

Department of Mathematics

Contact Information

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The Department of Mathematics offers courses leading to the Master of Science degree in Statistical Analytics, Computing and Modeling (SACM).

Graduate level courses may also serve to provide a supporting field for other majors.

Graduate Faculty

Agarwal, Ravi P Professor, Department of Mathematics; M.S., Agra University (India); Ph.D., Indian Institute of Technology (India).

Ahangar, Reza R Professor, Department of Mathematics; B.S., Tehran University (Iran); M.S., The Catholic University of America; Ph.D., The Catholic University of America.

Hodis, Simona Associate Professor, Department of Mathematics; B.Sc., Universitatea Al.I.Cuza (Romania); M.Sc., McMaster University (Canada); Ph.D., University of Western Ontario (Canada).

Singh, Sarjinder Professor, Department of Mathematics; B.S., Punjab Agricultural University (India); M.S., Punjab Agricultural University (India); Ph.D., Punjab Agricultural University (India).

Associate Member

Kim, Dongwook Assistant Professor, Department of Mathematics; B.A., Chung Ang University (South Korea); M.A., University of Georgia; Ph.D., New Jersey Institute of Technology.

Muzheve, Michael T Associate Professor, Department of Mathematics; Chair; B.S., University of Zimbabwe (Zimbabwe); M.Phil., University of Zimbabwe; M.S., Texas A&M University; Ph.D., Texas A&M University.

Zuo, Lihua Assistant Professor, Department of Mathematics; B.S., Nanjing University of Science and Technology (China); M.S., Fudan University (China); Ph.D., Texas A&M University.

Emeritus

Cecil, David Professor of Mathematics, Department of Mathematics; B.A., Tulsa University; M.S., Oklahoma State University; Ph.D., Oklahoma State University.

Mathematics (MATH)

MATH 5305 Graduate Research Project **3 SCH (3)**

A Graduate Research Project must be completed and submitted to the Graduate Office for a grade to be assigned, otherwise IP notations are recorded. This course is specifically designed for Plan II and Plan III students. Prerequisite: departmental approval.

MATH 5306 Thesis **3 SCH (3)**

Designed for thesis option students. The course requires completion of thesis research. Prerequisite: departmental approval. May be repeated for maximum of 6 semester hours.

MATH 5340 Matrix Methods Linear Models **3 SCH (3-0)**

Common matrix methods in statistical applications, including eigenvalues and eigenvectors; the Moore-Penrose inverse; matrix differentiation; the distribution of quadratic forms. Prerequisite: STAT 4303 and MATH 3340 or equivalents.

MATH 5341 Abstract Algebraic Theories **3 SCH (3-0)**

Groups and their generalizations. Homomorphism and isomorphism theorem. Direct sums and products. Linear spaces and representations. Field extensions and Galois groups. Prerequisite: MATH 4340 or its equivalent.

MATH 5360 Analytic Decision Theory **3 SCH (3-0)**

Introduction to mathematical decision theory and game theoretic analysis. Classification of games, definitions in game theory, sequential-/simultaneous-move games, pure and mixed strategies, equilibrium concepts and matrix games. Prerequisite: MATH 3340 or equivalent.

MATH 5390 Advanced Topics in Math **1-3 SCH (1-3)**

Different areas of advanced mathematics with emphasis on rigor, critical reasoning and the concept of proof. May be repeated as topic changes.

Statistics (STAT)

STAT 5332 Big Data and Computing 3 SCH (3-0)

Introduction to use of SAS (and R)/PC statistical software, including data entry, data summaries, descriptive statistics, and interpretation of SAS (and R) output for some standard statistical procedures. Prerequisite: STAT 5344 or equivalent.

STAT 5344 Predictive Analytics 3 SCH (3-0)

Correlation, simple linear and multiple regression, one and two way ANOVA, various multiple comparison procedures, randomized block designs, applications, use of statistical software. Prerequisite: STAT 4301 or STAT 4303 or equivalent.

STAT 5346 Design of Experiments 3 SCH (3-0)

Hypothesis testing, principles of design of an experiment, t-test, completely randomized design, randomized block design, multiple comparison techniques, factorial designs, random effect models, fixed effect models, BIBD, nested designs, analysis of covariance and split plot design. Prerequisite: STAT 4301 or STAT 4303 or equivalent.

STAT 5350 Probability for Analytics 3 SCH (3-0)

Mathematical treatment of probability distributions, probability concepts and laws; sample spaces, combinations and permutations, Bayes' theorem, discrete/continuous random variables, expected value, distribution of functions of random variable, two-dimensional variables, central limit theorem; t, F, and chi-square distributions. Prerequisite: STAT 4301 or STAT 4303 or equivalent.

STAT 5351 Inferential Analytics 3 SCH (3-0)

Theory of estimation and hypothesis testing, maximum likelihood, method of moments, likelihood ratio tests, consistency, bias, efficiency and sufficiency. Prerequisite: STAT 5350 or equivalent.

STAT 5361 Multivariate Statistics 3 SCH (3-0)

An applied approach to multivariate data analysis and linear statistical models in research. Prerequisite: MATH 4341 and STAT 5344 or equivalents.

STAT 5370 Survey Sampling Analytics 3 SCH (3-0)

Survey sampling from initial planning phases through collection and storage of the data; simple random sampling, stratified random sampling, auxiliary information, estimators, chi-square contingency table analysis for two and three way tables, handling of small expected frequencies, matched pairs, measures of association; use of statistical software on big survey data. Prerequisite: STAT 4301 or STAT 4303 or equivalent.

STAT 5372 Model Assisted Survey Methods 3 SCH (3-0)

Probability proportional to size sampling, auxiliary information, Horvitz and Thompson estimator, calibration of design weights, model assisted calibration techniques, GREG and linear regression estimator, imputation of missing data, bootstrap and jackknifing. Prerequisite: STAT 5370 [requested] or equivalent.

STAT 5374 Survey Models Social Science 3 SCH (3-0)

Sensitive data and privacy issues in survey sampling. Randomized response models and variations. Estimation of prevalence of two or more sensitive characteristics. Use of Cramer-Rao lower bound of variance. Measures of protection of respondents. Models using complex designs. Prerequisite: PSYC/SOCI 3381.

STAT 5390 Advanced Topic in Statistics 3 SCH (3-0)

Different areas of advanced statistics will be covered at separate offerings of this course. Topics include sampling techniques, multivariate analysis, quality control techniques. May be repeated once. Prerequisite: 6 semester hours of advanced statistics or the equivalent.

Fee: \$5.00

Statistical Analytics, Computing and Modeling (SACM), M.S.

This program is designed to provide the student with competency in the major areas of statistical and mathematical application, a working knowledge of mathematical and/or statistical software and a sufficient theoretical background to serve as a foundation for continued professional development.

A student entering the program is expected to have completed at least 6 semester hours of advanced mathematics beyond multivariate calculus and differential equations. Students lacking these prerequisites may be admitted conditionally.

Thesis Option

The thesis option requires 30 SCH to complete the M.S. degree of which 24 hours must be from core courses including Thesis. Elective courses comprise 6 hours of the curriculum. Students have the flexibility to select the elective hours from a list of courses to meet degree requirements. *Elective hours may be taken from other disciplines with advisor's approval.*

Project Option

The project option requires 36 SCH to complete the M.S. degree of which 21 hours must be from core courses including Project. Elective courses comprise 15 hours of the curriculum. Students have the flexibility to select the electives hours from a list of courses to meet degree requirements. *Elective hours may be taken from other disciplines with advisor's approval.*

The curriculum as been **designed to emphasize Statistical Analytics and Applied Mathematics courses**. The curriculum required 15 SCH of Statistical Analytics courses and 6 SCH of **Applied Mathematics** courses. However, the **curriculum also permits students the flexibility** needed to pursue coursework that emphasizes their career interests.

- For example, if SACM students wants to emphasize Applied Mathematics as a career option, and if they completed the 12 hours of Applied Mathematics courses provided as electives, they could use Applied Mathematics as supporting field.

Code	Title	Semester Credit Hours
Required Courses		
STAT 5350	Probability for Analytics	3
STAT 5351	Inferential Analytics	3
STAT 5332	Big Data and Computing	3
STAT 5344	Predictive Analytics	3
STAT 5306 or STAT 5306		3 - 6
MATH 5340	Matrix Methods Linear Models	3
MATH 5360	Analytic Decision Theory	3
Total Semester Credit Hours		21-24
Code	Title	Semester Credit Hours
Elective Courses		
STAT 5361	Multivariate Statistics	3
STAT 5362		3
STAT 5346	Design of Experiments	3
STAT 5370	Survey Sampling Analytics	3
STAT 5372	Model Assisted Survey Methods	3
STAT 5374	Survey Models Social Science	3
MATH 5375		3
STAT 5380		3
MATH 5374		3
MATH 5323		3
Total Semester Credit Hours		30