STATISTICS (STAT)

STAT 124 - Introduction to Survey Methods
Introduction to Survey Methods: A 100 level course that introduces students to aspects of how surveys work. Students learn about the design, and interpretation of survey data. A range of survey strategies (e.g., telephone, face-to-face, mail and internet surveys) within the broader context of a research or evaluation project are introduced. Topics include formulation of research goals, developing an appropriate questionnaire design, protection of human subjects and proper conduct of research, sample size calculation and sample design, survey administration, construction of a survey report including basic data analysis techniques, and presentation of the results of a survey. Class topics are designed to convey practical knowledge of survey design.

Prerequisite: ACSD 110[D]
[D] Requires minimum grade of D.
Credits: 3
Term(s) Typically Offered: Offered as Needed

STAT 139 - Foundations of Academic Discovery
Foundations of Academic Discovery serves as the entry point to the Rock Integrated Studies Program. With its strong faculty-student interaction, the course promotes intellectual inquiry, critical and creative thinking, and computer skills needed for academic success. Through varied content, the course introduces students to academic discourse and information literacy while exploring topics such as diversity and inclusion and global awareness. This course will set students along the path to becoming engaged with issues and scholarship important to a 21st century education while they learn about themselves and their place in the world.

Credits: 3
Term(s) Typically Offered: Offered as Needed
Enrollment limited to students with a semester level of Freshman 1 or Freshman 2.
Enrollment limited to students with the ROCK STUDIES 2 STUDENT or ROCK STUDIES STUDENT attributes.

STAT 152 - Elementary Statistics I
This is a course about how data inform every aspect of our lives. This course focuses on what data are collected, how they are collected, how they are summarized and interpreted, and how possible error in those data is quantified and understood. In this class, we will learn about ways in which statistics are used by businesses, governmental agencies, researchers, and practitioners to understand our world. Topics covered include descriptive statistics, bivariate and multivariate data, elementary probability, random variables, normal and binomial probability distributions, Central Limit Theorem, confidence intervals, hypothesis testing, and simple linear regression.

Prerequisites: (ACSD 110[C] or ESAP 110[C]) or minimum score of Y in 'WAIVE ACSD110 W HIGHER MATH'
[C] Requires minimum grade of C.
Credits: 3
Term(s) Typically Offered: Offered Every Term
Thematic Thread(s): Citizenship & Social Problems, Conservation, Technology & Imagination, Human Diversity & Well-Being, Institutions & Human Innovations, Transfer Thread Completion Course

STAT 190 - Experimental
A unique and specifically focused course within the general purview of a department which intends to offer it on a "one time only" basis and not as a permanent part of the department's curriculum.

Credits: 1-3
Term(s) Typically Offered: Offered as Needed

STAT 195 - Workshop
A workshop is a program which is usually of short duration, narrow in scope, often non-traditional in content and format, and on a timely topic.

Credits: 1-6
Term(s) Typically Offered: Offered as Needed

STAT 198 - Selected Topics
A Selected Topics course is a normal, departmental offering which is directly related to the discipline, but because of its specialized nature, may not be able to be offered on a yearly basis by the department.

Credits: 1-3
Term(s) Typically Offered: Offered as Needed

STAT 252 - Introduction to Statistical Modeling
What do we mean when we talk about "statistical modeling"? How can statistical models be used to provide evidence for scientific or social theories? In this course, we begin by reviewing hypothesis testing and learn how hypothesis testing is applied in a wide variety of statistical contexts. We then move on to the workhouse of statistical modeling, linear regression, and learn the complex methods used to determine the validity of regression models. We then touch on analysis of variance models, polynomial regression, and time series. R will be used for data analysis, but no prior knowledge of R is assumed.

Prerequisites: STAT 152[D] and ENGL 102[D] and (MATH 123[D] or MATH 125[D] or MATH 225[D])
[D] Requires minimum grade of D.
Credits: 3
Term(s) Typically Offered: Offered Fall Terms

STAT 254 - Nonparametric Statistics
Statistical models in nonparametric settings. Theory and practice using techniques requiring less restrictive assumptions about the distribution of the data. Nonparametric analogues of t- and F-tests in one and two sample settings, ANOVA, regression and correlation will be discussed.

Prerequisites: MATH 125[D] and (MATH 153[D] or STAT 153[D])
[D] Requires minimum grade of D.
Credits: 3
Term(s) Typically Offered: Offered as Needed

STAT 256 - Statistical Computing
Statistical computing considers how data are processed and analyzed, and how statistical models are simulated, in a computational setting. The current landscape of the statistical computing community will be explored, including common statistical software, proprietary versus open-source statistical languages, and how statistical software packages are tailored for specific uses. Computationally intense statistical techniques will be discussed and programmed. At least one proprietary and one open-source statistical computing environment will be learned. Students will learn how to combine the functionality of different statistical packages to create and present a data analysis optimally. Prior experience with computer programming highly recommended.

Prerequisite: STAT 252[D]
[D] Requires minimum grade of D.
Credits: 3
Term(s) Typically Offered: Offered Spring Terms

STAT 290 - Experimental
A unique and specifically focused course within the general purview of a department which intends to offer it on a "one time only" basis and not as a permanent part of the department's curriculum.

Credits: 1-3
Term(s) Typically Offered: Offered as Needed

STAT 295 - Workshop
A workshop is a program which is usually of short duration, narrow in scope, often non-traditional in content and format, and on a timely topic.

Credits: 1-6
Term(s) Typically Offered: Offered as Needed

STAT 298 - Selected Topics
A Selected Topics course is a normal, departmental offering which is directly related to the discipline, but because of its specialized nature, may not be able to be offered on a yearly basis by the department.

Credits: 1-3
Term(s) Typically Offered: Offered as Needed

STAT 318 - Statistical Study Design
There are five basic sources of data that can be used for a statistical study: observational data, experimental data, data from a survey or census, simulation data, and found data. In this course, we learn the strengths and weaknesses associated with each study type, exploring the concepts of randomization, representation, causality, weighting, estimation, and variance. Ethical issues associated with statistical studies will also be discussed. A working knowledge of spreadsheet software such as Microsoft Excel is assumed.

Prerequisite: STAT 152[C]
[C] Requires minimum grade of C.
Credits: 3
Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

STAT 325 - Advanced Statistical Methods
Statistics is used in computer algorithms (machine learning) to enhance computer discision-making and prediction capabilities. this course will cover a wide variety of topics in statistical learning methods. Major statistical methods used in machine learning such as linear regression, survival analysis and others will be discussed. Additional topics include unsupervised learning and supervised techniques such as principal component analysis, nearest neighbor, random forest, support vector machines and neural networks. simulation methods, such as the EM algorithm, Metropolis-Hasting algorithm and the Markov Chain Monte Carlo method will also be discussed.

Credits: 3
Term(s) Typically Offered: Offered as Needed
Enrollment is limited to Graduate level students.

STAT 350 - Applied Statistics
A calculus-based introduction to probability and statistical applications. Discrete and continuous probability and expected value. Confidence intervals and hypothesis testing for single populations. This course is not open to students who have credit for MATH 352. This course does not count as an upper division elective mathematics course for mathematics majors.

Credits: 3
Term(s) Typically Offered: Offered Spring Terms
Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

STAT 352 - Mathematical Statistics I
An introduction to the mathematical foundations of probability theory including discrete and continuous probability distributions, random variables, mathematical expectation, momentuo, and moment generating functions.

Prerequisite: MATH 230[D]
[D] Requires minimum grade of D.
Credits: 3
Term(s) Typically Offered: Offered Fall Terms
Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

STAT 353 - Mathematical Statistics II
Functions of random variables, sampling distributions, introduction to mathematical theory of statistical inference, including methods of moments, estimators, maximum likelihood estimators, sufficient statistics, interval estimates, and hypothesis testing.

Prerequisites: MATH 352[D] or STAT 352[D]
[D] Requires minimum grade of D.
Credits: 3
Term(s) Typically Offered: Offered Spring Terms
Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

STAT 354 - Mathematical Statistics III
Stochastic processes and statistical inference including: Type I and Type II errors, MLE, Neyman-Pearson lemma, order statistics, Poisson processes, ANOVA, nonparametric tests, comparing models and Bayesian parameter estimation.

Prerequisites: MATH 231[D] and (MATH 353[D] or STAT 353[D])
[D] Requires minimum grade of D.
Credits: 3
Term(s) Typically Offered: Offered Fall Terms Odd
Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

STAT 363 - Statistical Learning
The field of statistical learning encompasses the theory and data analytic techniques developed to process and make sense of evolving data challenges arising in the fields of data science and machine learning. This course will cover the theoretical underpinnings of supervised and unsupervised learning techniques, including generalized linear models, classification, dimension reduction, and cluster analysis. R and R-studio will be used for illustrative purposes. A working knowledge of linear algebra and multivariate calculus is assumed. Previous experience suing R software package is also assumed.

Prerequisites: (MATH 309[D] or MATH 232[D]) and MATH 231[D] and STAT 252[D]
[D] Requires minimum grade of D.
Credits: 3
Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

STAT 372 - Forecasting & Time Series
An introduction to creating, solving, analyzing and interpreting real-world time-series and forecasting models. Topics include linear, autoregressive, moving average and other forecasting and time-series techniques, transfer functions, multivariate model building, stationary and nonstationary techniques. Applications may include all areas where forecasting is required including transportation, finance, scheduling, networks, and supply chains. Appropriate software tools for analyzing forecasting models including software such as SAS and spreadsheet software will be taught.

Prerequisites: MATH 252[C] or STAT 252[C] or MATH 350[C] or STAT 350[C]
[C] Requires minimum grade of C.
Credits: 3
Term(s) Typically Offered: Offered Spring Terms Even
Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

STAT 373 - Statistical Quality Control
A comprehensive coverage of modern quality control techniques including the design of statistical process control systems, acceptance sampling and process improvement.

Prerequisites: MATH 230[C] and (STAT 252[C] or STAT 311[C])
[C] Requires minimum grade of C.
Credits: 3
Term(s) Typically Offered: Offered as Needed
Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

STAT 390 - Experimental
A unique and specifically focused course within the general purview of a department which intends to offer it on a "one time only" basis and not as a permanent part of the department's curriculum.

Credits: 1-3
Term(s) Typically Offered: Offered as Needed
Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

STAT 395 - Workshop
A workshop is a program which is usually of short duration, narrow in scope, often non-traditional in content and format, and on a timely topic.

Credits: 1-6
Term(s) Typically Offered: Offered as Needed
Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

STAT 398 - Selected Topics
A Selected Topics course is a normal, departmental offering which is directly related to the discipline, but because of its specialized nature, may not be able to be offered on a yearly basis by the department.

Credits: 1-3
Term(s) Typically Offered: Offered as Needed
Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

STAT 490 - Independent Study
Independent Study courses give students the opportunity to pursue research and/or studies that are not part of the university's traditional course offerings. Students work one on one or in small groups with faculty guidance and are typically required to submit a final paper or project as determined by the supervising professor.

Credits: 1-3
Term(s) Typically Offered: Offered as Needed
Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

STAT 491 - Statistics Seminar
In this seminar, we will explore the history of statistics and the field of statistics today. Students will learn about current topics of interest in the field—technical, ethical, and societal–and will research a current technical topic of interest. This is a capstone course for statistics students.

Credits: 1
Term(s) Typically Offered: Offered Spring Terms
Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

STAT 495 - Workshop
A workshop is a program which is usually of short duration, narrow in scope, often non-traditional in content and format, and on a timely topic.

Credits: 1-6
Term(s) Typically Offered: Offered as Needed
Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.

STAT 498 - Selected Topics
A Selected Topics course is a normal, departmental offering which is directly related to the discipline, but because of its specialized nature, may not be able to be offered on a yearly basis by the department.

Credits: 1-3
Term(s) Typically Offered: Offered as Needed
Students with a semester level of Freshman 1, Freshman 2 or Sophomore 1 may **not** enroll.