STATISTICS (STAT)

Courses

STAT 051. 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 H.S. algebra. No credit for Sophomores, Juniors, orSeniors in the mathematical and engineering sciences.

STAT 087. Introduction to Data Science. 3 Credits.
Basic techniques of data harvesting and cleaning; association rules, classification and clustering; analyze, manipulate, and visualize data using programming languages. Basic principles of probability and statistical modeling/inference to make meaning out of large datasets. 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. 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. Basic Statistical Methods. 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. Prerequisites: Minimum Sophomore standing.

STAT 143. 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. 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. Prob & Stat for Cmprtr Sci. 3 Credits.

STAT 183. Statistics for Business. 3 Credits.
Advanced quantitative methodologies for contemporary business scenarios. Analysis of variance, multiple regression, time series analysis, non-parametric methods, Bayesian statistics and decision analysis. Prerequisite: STAT 141 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. Med Biostatistics&Epidemiology. 3 Credits.

STAT 201. 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. 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. 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 222. 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 223. Applied Multivariate Analysis. 3 Credits.
Multivariate normal distribution. Inference for mean vectors and
covariance matrices. Multivariate analysis of variance (MANOVA),
discrimination and classification, principal components, factor
and cluster analysis. Prerequisite: STAT 221, matrix algebra
recommended. Cross-listed with: BIOS 223.

STAT 224. 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. Applied Regression Analysis. 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;

STAT 226. Neural Computation. 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: STAT 211; or
STAT 141 or Instructor permission.

STAT 227. 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 Instructor permission.

STAT 228. Survival/Logistic Regression. 3 Credits.
Models and inference for time-to-event and binary data. Censored
data, life tables, Kaplan-Meier estimation, logrank tests, proportional
hazards models. Logistic regression-interpretation, assessment, model
building, special topics. Prerequisite: STAT 221. Cross-listed with:
BIOS 229.

STAT 229. Categorical Data Analysis. 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 231. Experimental Design. 3 Credits.
Nonparametric Statistical Mthd. 3 Credits.
Statistical capacity, convergence theorems, backpropagation,
reinforcement learning, generalization. Prerequisites: MATH 122 or
MATH 124 or MATH 271; STAT 143 or STAT 153 or equivalent;

STAT 232. Applied Multivariate Analysis. 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: STAT 211; or
STAT 141 or Instructor permission.

STAT 233. 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 Instructor permission.

STAT 234. 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 235. Categorical Data Analysis. 3 Credits.
Models and inference for categorical and ordinal data
in multiway contingency tables. Log linear and logistic regression
models. Prerequisite: STAT 221. Cross-listed with: BIOS 235.

STAT 236. Survival/Logistic Regression. 3 Credits.
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 237. Nonparametric Statistical 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 Instructor permission.

STAT 238. 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. 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 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.