STATISTICS (STAT)

Courses

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: Junior standing. Cross-listed with: BIOS 211.

STAT 212. Statistical Methods II. 3 Credits.

STAT 221. 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: Any 200-level Statistics course, STAT 221 or STAT 225 recommended, matrix algebra recommended. Cross-listed with: BIOS 223.

STAT 222. 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 223. 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. Survival/Logistic Regression. 3 Credits.

STAT 231. 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: STAT 211; STAT 221 recommended.

STAT 232. 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 233. 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. 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 STAT 143 with Instructor permission.

STAT 241. 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. 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. Appl 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. 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. 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: BIO 261.

STAT 265. Integrated Product Development. 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. 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.

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 308. Applied Biostatistics. 3 Credits.
The rationale and application of biostatistical methods in the
biological, health and life sciences with emphasis on interpreting and
reporting results. sciences. Prerequisite: STAT 141 or equivalent.
Cross-listed with: MPBP 308, BIOS 308.

STAT 321. Seminar in Advanced Statistics. 1 Credit.
Seminar presentations and discussions of statistical literature
pertaining to the theoretical aspects of methods studied in STAT 221,
STAT 223, STAT 224, STAT 225, and STAT 229, respectively.
Corequisites: STAT 221; STAT 241 or STAT 261 recommended.

STAT 322. Seminar in Advanced Statistics. 1 Credit.
Seminar presentations and discussions of statistical literature
pertaining to the theoretical aspects of methods studied in STAT 221,
STAT 223, STAT 224, STAT 225, and STAT 229, respectively. Co-
requisites: STAT 223; STAT 241 or STAT 261 recommended.

STAT 324. Seminar in Advanced Statistics. 1 Credit.
Seminar presentations and discussions of statistical literature
pertaining to the theoretical aspects of methods studied in STAT 221,
STAT 223, STAT 224, STAT 225, and STAT 229, respectively Co-
requisites: STAT 224; STAT 241 or STAT 261 recommended.

STAT 325. Seminar in Advanced Statistics. 1 Credit.
Seminar presentations and discussions of statistical literature
pertaining to the theoretical aspects of methods studied in STAT 221,
STAT 223, STAT 224, STAT 225, and STAT 229, respectively.
Co-requisites: STAT 225 or STAT 221; STAT 241 or STAT 261
recommended.

STAT 329. Seminar in Advanced Statistics. 1 Credit.
Seminar presentations and discussions of statistical literature
pertaining to the theoretical aspects of methods studied in STAT 221,
STAT 223, STAT 224, STAT 225, and STAT 229, respectively.

STAT 330. Bayesian Statistics. 3 Credits.
Introduction to Bayesian inference. Posterior inference, predictive
distributions, prior distribution selection. MCMC algorithms.
Hierarchical models. Model checking and selection. Use of computer
software. Pre/co-requisite: STAT 241 or STAT 251 or Instructor
permission.

STAT 335. Statistical Pattern Recognition. 3 Credits.
Analysis of algorithms used for feature selection, density estimation,
and pattern classification, including Bayes classifiers, maximum
likelihood, nearest neighbors, kernels, discriminants, neural networks
and clustering. Prerequisite: STAT 241 or STAT 251, or Instructor

STAT 360. Linear Models. 3 Credits.
Theory of linear models, least squares and maximum likelihood
estimation, fixed, random and mixed models, variance component
estimation, introduction to generalized linear models, bootstrapping.
Prerequisites: STAT 261 and knowledge of matrix algebra or
Instructor permission.

STAT 369. Applied Geostatistics. 3 Credits.
Introduction to the theory of regionalized variables, geostatistics
(kriging techniques): special topics in multivariate analysis;
Applications to real data subject to spatial variation are emphasized.
Pre/co-requisites: STAT 223 or STAT 225, and CS 016 or CE 011 or
permission. Cross-listed with: CSYS 369.

STAT 386. Sem:Statistics & Biostatistics. 0.5-1 Credits.
Presentation and discussion of current topics, methodological
research and applications in Statistics and Biostatistics by graduate
students, faculty and guest speakers. Prerequisite: Instructor
Permission.

STAT 391. Statistical Research. 1-3 Credits.
Methodologic or data analytic research culminating in oral and
written reports to the faculty. Prerequisite: Instructor permission.
Cross-listed with: BIOS 391.
STAT 385. Consulting Practicum. 1-3 Credits.
Supervised field work in statistical consulting. Experiences may include advising UVM faculty and students or clients in applied settings such as industry and government agencies. Prerequisites: Second year Graduate standing in Statistics or Biostatistics and permission of Statistics Program Director.

STAT 387. Data Science II. 3 Credits.
Advanced data analysis, collection, and filtering. Statistical modeling, monte carlo statistical methods, and in particular Bayesian data analysis, including necessary probabilistic background material. A practical focus on real datasets and developing good habits for rigorous and reproducible computational science. Prerequisite: STAT 287 or Instructor permission.

STAT 391. Master's Thesis Research. 1-6 Credits.

STAT 395. Advanced Special Topics. 1-18 Credits.
Lectures or directed readings on advanced and contemporary topics not presently included in other statistics courses. Prerequisites: As listed in schedule of courses.