

DOCUMENTS OF THE GENERAL FACULTY

**PROPOSAL TO CREATE A TRANSCRIPT-RECOGNIZED APPLIED STATISTICAL MODELING
CERTIFICATE IN THE COLLEGE OF NATURAL SCIENCES CHAPTER IN THE
*UNDERGRADUATE CATALOG, 2016-2018***

Dean Linda Hicke, in the College of Natural Sciences has filed with the secretary of the Faculty Council the following addition of an Applied Statistical Modeling Certificate to the *Undergraduate Catalog, 2016-2018*. On April 28, 2015, the Department of Statistics and Data Sciences approved the proposal, and on September 28, 2015, Associate Dean David Vanden Bout approved it on behalf of the college and the dean. The secretary has classified this proposal as legislation of *general* interest to more than one college or school.

The Committee on Undergraduate Degree Program Review recommended approval of the certificate on October 22, 2015, and forwarded them to the Office of the General Faculty. The Faculty Council has the authority to approve this legislation on behalf of the General Faculty. The authority to grant final approval on this legislation resides with UT System with formal notification to the Texas Higher Education Coordinating Board.

If no objection is filed with the Office of the General Faculty by the date specified below, the legislation will be held to have been approved by the Faculty Council. If an objection is filed within the prescribed period, the legislation will be presented to the Faculty Council at its next meeting. The objection, with reasons, must be signed by a member of the Faculty Council.

To be counted, a protest must be received in the Office of the General Faculty by November 11, 2015.



Hillary Hart, Secretary
General Faculty and Faculty Council

If 3 a, b, c, or d was answered with yes, please answer the following questions. If the proposal has potential budgetary impacts for another college/school, such as requiring new sections or a non-negligible increase in the number of seats offered, at least one contact must be at the college-level.

How many students do you expect to be impacted? Our target enrollment for the certificate is fifty, with ten to twenty graduates per academic year. We anticipate very small increases in enrollments in mathematics and statistics and data sciences classes, detailed in 3c. We do not anticipate any increases in enrollments for courses taught in other colleges.

Impacted schools must be contacted and their response(s) included:

1) McCombs School of Business

Person communicated with: Dr. Prabhudev Koana, chair, Department of Information, Risk, and Operations Management

Date of communication: March 2015

Response: approved inclusion of STA courses

2) Moody College of Communication

Person communicated with: Dr. Patricia Stout, director, Department of Advertising

Date of communication: March 3, 2015

Response: approved inclusion of ADV course

Person communicated with: Dr. Barry Brummett, chair, Department of Communication Studies

Date of communication: March 3, 2015

Response: approved inclusion of CMS course

2) College of Education

Person communicated with: Dr. Cindy Carlson, chair, Department of Educational Psychology

Date of communication: March 4, 2015

Response: approved inclusion of EDP courses

Person communicated with: Dr. John Bartholomew, interim chair, Department of Kinesiology and Health Education

Date of communication: Feb. 13, 2015

Response: approved inclusion of HED and KIN courses

4) Cockrell School of Engineering

Person communicated with: Dr. Jon Olson, chair, Department of Petroleum and Geosystems Engineering

Date of communication: Feb. 13, 2015

Response: approved inclusion of PGE course

Person communicated with: Dr. Ahmed Tweflik, chair, Department of Electrical and Computer Engineering

Date of communication: April 9, 2015

Response: approved inclusion of EE courses

5) Jackson School of Geosciences

Person communicated with: Dr. Ron Steel, chair, Department of Geological Sciences

Date of communication: Feb. 13, 2015

Response: approved inclusion of GEO courses

6) College of Liberal Arts

Person communicated with: Dr. Jason Abrevaya, chair, Department of Economics

Date of communication: Feb. 13, 2015

Response: approved inclusion of ECO courses

Person communicated with: Dr. Robert Crosnoe, chair, Department of Sociology

Date of communication: Feb. 13, 2015

Response: approved inclusion of SOC course

Person communicated with: Dr. Jacqueline Woolley, chair, Department of Psychology

Date of communication: March 26, 2015

Response: approved inclusion of PSY courses

4. Official Certificate Name: Applied Statistical Modeling

5. Proposed Implementation Date: Fall 2016

6. CIP Code (administrative unit awarding the certificate): 27.0501; Department of Statistics and Data Sciences

7. Statement of Objective:

The Certificate in Applied Statistical Modeling equips undergraduate students with the tools necessary to understand how to apply statistics to their primary field of study. This certificate program is designed to complement diverse degree programs and to appeal to students across the University in engineering, science, economics, mathematics, and many other disciplines. Certificate students will fulfill a two-course sequence on the mathematical foundations of statistics, a two-course sequence on applied statistics, data mining, or machine learning, and complete two elective courses in statistics, machine learning, econometrics, and other relevant courses from the approved elective list.

8. Number of Students Expected to Receive the Certificate Each Semester:

Ten to twenty students are expected to earn the certificate each long semester.

9. Number of Hours Required for Completion:¹ Eighteen hours.

10. List Faculty on the Certificate Program Faculty Committee.

Name of Faculty Member	College/Department	Title at UT Austin	Highest Degree and Awarding Institution
*James G. Scott (program co-chair)	McCombs/IROM	Assistant Professor	Ph.D., Duke University
*Carlos Carvalho (program co-chair)	McCombs/IROM	Associate Professor	Ph.D., Duke University
*Michael Daniels	CNS/SDS/Section of Integrative Biology	Professor	Sc.D., Harvard University
*Lizhen Lin	SDS	Assistant Professor	Ph.D., University of Arizona
* Lauren Meyers	CNS/SDS/Section of Integrative Biology	Professor	Ph.D. Stanford University

*Peter Müller	CNS/Mathematics	Professor	Ph.D., Purdue University
*Pradeep Ravikumar	CNS/Computer Science	Assistant Professor	Ph.D. Carnegie Mellon University
*Tom Sager	McCombs/IROM	Professor	Ph.D., University of Iowa
*Purnamrita Sarkar	SDS	Assistant Professor	Ph.D., Carnegie Mellon University
*Tom Shively	McCombs/IROM	Professor	Ph.D., University of Chicago
*Stephen Walker	SDS/Mathematics	Professor	Ph.D., Imperial College of London
*Sinead Williamson	SDS/IROM	Assistant Professor	Ph.D., University of Cambridge
*Mingyuan Zhou	IROM	Assistant Professor	Ph.D., Duke University

11. Academic Course Requirements: Use this table to identify the courses that qualify for this certificate program.

Course Abbreviation and Number	Course Title	SCH
College of Natural Sciences		
CS 343	Artificial Intelligence # # CS 310, 310H, 429, or 429H; and M 362K or SDS 321.	3
M 339J	Probability Models with Actuarial Applications # # M 358K or 378K.	3
M 349P	Actuarial Statistical Estimate # # M 339J and M 341 or 340L.	3
M 349R	Applied Regression and Time Series # # M 358K or 378K or an introductory statistics course and consent of the director of the concentration in actuarial studies.	3
M 358K	Applied Statistics # # M 362K.	3
M 362K	Probability I # # M 408D, 408L, or 408S.	3
M 362M	Introduction to the Stochastic Processes # # M 362K.	3
M 378K	Introduction to Mathematical Statistics # # M 362K.	3
PBH 354	Epidemiology # # BIO 325 or 325H; PBH 317; and credit or registration for BIO 328M or SDS 328M.	3
SDS 302	Data Analysis for the Health Sciences	3
SDS 304	Statistics in Health Care	3
SDS 306	Statistics in Market Analysis	3
SDS 321	Introduction to Probability and Statistics # # CS 311, 313K, M 325K, and M 408C, 408K, or 408N.	3
SDS 323	Statistical Learning and Inference # # SDS 321 or the equivalent	3
SDS 325H	Honors Statistics # # Admission to Dean's Scholars Honors Program or consent of	3

	instructor.	
SDS 328M	Biostatistics # # 6 hours of BIO.	3
SDS 348	Computational Biology and Bioinformatics # # SDS 328M	3
SDS 352	Statistical Methods # # 1 of the following: M 316, SDS 303, 304, 305, or 306.	3
SDS 353	Advanced Multivariate Modeling # # M 408D or 408M; and SDS 325H or 352.	3
SDS 374E	Visualization and Data Analysis for Science and Engineering # # M 408D or 408M, 340, and prior programming experience using C or Fortran on Linux or Unix systems.	3
SDS 375	Special Topics in Scientific Computation # # Upper-division standing; additional prerequisites may vary with the topic.	3
SDS 378	Introduction to Mathematical Statistics # # M 362K.	3
SDS 379R	Undergraduate Research # # Upper-division standing and consent of instructor.	3
McCombs School of Business		
STA 309	Elementary Business Statistics # # M 408D, 408L, or 408S.	3
STA 371G	Statistics and Modeling # # MIS 301, 310H, or 310; STA 309 or 309H; and credit or registration for BA 324 or 324H.	3
STA 371H	Statistics and Modeling: Honors # # MIS 301, 310H, or 310; M 408D, 408L, 408M or 408S; STA 309 or 309H; and credit or registration for BA 324 or 324H.	3
STA 372	Topic 5: <i>Financial and Econometric Time Series Modeling</i> # # Upper-division standing and STA 309; STA 317G, 371H, 375, or 375H.	3
STA 375	Statistics and Modeling for Finance # # MIS 301, 301H, or 310; M 408D, 408L, 408M, or 408S; STA 309 or 309H; and credit or registration for BA 324 or 324H.	3
Moody College of Communication		
ADV 344K	Advertising Research # # Upper-division standing; ADV 318J; ADV 309R, PR 309, STA 309, or SDS 306. For advertising majors, credit or registration for ADV 325.	3
CMS 348	Communication Research Methods # # Upper-division standing.	3
College of Education		
EDP 371	Introduction to Statistics	3
HED 343	Foundations of Epidemiology # # Consent of instructor.	3
HED 373	Evaluation and Research Design # # Upper-division standing.	3
KIN 376	Measurement in Kinesiology # # 6 hours of upper-division coursework in KIN.	3
Cockrell School of Engineering		
EE 351K	Probability and Random Processes # # EE 313.	3
EE 361M	Introduction to Data Mining #	3

	# CS 314, 314H, or EE 422C; EE 351K or M 362K; and M 340L.	
PGE 378	Applied Reservoir Characterization # # GEO 416M or 316P; and PGE 323K or 331, and 337.	3
Jackson School of Geosciences		
GEO 325K	Computational Methods # # GEO 325J, and PHY 301 and 316.	3
GEO 365N	Seismic Data Processing # # Upper-division standing; GEO 325K and 465K.	3
College of Liberal Arts		
ECO 329	Economic Statistics # # ECO 304K and 304L; and M 408C and 408D, or 408K and 408L, or 408N and 408S.	3
ECO 341K	Introduction to Econometrics # # ECO 420K and 329.	3
ECO 354K	Introductory Game Theory # # ECO 420K and 329.	3
PSY 418	Statistics and Research Design # # PSY 301; and 1 of the following: M 302, 303D, 403K, 305G, 408C, 408K, 316; or SDS 302, 303, 304, 305, 306, 318.	4
PSY 325K	Advanced Statistics # # For psychology majors, PSY 301 and 418. For nonmajors, upper- division standing, PSY 301, and 1 of the following: BIO 318M, CE 311S, ECO 329, EDP 371, EE 351K, GOV 350K, M 316, 362K, ME 335, PSY 317, SOC 317L, SW 318, STA 309, SDS 302, 303, 304, 305, 306, or 318.	3
SOC 317L	Introduction to Social Statistics	3

12. Other Certificate Requirements: Students must receive a C or better in each course applied to the certificate and have a cumulative grade point average of 3.0 or higher in the courses presented to fulfill the certificate.

13. Give a Detailed Rationale for Change(s):

The rationale for creating the Undergraduate Certificate in Applied Statistical Modeling is to provide undergraduate students at The University of Texas at Austin the opportunity to develop expertise in applied statistical methods. There is career-driven student demand for more intensive data modeling skills that students' majors currently do not provide. This demand can be satisfied by a certificate program that is less intensive than a master's degree. The certificate curriculum can be accommodated within a student's regular undergraduate program, or at most, one additional semester beyond the baccalaureate. Additionally, a certificate program will standardize the quality of this additional training while offering official recognition of student achievement of data modeling skills.

The Department of Statistics and Data Sciences (SDS) acts as a central hub, working with faculty throughout campus with the intent to foster faculty collaboration and afford undergraduates in a variety of disciplines the invaluable training in the development and application of statistical methods. No other UT academic unit has the requisitely skilled faculty of interdisciplinary breadth and relevant experience. The SDS has the requisite faculty with the skills to teach the certificate curriculum plus experience teaching the undergraduate students who would most likely take certificate courses. Also, the SDS has the interdisciplinary breadth of faculty for the various academic areas from which certificate students are most likely to come.

14. College/School Approval Process:

Approver: Michael Daniels, Chair, Department of Statistics and Data Sciences
Date: February 6, 2015; April 22, 2015; April 28, 2015

College approval date: April 22, 2015; April 28, 2015
 Approver: David Vanden Bout, Associate Dean for College of Natural Sciences
 Date: September 28, 2015

PROPOSED NEW CATALOG TEXT:

APPLIED STATISTICAL MODELING

The certificate in Applied Statistical Modeling equips undergraduate students with the tools necessary to understand how to apply statistics to their primary field of study. This certificate program is designed to complement diverse degree programs and to appeal to students across the University in engineering, science, economics, mathematics, and many other disciplines. Certificate students will complete a two-course sequence in the mathematical foundations of statistics, a two-course sequence in applied statistics, data mining, and machine learning, and six additional hours in statistics, machine learning, econometrics, and other relevant courses from the approved list below.

Admission to the certificate is by application only. Students may download an application form from the Department of Statistics and Data Sciences webpage. Students seeking the certificate must also complete the prerequisite course Mathematics 408C or 408L with a grade of at least C-.

The certificate consists of eighteen hours. Students must receive a grade of at least C in each course applied toward the certificate and have a cumulative grade point average of at least 3.0 in the courses presented to fulfill the certificate. Students must contact the Department of Statistics and Data Sciences to apply for the certificate in the semester in which they are completing the requirements and graduating.

1. Sequence in the mathematical foundation of statistics:
 - a. Choose one of the following: Electrical and Computer Engineering 351K, Mathematics 362K, or Statistics and Data Sciences 321.
 - b. Choose one of the following: Mathematics 378K or Statistics and Data Sciences 323 or 378.
2. Sequence in applied statistics, data mining, and machine learning:
 - a. Choose one of the following: Economics 329, Educational Psychology 371, Mathematics 358K, Psychology 418, Sociology 317L, Statistics 309, Statistics and Data Sciences 302, 304, 306, or 328M.
3. Choose one of the following: Economics 341K, Mathematics 349R, Statistics 371G, 371H, 375, or Statistics and Data Sciences 325H or 352.
4. Six hours of additional coursework chosen freely from the following lists. Of the six hours, a minimum of 3 hours must be upper-division.

Students are encouraged to select courses within their own majors or colleges as appropriate. The Statistics and Data Sciences courses listed in requirement 3a are available to students in all majors.

- a. Courses in the College of Natural Sciences: Computer Science 343, Mathematics 339J, 349P, and 362M, Public Health 354, Statistics and Data Sciences 323, 348, 353, 374E, 375, and 379R.
- b. Courses in the McCombs School of Business: Statistics 372 (Topic 5: *Financial and Econometric Time Series Modeling*).
- c. Courses in the Moody College of Communication: Advertising 344K, and Communication Studies 348.
- d. Courses in the College of Education: Health Education 343 and 373, and Kinesiology 376.
- e. Courses in the Cockrell School of Engineering: Electrical and Computer Engineering 361M, and Petroleum and Geosystems Engineering 378.
- f. Courses in the Jackson School of Geosciences: Geological Sciences 325K and 365N.
- g. Courses in the College of Liberal Arts: Economics 350K (Topic 4: *Advanced Econometrics*) and 354K, and Psychology 325K.

¹ See footnote 1b above: 18-24 hours are required.