DISTRIBUTION FREE STATISTICS (3). Survey of nonparametric statistical techniques and their logical foundations including the distributions of order statistics and ranks, tests of hypotheses, confidence intervals and Hodges-Lehmann estimators for one sample, two sample,~~

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~~and paired sample location problems, the two sample dispersion problem, analysis of one way and two way layouts, tests of independence, goodness of fit tests, linear rank statistics, and U-statistics. PRQ: STAT 572 or STAT 574, or consent of division.~~

~~677. SAMPLING TECHNIQUES (3). Introduction to sample survey techniques and sampling theory including estimation of population parameters based on simple random sampling, cluster sampling, stratified sampling, and ratio sampling. Includes a summary of recent advances in sampling theory and discussions of practical problems and sources of error in surveys. PRQ: STAT 572 or STAT 574, or consent of division.~~

~~678. TIME SERIES ANALYSIS (3). Models for analysis of time series data including mean and covariance functions of stationary time series, moving average, autoregressive and mixed models, identification and estimation in ARMA (p,q) models, asymptotic properties of estimators, periodogram and spectral analysis, and regression with time series error. PRQ: STAT 572 and STAT 574, or consent of division.~~

~~679. ADVANCED STATISTICAL METHODS (3). Various topics discussed from the perspective of modeling and analyzing data. Emphasis on application of statistical methodology. Data analytic techniques illustrated with several types of data including categorical data, multivariate data, survival data, linear and nonlinear regression data, time series data, and data from designed experiments. Extensive use of modern statistical software. PRQ: STAT 572 and STAT 574, or consent of division. Recommended: MATH 662.~~

~~680. BAYESIAN STATISTICS (3). Topics include Bayesian inference, Loss function and Risk, One parameter models and posterior inference, conjugate priors, non-informative priors, Multi parameter models, Bayesian computation, Gibbs sampling and Markov Chain Monte Carlo Methods and Applications in different areas. Additional topics may include Decision theory, Theoretical and convergence properties of the Markov chain samplers, Bayesian model checking, selection and assessment criteria, Hierarchical models, Bayesian survival analysis. PRQ: STAT 572 and STAT 579, or consent of division.~~

~~681. INTRODUCTION TO STATISTICAL LEARNING (3). Introduction to the interface between statistical theory and modern data analytic techniques beginning with an overview of supervised and unsupervised learning and continuing with an in depth look at model assessment, selection, and regularization, and the statistical theory underlying data analytic methods such as smoothing, penalized least squares, resampling plans, classification, tree methods, random forests, bagging, boosting, and support vector machines. Practical problems are solved using statistical software packages. A particular emphasis is placed on high dimensional problems. PRQ: STAT 572 and STAT 574 or consent of division.~~

~~691. STATISTICAL CONSULTING (3). Content varies; topics may include techniques for problem formulation; identification of parameters and solutions; client consultant interaction techniques; ill-posed problems and their formulation; management of consulting time, facilities, and personnel. Participation under supervision in actual consulting projects. PRQ: STAT 574 or consent of division. CRQ: STAT 572.~~

~~693. GRADUATE READING IN PROBABILITY AND STATISTICS (1-9). May be repeated to a maximum of 9 semester hours. PRQ: Consent of division. 699. MASTER'S THESIS (1-6). May be repeated to a maximum of 6 semester hours. PRQ: Consent of division.~~

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~~775. TOPICS IN STATISTICS (3). Content varies; may include courses in linear models, estimation, hypothesis testing, decision theory, and Bayesian inference. May be repeated to a maximum of 15 semester hours. PRQ: Consent of division.~~

~~785. ASYMPTOTIC THEORY OF STATISTICS (3). Review of modes of convergence of random variables, weak convergence, weak and strong laws of large numbers, and central limit theorems. Law of the iterated logarithm. Convergence of moments and uniform integrability. Asymptotic expansions including Edgeworth and Cornish-Fisher expansions. Saddlepoint approximations. Asymptotic expansions for random variables and stochastic order notation. The delta method. Applications to problems in statistical inference that may include nonparametric statistics, the bootstrap, density estimation, nonparametric regression and Bayesian statistics. PRQ: STAT 670 or consent of division.~~

~~790. SEMINAR IN STATISTICS (1-9). Discussions on topics in advanced probability and statistics as scheduled. Topics include but are not limited to probability theory, stochastic processes, statistical inference, nonparametric statistics, multivariate analysis, linear and nonlinear models, discrete data analysis, time series. One to 9 semester hours as scheduled. May be repeated to a maximum of 24 semester hours, not more than 15 of which may be on a single topic. PRQ: Consent of division.~~

Rationale: Courses are being deleted and revised as indicated in the other sections of these minutes. This is to remove them from the course list under Mathematical Sciences since they will now be housed in the new Department of Statistics.

Other Catalog Change

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Department of Statistics and Actuarial Science (STAT)

Chair: Barbara Gonzalez

Graduate Faculty

Nader Ebrahimi, emeritus distinguished research professor, Ph.D., Iowa State

Barbara Gonzalez, chair, associate professor, Ph.D., Cornell University

Lei Hua, associate professor, Ph.D., University of British Columbia

Alan Polansky, associate professor, Ph.D., Southern Methodist University

Duchwan Ryu, associate professor, Ph.D., Texas A&M

Michelle Xia, assistant professor, Ph.D., University of British Columbia

Haiming Zhou, assistant professor, Ph.D., University of South Carolina, Columbia University

The Department of Statistics and Actuarial Science offers graduate programs leading to the M.S. in statistics, and the Ph.D. in mathematical sciences. Applicants to these graduate programs are normally notified of an admission decision within three weeks of receipt of the complete application.

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If a student in an M.S. program has already completed a required 400-level course with a grade of C or better as an undergraduate at NIU, that course requirement will be waived in the student's M.S. program. Other graduate course work will be substituted to complete the required program, with the approval of the student's adviser.

Master of Science in Statistics

At the time of admission each student is expected to have completed a standard three-course sequence in calculus and a course in elementary linear algebra. Courses equivalent to CSCI 230 and one from STAT 400 and STAT 435, must also have been completed. Any deficiencies should be removed at the beginning of the student's program.

The student learning outcomes for this degree are located at <http://www.niu.edu/assessment/clearinghouse/outcomes/index.shtml>.

Requirements

Complete at least 33 semester hours of graduate work, with at least 21 hours completed in STAT courses numbered 600 and above. At most, six semester hours can be courses offered outside of the Department of Statistics and Actuarial Science. These courses might only be taken with prior permission of the student's adviser.

Follow a program of study approved by the Department of Statistics and Actuarial Science.

Write a Master's thesis or pass a comprehensive examination based upon his or her plan of study. Usually, a student pursuing full-time graduate study will be required to write a Master's thesis or take the comprehensive examination within two academic years of admission to the Graduate School. A student who fails the examination may, with the permission of the department, repeat it once.

Thesis Option. The thesis option is usually recommended by the department. Each student pursuing this option must enroll in MATH 699, Master's Thesis, for at least two semesters, and submit a written thesis. Up to three semester hours credit in MATH 699 may be applied toward the degree. The student's thesis adviser serves as chair of the graduate committee that administers a defense of the thesis.

Non-Thesis Option. The non-thesis option is primarily for students who intend to pursue doctoral work in the mathematical sciences at NIU. With departmental consent, the student must complete a 33-semester hour program of courses approved by the department and pass a written comprehensive examination.

Course Requirements

STAT 515 - Statistical Computing (3)

STAT 610 - Theory of Statistics I (3)

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STAT 611 - Theory of Statistics II (3)

STAT 695 - Statistical Consulting (3)

Four STAT courses numbered 600 or above (12)

Four STAT courses numbered 500 or above (12). With consent of the department, up to two of these may be graduate level courses offered outside of the Department of Statistics and Actuarial Science.

With the consent of the department, a student may include STAT 699, Master's Thesis, for up to 3 semester hours of credit, in the 33 semester hours required for a master's degree.

Doctor of Philosophy in Mathematical Sciences with an emphasis in Statistics

Please refer to the Department of Mathematical Sciences catalog entry for this degree.

Course List (STAT)

500. INTRODUCTION TO PROBABILITY THEORY (3). Includes probability spaces, random variables, discrete, continuous, mixed probability distributions, moment generating functions, multivariate distributions, conditional probability, conditional expectation, special distributions, laws of large numbers, and central limit theorem. PRQ: MATH 232 and STAT 350, or consent of department. CRQ: MATH 240 or consent of department.

510. MATHEMATICAL STATISTICS I (3). Distributions of functions of random variables, laws of large numbers, central limit theorem, interval estimation, sufficiency, completeness, point estimation, and principles of Bayesian estimation. PRQ: STAT 400 or ACSC 400X, or STAT 500; or consent of department.

511. MATHEMATICAL STATISTICS II (3). Principles of statistical hypothesis testing including the likelihood ratio test, uniformly most powerful tests and Bayesian testing techniques, theory of linear models including multiple linear regression and ANOVA. PRQ: STAT 510.

515. STATISTICAL COMPUTING (3). Theory and assessment of commonly used numerical methods in statistical research such as (a) numerical optimization: Newton-Raphson, quasi-Newton, and other methods; (b) numerical integration: adaptive methods, Gauss quadrature, Monte Carlo; (c) Monte Carlo simulation: algorithms and methods for non-standard probability distributions; (d) numerical linear algebra: solving linear and non-linear systems of equations, SVD, Cholesky and other decompositions; (e) numerical roundoff and computer representation of numbers; (f) possibly numerical inversions of probability generating functions and Laplace transforms. PRQ: STAT 510, and either CSCI 230 or CSCI 240, or consent of the department.

517. APPLIED STATISTICAL LEARNING (3). Modern statistical methods for supervised and unsupervised learning with an emphasis on model assessment, selection, and regularization. Practical problems are solved using statistical software packages. A particular emphasis is placed on high dimensional problems. PRQ: STAT 510 or consent of department.

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535. APPLIED REGRESSION ANALYSIS (3). In-depth exploratory data analysis and graphical techniques, and statistical methods for regression analysis. Includes techniques for model selection, assessment of influential observations, and verification of model assumptions. PRQ: STAT 300, or consent of department.

536. DESIGN AND ANALYSIS OF EXPERIMENTS (3). Design and analysis of single, multifactor, factorial, nested, and randomized block designs. PRQ: STAT 535.

537. CATEGORICAL DATA ANALYSIS (3). Contingency tables. Poisson, binomial, and multinomial regression techniques. PRQ: STAT 535.

538. APPLIED ANALYSIS OF TIME SERIES (3). Removal and estimation of trend and seasonality; autoregressive, moving average, and mixed models; model identification and estimation; diagnostic checking; and the use of time series models in forecasting. PRQ: STAT 535 or consent of department.

600. PROBABILITY THEORY (3). Review of measures, measurable functions, and algebras of events. Random variables and their moments and characteristic function. Sequences of random variables and various modes of convergence. Borel-Cantelli Lemma and Kolmogorov 0-1 law. Weak and strong laws of large numbers. Convergence in distributions and central limit theorems. Conditional expectation and martingales. Brownian motion and stochastic processes. PRQ: MATH 630 and STAT 500, or consent of department.

601. STOCHASTIC PROCESSES II (3). Markov chains and processes. Brownian motion and Gaussian processes. Point processes and renewal processes. Martingales and weakly dependent stochastic processes. Convergence of stochastic processes. PRQ: STAT 600 or consent of department.

610. THEORY OF STATISTICS I (3). Axiomatic foundations of probability, random variables and vectors, expectation, families of distributions, and transformations of random variables and vectors, convergence of distributions, convergence of random variables, derived distributions, distribution of the sample mean and variance. PRQ: STAT 500 or consent of the department.

611. THEORY OF STATISTICS II (3). Principles of data reduction, sufficiency, point estimation including method of moments, Bayesian and likelihood methods, evaluation of point estimators, developing and evaluating statistical hypothesis tests including likelihood ratio and Bayesian tests, interval estimation, asymptotic considerations. PRQ: STAT 610 or consent of the department.

617. STATISTICAL LEARNING (3). Supervised learning algorithms such as classification, regression, splines, lasso and other shrinkage methods, bootstrap, boosting, tree based methods and support vector machines, and unsupervised learning algorithms such as clustering and principal components analysis. PRQ: STAT 510 or STAT 537 or consent of department.

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625. BAYESIAN STATISTICS (3). Bayesian inference, loss function and risk, one parameter models and posterior inference, conjugate priors, non-informative priors, multi-parameter models, Bayesian computation, Gibbs sampling and Markov chain Monte Carlo methods and applications in different areas. Additional topics may include decision theory, theoretical and convergence properties of the Markov chain samplers, Bayesian model checking, selection and assessment criteria, hierarchical models, Bayesian survival analysis. PRQ: STAT 510 or consent of department.

635. REGRESSION ANALYSIS (3). Simple and multiple linear regression, estimation, confidence intervals and tests, and prediction. Theoretical analysis of the effect of departures from assumptions. Theoretical development of diagnostic methods using residuals, transformations, outliers, and influence analysis. Remedies for departures from assumptions. Theory of model selection. Regularization methods including ridge regression and lasso techniques. PRQ: STAT 611 or consent of department.

637. MODELS FOR DISCRETE DATA (3). A first course in the analysis of discrete data including two-dimensional tables, the log linear model, goodness-of-fit of the model, measures of dependence, three and higher dimensional tables, hierarchical models, model selection, ordered categories, logit model, zero frequency problem, and introduction to Bayesian analysis of categorical data. In addition, multivariate version of Binomial and Poisson distribution will be reviewed. PRQ: STAT 510 and STAT 537, or consent of department.

638. TIME SERIES ANALYSIS (3). Models for analysis of time series data including mean and covariance functions of stationary time series, moving average, autoregressive and mixed models, identification and estimation in ARMA (p,q) models, asymptotic properties of estimators, periodogram and spectral analysis, and regression with time series error. PRQ: STAT 510 or consent of department.

639. SURVIVAL ANALYSIS (3). Censoring, Kaplan-Meier estimator, log-rank tests, Cox proportional hazards and accelerated failure time regression models, diagnostics, competing risks and frailty models. PRQ: STAT 510 or consent of department.

640. LONGITUDINAL DATA ANALYSIS (3). Repeated measure ANOVA and MANOVA, linear mixed models, generalized linear mixed models, generalized estimating equations. Possible additional topics include analysis of data from crossover designs, and statistical validation of questionnaires. PRQ: STAT 510 and STAT 535, or consent of department.

642. QUANTITATIVE RISK MANAGEMENT (3). Risk measures; statistical methods in extreme value theory; multivariate distributions and dependence; elliptical distributions and copulas; credit risk modeling; operational risk and insurance analytics. PRQ: STAT 500 or consent of department.

643. LINEAR MODELS (3). Theory of linear models with applications to the analysis of variance and regression and to the design of experiments. CRQ: STAT 611 or consent of department.

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644. GENERALIZED LINEAR MODELS (3). Topics on generalized linear models, such as the exponential family of distributions, maximum likelihood estimation and inference, normal linear models, logistic regression for binary outcomes, nominal and ordinal logistic models, and Poisson regression and log-linear models. PRQ: STAT 611 or consent of department.

645. MULTIVARIATE STATISTICS (3). Introduction to the techniques of multivariate analysis including description of multivariate data, reducing the dimension, principal components, factor analysis, estimation and testing for the parameters in multinormal populations, and multivariate analysis of variance. Problems which involve the use of computers will be treated. PRQ: STAT 510 or consent of department.

646. NON-PARAMETRIC STATISTICS (3). Order statistics and ranks, distribution free statistics, linear rank statistics, and U-statistics. Asymptotic relative efficiency. Nonparametric density estimation and regression, kernel methods, bandwidth selection, roughness penalties. Nonparametric resampling methods, standard error estimation, bootstrap confidence intervals, bootstrap tests. Nonparametric observed confidence levels. PRQ: STAT 611 or-consent of department.

667. RELIABILITY AND LIFE TESTING (3). Survival function, failure rate, types of censored data, estimation for parametric models, accelerated life tests, competing risks, and Bayesian analysis of survival data. PRQ: STAT 510 or consent of department.

695. STATISTICAL CONSULTING (3). Content varies and involves participation in actual consulting projects. Topics may include statistical techniques commonly used in solving real life problems, model formulation; given specific data and research questions, identification of parameters and solutions, client-consultant interaction techniques, ill-posed problems and their formulation. PRQ: Consent of department.

697. INDEPENDENT STUDY (1-9). May be repeated to a maximum of 9 semester hours. PRQ: Consent of department.

STAT 699. MASTER'S THESIS (1-6). May be repeated to a maximum of 6 semester hours. PRQ: Consent of department.

STAT 775. TOPICS IN STATISTICS (3). Content varies; may include courses in linear models, estimation, hypothesis testing, decision theory, and Bayesian inference. May be repeated to a maximum of 15 semester hours. PRQ: Consent of department.

STAT 790. SEMINAR IN STATISTICS (1-9). Discussions on topics in advanced probability and statistics as scheduled. Topics include but are not limited to probability theory, stochastic processes, statistical inference, nonparametric statistics, multivariate analysis, linear and nonlinear models, discrete data analysis, time series. One to 9 semester hours as scheduled. May be repeated to a maximum of 24 semester hours, not more than 15 of which may be on a single topic. PRQ: Consent of department.

NORTHERN ILLINOIS UNIVERSITY
COLLEGE OF LIBERAL ARTS AND SCIENCES
CURRICULUM COMMITTEE
#8 Meeting – October 24, 2018
Approved Attachments

Rationale: Creation of the new Department of Statistics and Actuarial Sciences. New information and requirements outlining the graduate program and course offerings.

Other Catalog Change

Page 329, 2018-19 Graduate Catalog

Inter-College Interdisciplinary Certificates

↓

Certificates of Graduate Study

↓

Environmental and Hazards Risk Assessment Track (15-18)

**Coordinators: David Changnon, Department of Geographic and Atmospheric Sciences;
Alan Polansky, Department of Mathematical Sciences **Statistics****

STAT ~~570~~ **500** - Introduction to Probability Theory (3)

Four of the following with at least one chosen from outside the division of statistics (12-15)

CSCI 607 - Principles of Computer Security (3)

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GEOG 656 - GIS Design and Data (3)

STAT 578 **538** - ~~Statistical Methods~~ **Applied Analysis** of **Time Series** Forecasting (3)

~~STAT 581 - Probabilistic Foundations of Actuarial Science (3)~~

STAT ~~665~~ **635** - Regression Analysis (3)

Rationale: Deletion of STAT 581. Revisions of STAT 570 (now 500), STAT 578 (now 538), and STAT 665 (now 635).