STATISTICS (3470)

3470:250 Statistics for Everyday Life (4 Credits)
Prerequisite: placement test. Conceptual approach to the basic ideas and reasoning of statistics. Topics include descriptive statistics, probability (uncertainty), statistical inference (estimation and hypothesis testing). Computer applications laboratory.
Gen Ed: Tier 1 - Quantitative Reasoning

3470:260 Basic Statistics (3 Credits)
Gen Ed: Tier 1 - Quantitative Reasoning

3470:261 Introductory Statistics I (2 Credits)
Prerequisite: placement test. Descriptive statistics, tabular and graphical data displays; probability, probability distributions. Introduction to statistical inference (hypothesis testing, estimation); one-sample parametric and nonparametric methods. Computer applications.
Gen Ed: Tier 1 - Quantitative Reasoning

3470:262 Introductory Statistics II (2 Credits)
Prerequisite: 3470:261 or equivalent. Parametric and nonparametric methods of statistical inference for paired data and two-sample problems; one-way ANOVA, simple linear regression and correlation. Computer applications.
Gen Ed: Tier 1 - Quantitative Reasoning

3470:289 Selected Topics in Statistics (1-3 Credits)
Prerequisite: Permission. Selected topics of interest in statistics.

3470:360 Statistical Investigations (3 Credits)
Prerequisites: 3470:250 or 3470:260 or 3470:262. This course provides practical statistical methods beyond the introductory course. The topics include design of experiments, data analysis, multiple regression and modern software use.

3470:401 Probability and Statistics for Engineers (2 Credits)
Prerequisite: 3450:222. Introduction to probability, statistics, random variables, data descriptions, statistical inference, confidence intervals, hypothesis testing, design of experiments, and applications of statistics to engineering.

3470:450 Probability (3 Credits)
Prerequisite: 3450:221. Introduction to probability, random variables and probability distributions, expected value, sums of random variables, Markov processes.

3470:451 Theoretical Statistics I (3 Credits)
Sequential. Prerequisite: 3450:223. Elementary combinatorial probability theory, probability distributions, mathematical expectation, functions of random variables, sampling distributions, point and interval estimation, tests of hypotheses, regression and correlation, introduction to experimental designs.

3470:452 Theoretical Statistics II (3 Credits)
Sequential. Prerequisite: 3470:451. Elementary combinatorial probability theory, probability distributions, mathematical expectation, functions of random variables, sampling distributions, point and interval estimation, tests of hypotheses, regression and correlation, introduction to experimental designs.

3470:461 Applied Statistics (4 Credits)
Prerequisite: 3450:222. Applications of statistical theory to natural and physical sciences and engineering, including probability distributions, interval estimation, hypotheses testing (parametric and nonparametric), and simple linear regression and correlation.

3470:462 Applied Regression and ANOVA (4 Credits)
Prerequisite: 3470:262 or 3470:461. Applications of the techniques of regression and multifactor analysis of variance.

3470:465 Design of Sample Surveys (3 Credits)
Prerequisite: 3470:262 or 3470:461 or equivalent. Design and analysis of frequently used sample survey techniques.

3470:469 Reliability Models (3 Credits)
Prerequisite: 3470:461. Selected topics in reliability modeling including parametric and nonparametric models, competing modes of failure, censored data and accelerated life models.

3470:470 Biostatistics and Epidemiology (3 Credits)
Prerequisite: 3470:261 and 3470:262 or 3470:461, or equivalent. Biostatistics and Epidemiological methods for biological and medical studies, including ANOVA, analysis of repeated measures, disease-related measures, log-linear models, and clinical trials.

3470:471 Introduction to Actuarial Science (3 Credits)
Prerequisite: 3470:221 or equivalent. Pre/Corequisite: 3470:222 or equivalent. Interest theory and financial mathematics used in actuarial science. Topics include value of money, annuities, loans, bonds, cash flows and immunization, interest rate swaps.

3470:472 Actuarial Models (3 Credits)
Prerequisite: 3470:451. Study of severity, frequency and aggregate models used in actuarial applications. Calibration and evaluation. Credibility procedures, fundamental principles of pricing in short-term insurance coverage.

3470:473 Survival Analysis (3 Credits)
Prerequisite: 3470:262 or 3470:461. Basic concepts in survival analysis, censoring and data truncation, estimation of survival models, nonparametric hazard and survival function estimation, comparing survival times between groups.

3470:475 Foundations of Statistical Quality Control (3 Credits)
Prerequisite: 3470:461 or equivalent. Course provides a solid foundation in the theory and applications of statistical techniques widely used in industry.

3470:476 Bayesian Statistics (3 Credits)
Prerequisite: 3470:262 or 3470:461 or equivalent. Basic concepts in Bayesian theory, sampling methods, MCMC, and hierarchical modeling. Computer applications of Bayesian statistics to natural; and physical; sciences and engineering.

3470:477 Time Series Analysis (3 Credits)

3470:480 Statistical Data Management (3 Credits)
Prerequisite: 3470:262 or 3470:461. Students learn data organization and structures, design of statistical data bases, statistical software analysis, importing and exporting data between software, and missing data analysis.
3470:483 Advanced Statistical Computing (3 Credits)
Prerequisite: 3470:262 or 3470:461 or equivalent. Topics include data management, random number generation, resampling methods, numerical optimization, Markov Chain Monte Carlo, smoothing methods, data mining: clustering and classification.

3470:484 Introduction to Machine Learning (3 Credits)
Prerequisite: 3470:262 or 3470:461 or equivalent. Methodologies for statistical learning, including generalized logistic regression, ridge regression, neural networks, support vector machines, principal components analysis, and K-means and hierarchical clustering.

3470:485 Applied Analytics-Decision Trees (3 Credits)
Prerequisite: 3470:262 or 3470:461. Selected topics in predictive modeling using CHAID, Classification and Regression Trees, Logistic Regression and Neural Networks.

3470:486 Spatial-temporal Statistics (3 Credits)
Prerequisite: 3470:262 or 3470:461 or equivalent. Basic concepts of geostatistics, point pattern, area unit. Spatial-temporal modeling in high dimensional data. Computer applications to natural and physical sciences and engineering.

3470:489 Topics in Statistics (1-3 Credits)
(May be repeated for a total of six credits) Prerequisite: Permission. Selected topics in advanced statistics, including quality control, reliability, sampling techniques, decision theory, advanced inference, stochastic processes and others.

3470:491 Workshop in Statistics (1-3 Credits)
(May be repeated with change of topic) Group studies of special topics in statistics. May not be used to meet undergraduate or graduate major requirements in mathematics and statistics. May be used for elective credit only.

3470:495 Statistical Consulting (1-3 Credits)
Prerequisite: 3470:462 or 3470:480 or permission. Students will learn about various aspects of statistical consulting and will work on current projects of the Center for Statistical Consulting. May be repeated for a total of 4 credits.

3470:497 Individual Reading: Statistics (1-2 Credits)
(May be repeated for a total of four credits) Prerequisites: senior standing and permission. Directed studies in statistics designed as introduction to research problems under guidance of selected faculty member.

3470:498 Senior Honors Project (1-3 Credits)
Prerequisite: 3470:489 (honors). Directed study for senior student in the University Honors Program who has completed 3450:489 (honors). An introduction to research problems in the mathematical sciences under the guidance of selected faculty.