STATISTICS (STAT)

Courses

STAT 051. QR: Probability With Statistics. 3 Credits.
Introduction to probabilistic and statistical reasoning, including probability distribution models and applications to current scientific/social issues. Roles of probability, study design, and exploratory/confirmatory data analysis. Prerequisite: Two years high school algebra. No credit for Sophomores, Juniors, or Seniors in the mathematical and engineering sciences.

STAT 052. D2:QR: Stat & Social Justice. 3 Credits.
Introduction to probabilistic and statistical reasoning, including applications to current scientific/social issues, with special focus on issues of poverty, criminal justice, environmental justice, and voting, and impact on diverse and disadvantaged populations. Prerequisites: Two years High School algebra; no credit for Sophomores, Juniors, or Seniors in the mathematical and engineering sciences; credit for only one of STAT 051 and STAT 052.

STAT 087. QR: Intro to Data Science. 3 Credits.
Basic techniques of data harvesting and cleaning; association rules, classification, clustering; analyze, manipulate, visualize data using programming languages. Basic principles of probability and statistical modeling/inference to make meaning out of large datasets. No credit given after STAT 200 or greater. Cross-listed with: CS 087.

STAT 090. Internship. 1-3 Credits.
On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

STAT 092. Independent Study. 1-18 Credits.
A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

STAT 095. Special Topics. 1-18 Credits.
Lectures, reports, and directed readings at an introductory level. Prerequisite: As listed in schedule of courses.

STAT 111. QR: Elements of Statistics. 3 Credits.
Basic statistical concepts, methods, and applications, including correlation, regression, confidence intervals, and hypothesis tests. Prerequisites: Two years of high school algebra; Sophomore standing.

STAT 141. QR: Basic Statistical Methods 1. 3 Credits.
Foundational course for students taking further quantitative courses. Exploratory data analysis, probability distributions, estimation, hypothesis testing. Introductory regression, experimentation, contingency tables, and nonparametrics. Computer software used. Credit not given for more than one of STAT 141 or STAT 143.

STAT 143. QR: Statistics for Engineering. 3 Credits.
Data analysis, probability models, parameter estimation, hypothesis testing. Multi-factor experimental design and regression analysis. Quality control, SPC, reliability. Engineering cases and project. Statistical analysis software. Credit not given for more than one of STAT 141 or STAT 143. Prerequisites: MATH 020 or MATH 022; Sophomore standing.

STAT 151. QR: Applied Probability. 3 Credits.
Foundations of probability, conditioning, and independence. Business, computing, biological, engineering reliability, and quality control applications. Classical discrete and continuous models. Pseudo-random number generation. Prerequisites: MATH 020 or MATH 022 or MATH 023.

STAT 153. QR: Prob & Stat for Cmptr Sci. 3 Credits.

STAT 183. QR: Basic Statistical Methods 2. 3 Credits.
Quantitative statistical methodologies useful across disciplines. Analysis of variance, multiple and logistic regression, time series analysis, non-parametric methods, Bayesian statistics and decision analysis. Prerequisite: STAT 141, STAT 143, STAT 211, or EC 170.

STAT 190. Internship. 1-18 Credits.
On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

STAT 191. Independent Study. 1-18 Credits.
A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion. Prerequisites: Junior standing; permission of Program Director.

STAT 195. Intermediate Special Topics. 1-18 Credits.
Lectures, reports, and directed readings. Prerequisite: As listed in schedule of courses.

STAT 197. Teaching Assistantship. 1-3 Credits.
Undergraduate student service as a teaching assistant, usually in an introductory level course in the discipline, for which credit is awarded. Offered at department discretion.

STAT 198. Undergraduate Research. 1-18 Credits.
Undergraduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.
STAT 200. QR: Med Biostat&Epidemiology. 3 Credits.

STAT 201. QR:Stat Computing&Data Analysis. 3 Credits.
Fundamental data processing, code development, graphing and analysis using statistical software packages, including SAS and R. Analysis of data and interpretation of results. Prerequisite: STAT 141 or STAT 143 or STAT 211; or STAT 111 with Instructor permission.

STAT 211. QR: Statistical Methods I. 3 Credits.
Fundamental concepts for data analysis and experimental design. Descriptive and inferential statistics, including classical and nonparametric methods, regression, correlation, and analysis of variance. Statistical software. Prerequisite: Minimum Junior standing or STAT 141 or STAT 143 and Instructor permission. Cross-listed with: BIOS 211.

STAT 221. QR: Statistical Methods II. 3 Credits.
Multiple regression and correlation. Basic experimental design. Analysis of variance (fixed, random, and mixed models). Analysis of covariance. Computer software usage. Prerequisite: STAT 143 or STAT 211; or STAT 141 and Instructor permission. Cross-listed with: BIOS 221.

STAT 223. QR: Appl Multivariate Analysis. 3 Credits.

STAT 224. QR:Stats for Qualty&Productvty. 3 Credits.
Statistical process control; Shewhart, cusum and other control charts; process capability studies. Total Quality Management. Acceptance, continuous, sequential sampling. Process design and improvement. Case studies. Prerequisite: STAT 141, STAT 143, or STAT 211.

STAT 225. QR: Applied Regression Analysis. 3 Credits.
Simple linear and multiple regression models; least squares estimates, correlation, prediction, forecasting. Problems of multicollinearity and influential data (outliers).

STAT 229. QR:Survivl/Logistic Regression. 3 Credits.

STAT 231. QR: Experimental Design. 3 Credits.
Randomization, complete and incomplete blocks, cross-overs, Latin squares, covariance analysis, factorial experiments, confounding, fractional factorials, nesting, split plots, repeated measures, mixed models, response surface optimization. Prerequisite: BIOS 221 or STAT 221; or BIOS 211 or STAT 211 and STAT 201. Cross-listed with: BIOS 231.

STAT 233. QR: Survey Sampling. 3 Credits.
Design and data analysis for sample surveys. Simple random, stratified, systematic, cluster, multitage sampling. Practical issues in planning and conducting surveys. Prerequisite: STAT 211; or STAT 141 or STAT 143 with Instructor permission.

STAT 235. QR: Categorical Data Analysis. 3 Credits.
Measures of association and inference for categorical and ordinal data in multiway contingency tables. Log linear and logistic regression models. Prerequisite: STAT 211. Cross-listed with: BIOS 235.

STAT 237. QR: Nonparametric Stats Mthd. 3 Credits.
Nonparametric and distribution free methods; categorical, ordinal, and quantitative data; confidence intervals; rank and chi-square hypothesis tests; computer-intensive procedures (bootstrap, exact tests). Prerequisite: STAT 211; or STAT 141 or STAT 143 with Instructor permission.

STAT 241. QR: Statistical Inference. 3 Credits.
Introduction to statistical theory: related probability fundamentals, derivation of statistical principles, and methodology for parameter estimation and hypothesis testing. Prerequisites: STAT 151, STAT 153, or STAT 251, and STAT 141 or equivalent, and MATH 121. Cross-listed with: BIOS 241.

STAT 251. QR: Probability Theory. 3 Credits.
Distributions of random variables and functions of random variables. Expectations, stochastic independence, sampling and limiting distributions (central limit theorems). Concepts of random number generation. Prerequisite: MATH 121; STAT 151 or STAT 153 recommended. Cross-listed with: MATH 207, BIOS 251.

STAT 252. Appl Discr Stochas Proc Models. 1 Credit.
Markov chain models for biological, social, and behavioral systems models. Random walks, transition and steady-state probabilities, passage and recurrence times. Prerequisite: STAT 151, STAT 153, or STAT 251.

STAT 253. QR: Appl Time Series&Forecastng. 3 Credits.
Autoregressive moving average (Box-Jenkins) models, autocorrelation, partial correlation, differencing for nonstationarity, computer modeling. Forecasting, seasonal or cyclic variation, transfer function and intervention analysis, spectral analysis. Prerequisite: STAT 211 or STAT 225; or STAT 141 or STAT 143 with Instructor permission. Cross-listed with: CSYS 253.
STAT 256. QR: Neural Computation. 3 Credits.
Introduction to artificial neural networks, their computational
capabilities and limitations, and the algorithms used to train them.
Statistical capacity, convergence theorems, backpropagation,
reinforcement learning, generalization. Prerequisites: MATH 122 or
MATH 124 or MATH 271; STAT 143 or STAT 153 or equivalent;
CS 110. Cross-listed with: CS 256, CSYS 256.

STAT 261. QR: Statistical Theory. 3 Credits.
Point and interval estimation, hypothesis testing, and decision
theory. Application of general statistical principles to areas such
as nonparametric tests, sequential analysis, and linear models.
Prerequisite: STAT 251; or STAT 151 or STAT 153 with Instructor
permission. Cross-listed with: BIOS 261.

STAT 265. QR: Integrated Product Dev. 3 Credits.
Project-based course focusing on the entire product life cycle.
Team dynamics, process and product design, quality, materials,
management, and environmentally-conscious manufacturing.
Prerequisite: Senior standing. Cross-listed with: BSAD 293, ME 265.

STAT 281. Statistics Practicum. 1-3 Credits.
Intensive experience in carrying out a complete statistical analysis
for a research project in substantive area with close consultation
with a project investigator. Prerequisite: STAT 200 or STAT 201
or STAT 221 through STAT 237 or STAT 253; some statistical
software experience; Instructor permission.

STAT 287. QR: Data Science I. 3 Credits.
Data harvesting, cleaning, and summarizing. Working with non-
traditional, non-numeric data (social network, natural language
textual data, etc.). Scientific visualization using static and interactive
"infographics". A practical focus on real datasets, and developing
good habits for rigorous and reproducible computational science.
Prerequisites: CS 020 or CS 021; STAT 141 or STAT 143 or
STAT 211; CS 110 and MATH 124 recommended. Cross-listed
with: CS 287.

STAT 288. QR: Statistical Learning. 3 Credits.
Statistical learning methods and applications to modern problems in
science, industry, and society. Topics include: linear model selection,
cross-validation, lasso and ridge regression, tree-based methods,
bagging and boosting, support vector machines, and unsupervised
learning. Prerequisites: STAT 143, STAT 183 or STAT 211. Cross-
listed with: CS 288.

STAT 290. Internship. 1-18 Credits.
On-site supervised work experience combined with a structured
academic learning plan directed by a faculty member or a faculty-staff
team in which a faculty member is the instructor of record, for which
academic credit is awarded. Offered at department discretion.

STAT 291. Independent Study. 1-18 Credits.
A course which is tailored to fit the interests of a specific student,
which occurs outside the traditional classroom/laboratory setting
under the supervision of a faculty member, for which credit is
awarded. Offered at department discretion.

STAT 293. Undergrad Honors Thesis. 1-18 Credits.
A program of reading, research, design, and analysis culminating in a
written thesis and oral defense. Honors notation appears on transcript
and Commencement Program. Contact Statistics Program Director
for procedures.

STAT 294. Undergrad Honors Thesis. 1-8 Credits.
A program of reading, research, design, and analysis culminating in a
written thesis and oral defense. Honors notation appears on transcript
and Commencement Program. Contact Statistics Program Director
for procedures.

STAT 295. Advanced Special Topics. 1-18 Credits.
For advanced students. Lectures, reports, and directed readings on
advanced topics. Prerequisite: As listed in schedule of courses.

STAT 297. Teaching Assistanship. 1-3 Credits.
Undergraduate student service as a teaching assistant, usually in
an introductory level course in the discipline, for which credit is
awarded. Offered at department discretion.

STAT 298. Undergraduate Research. 1-18 Credits.
Undergraduate student work on individual or small team research
projects under the supervision of a faculty member, for which credit is
awarded. Offered at department discretion.