DEPARTMENT OF MATHEMATICS

Contact Information
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Building Name: Rhode Hall
Room Number: 217

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.

Faculty
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 Assistant 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
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.

Sedory, Stephen A Professor, Department of Mathematics; B.A., Luther College; M.S., Oklahoma State University; M.S., Oklahoma State University; Ph.D., Oklahoma State University.

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

Courses
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 5321  Real Analysis  3 SCH  (3-0)
Lebesgue integration and Lebesgue measure. LP spaces. Differentiability properties of monotone functions.

MATH 5323  Partial Differential EQ  3 SCH  (3-0)
An introduction to the fundamental notions and/or methods in the theory of partial differential equations. Includes Fourier series, the wave equation, the potential equation and the heat equation.

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 quadratics 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 5372 Adv Math for Physics and Eng I 3 SCH (3-0)
Complex variable methods, concepts of the theory of distributions, eigen-value problems in partial differential equations, special functions and finite-dimensional vector spaces. Prerequisites: 9 semester hours of advanced mathematics including MATH 3315 and MATH 3320 or the equivalent.

MATH 5373 Adv Math for Physics and EN II 3 SCH (3-0)
Infinite-dimensional vector spaces, Green's functions, variational problems, traveling waves and perturbation methods. Prerequisite: MATH 5372 or the equivalent.

MATH 5374 Numerical Analysis 3 SCH (3-0)
Underlying principles of numerical analysis. Topics include: finite differences and interpolation, numerical differentiation and integration, solving algebraic and transcendental equations, computations with matrices, the method of least squares, and numerical solutions of differential equations. Attention is given to the solutions of problems using computer. Prerequisite: MATH 4341 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.

MATH 5394 Spec Topics in Mathematics 1-3 SCH (1-3)
Topics in mathematics which are of interest to persons in diverse disciplines and occupations. May be repeated as topic changes. Not applicable for credit in the physical sciences, mathematics or engineering. Laboratory fee, $5.

Statistics (STAT)

STAT 5331 Statistical Computing 3 SCH (3-0)
Provides the computer tools for modern research analysis. Introduction to use of computer and statistical software. Includes applications of SAS to data entry, experimental design, regression, surveys. Prerequisite: one statistics course or equivalent.

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 5343 Applied Regression Analysis 3 SCH (3-0)
Multiple regression analysis, selecting the "best" regression equation, general model building, introductory linear models. Prerequisite: an advanced statistics course.

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 5345 Analysis of Research Data 3 SCH (3-0)
Basic concepts and techniques for research including completely randomized design, factorial, randomized complete block, split-plot, Latin square and analysis of variance. Prerequisite: one statistics course.

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 5354 Advanced Analytics 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 5362 Nonparametric Statistics 3 SCH (3-0)
Estimation and hypothesis testing, models for categorical data, classical rank-based nonparametric methods, permutation tests, bootstraps methods, and curve smoothing. Prerequisite: STAT 4301 or STAT 4303 or equivalent.

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 5375  Operations Research  3 SCH (3-0)
Geometric linear programming, the Simplex method, duality theory, sensitivity analysis, project planning and integer programming. Optional topics
include, but are not limited to: the transportation problem, the upper bounding technique, the dual Simplex method, parametric linear programming,
queuing theory, decision analysis, and simulation. Prerequisite: Any introductory course in linear algebra.

STAT 5380  Survival Analysis  3 SCH (3-0)
Statistical analysis of time-to-event or survival data. Basic Terminology and both parametric and non-parametric techniques. Continuous and discrete
time regression models and partial likelihood estimation. Includes competing risk models, unobserved heterogeneity, and multivariate survival models
including event history. Prerequisite: STAT 5350 and STAT 5351 or equivalents.

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

Degree Requirements
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.