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 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,
and variance. Discrete and continuous probability distributions.
Pseudo-random number generation. Prerequisites: MATH 020 or
MATH 022.

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. 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.
Foundations of probability, conditioning, independence, expectation
and variance. Discrete and continuous probability distributions.
Computer simulation examples. Introductory descriptive and
inferential statistics. Simple regression analysis. Pre/co-requisite:
MATH 020 or MATH 022.

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.
Introductory design and analysis of medical studies. Epidemiological
concepts, case-control and cohort studies. Clinical trials. Students
evaluate statistical aspects of published health science studies.
Prerequisite: STAT 111, STAT 141, STAT 143, or STAT 211. Cross-
listed with: BIOS 200.

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 111
with Instructor permission, or STAT 141 or STAT 211.
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: Applied Multivariate Analysis. 3 Credits.

STAT 224. QR: Stats for Quality & Productivity. 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: Survival/Logistic Regression. 3 Credits.

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

STAT 233. QR: Survey Sampling. 3 Credits.
Design and data analysis for sample surveys. Simple random, stratified, systematic, cluster, multistage 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 Mthds. 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 Discrete Stochastic 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: Applied Time Series & Forecasting. 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.
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 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 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.