

# DATA SCIENCE (DSCI)

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## DSCI 101 - INTRODUCTION TO DATA SCIENCE

**Short Title:** INTRO TO DATA SCIENCE

**Department:** Data Science

**Grade Mode:** Standard Letter

**Course Type:** Lecture/Laboratory

**Distribution Group:** Distribution Group III

**Credit Hours:** 3

**Restrictions:** Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.

**Course Level:** Undergraduate Lower-Level

**Description:** In this course, students learn the fundamentals of data science and Python programming while working on teams to solve real data science challenges, design a data science pipeline, and derive and communicate valuable insights from data. This is a non-calculus based course with no prior background in statistics or programming required.

## DSCI 301 - PROBABILITY AND STATISTICS FOR DATA SCIENCE

**Short Title:** STATISTICS FOR DATA SCIENCE

**Department:** Data Science

**Grade Mode:** Standard Letter

**Course Type:** Lecture/Laboratory

**Distribution Group:** Distribution Group III

**Credit Hours:** 4

**Restrictions:** Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.

**Course Level:** Undergraduate Upper-Level

**Prerequisite(s):** MATH 102 or MATH 106

**Description:** An introduction to mathematical statistics and computation for applications to data science. Topics include probability, random variables expectation, sampling distributions, estimation, confidence intervals, hypothesis testing and regression. A weekly lab will cover the statistical package, R, and data projects. Cross-list: STAT 315. Recommended Prerequisite(s): MATH 212. Mutually Exclusive: Cannot register for DSCI 301 if student has credit for ECON 307/STAT 310.

## DSCI 302 - INTRODUCTION TO DATA SCIENCE TOOLS AND MODELS

**Short Title:** DATA SCIENCE TOOLS AND MODELS

**Department:** Data Science

**Grade Mode:** Standard Letter

**Course Type:** Lecture

**Credit Hours:** 3

**Restrictions:** Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students. Students in the Computer Science department may not enroll.

**Course Level:** Undergraduate Upper-Level

**Prerequisite(s):** COMP 140 or DSCI 101

**Description:** This course introduces key concepts in data management, preparation, and modeling and provides students with hands-on experience in performing these tasks using modern tools, including relational databases, pandas, and Spark. Models covered include kNearest Neighbors, linear regression and gradient descent. For registration purposes, DSCI 101 or COMP 140 is a required prerequisite for this course. With instructor permission, students who have experience with the Python programming language may be allowed to special register for this course. Note that these students may be required to demonstrate proficiency with Python. Priority for this course is given to students enrolled in the data science minor or sport analytics major. Other students may be permitted to enroll at the discretion of the instructor. Mutually Exclusive: Cannot register for DSCI 302 if student has credit for COMP 330.

## DSCI 303 - MACHINE LEARNING FOR DATA SCIENCE

**Short Title:** MACHINE LEARNING FOR DS

**Department:** Data Science

**Grade Mode:** Standard Letter

**Course Type:** Lecture

**Credit Hours:** 3

**Restrictions:** Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.

**Course Level:** Undergraduate Upper-Level

**Prerequisite(s):** (DSCI 101 or COMP 140) and (DSCI 302 (may be taken concurrently) or COMP 330 or COMP 430) and (DSCI 301 or STAT 310 or STAT 280 or STAT 305 or ELEC 303 or PSYC 339 or SOCI 382 or SOSC 302 or BIOE 439 or ECON 307)

**Description:** This course is a practical introduction to machine learning, emphasizing when and how to apply techniques and how to interpret results. Topics covered include regression, classification, dimension reduction, clustering, decision trees, ensemble learning, and neural networks. Mutually Exclusive: Cannot register for DSCI 303 if student has credit for ELEC 478.

## DSCI 304 - INTRODUCTION TO EFFECTIVE DATA VISUALIZATION

**Short Title:** DATA VISUALIZATION

**Department:** Data Science

**Grade Mode:** Standard Letter

**Course Type:** Lecture/Laboratory

**Credit Hours:** 3

**Restrictions:** Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.

**Course Level:** Undergraduate Upper-Level

**Prerequisite(s):** BIOE 439 or DSCI 301 or ECON 307 or ECON 310 or COMP 330 or COMP 340 or STAT 280 or STAT 305 or STAT 311 or STAT 312 or STAT 310 or STAT 315 or SOCI 382 or SOSC 302 or BUSI 251 or BUSI 395 or ELEC 303

**Description:** This course teaches fundamental data visualization skills to undergraduate students in the Data Science minor. Students will learn how to create data visualizations in Python or R, how to design effective visualizations that account for visual perception, and how to explain and present data to technical and non-technical audiences.

## DSCI 305 - DATA, ETHICS, AND SOCIETY

**Short Title:** DATA, ETHICS, AND SOCIETY

**Department:** Data Science

**Grade Mode:** Standard Letter

**Course Type:** Seminar

**Distribution Group:** Distribution Group II

**Credit Hours:** 3

**Restrictions:** Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.

**Course Level:** Undergraduate Upper-Level

**Description:** An examination of the ethical implications and societal impacts of choices made by data science professionals. The course will provide practical guidance on evaluating ethical concerns, identifying the potential for harm, and applying best practices to protect privacy, design responsible algorithms, and increase the societal benefit of data science research.

**DSCI 400 - DATA SCIENCE AND MACHINE LEARNING SELF-GUIDED  
CAPSTONE LABORATORY**

**Short Title:** DATA SCIENCE CAPSTONE LAB

**Department:** Data Science

**Grade Mode:** Standard Letter

**Course Type:** Lecture/Laboratory

**Credit Hours:** 3

**Restrictions:** Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.

**Course Level:** Undergraduate Upper-Level

**Prerequisite(s):** (DSCI 301 or STAT 315 or STAT 310 or STAT 311 or ECON 307 or ELEC 303 or BIOE 439 or SOCI 382 or PSYC 339) and (DSCI 302 or COMP 330 or COMP 430) and (DSCI 303 or ELEC 478 or STAT 413 or COMP 540)

**Description:** In this project-based course, student teams will choose, define, and execute semester-long data-science and machine-learning research projects. These projects may be selected from a variety of disciplines and industries, where freedom is given in defining the projects. The course is about learning best practices in data science and machine learning while finding a suitable curiosity-driven project to build these methods and systems around.

**DSCI 415 - DATA SCIENCE CONSULTING**

**Short Title:** DATA SCIENCE CONSULTING

**Department:** Data Science

**Grade Mode:** Standard Letter

**Course Type:** Lecture/Laboratory

**Credit Hours:** 3

**Restrictions:** Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.

**Course Level:** Undergraduate Upper-Level

**Prerequisite(s):** STAT 405 or COMP 140 or CAAM 210

**Description:** Students in this course will advise clients at Rice and beyond in a data science consulting clinic, learn best practices in consulting, and gain exposure to a variety of real data science problems. Graduate/Undergraduate Equivalency: DSCI 515. Mutually Exclusive: Cannot register for DSCI 415 if student has credit for DSCI 515. Repeatable for Credit.

**DSCI 435 - APPLIED MACHINE LEARNING AND DATA SCIENCE  
PROJECTS**

**Short Title:** DATA SCIENCE PROJECTS

**Department:** Data Science

**Grade Mode:** Standard Letter

**Course Type:** Lecture/Laboratory

**Credit Hours:** 4

**Restrictions:** Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.

**Course Level:** Undergraduate Upper-Level

**Description:** In this project-based course, student teams will complete semester-long data science research or analysis projects selected from a variety of disciplines and industries. Students will also learn best practices in data science. Cross-list: COMP 449. Graduate/Undergraduate Equivalency: DSCI 535. Repeatable for Credit.

**DSCI 515 - DATA SCIENCE CONSULTING**

**Short Title:** DATA SCIENCE CONSULTING

**Department:** Data Science

**Grade Mode:** Standard Letter

**Course Type:** Lecture/Laboratory

**Credit Hours:** 3

**Restrictions:** Enrollment is limited to Graduate level students.

**Course Level:** Graduate

**Description:** Students in this course will advise clients from across this Rice community in a data science consulting clinic, learn best practices in consulting, and gain exposure to a variety of real data science problems. Graduate/Undergraduate Equivalency: DSCI 415. Mutually Exclusive: Cannot register for DSCI 515 if student has credit for DSCI 415. Repeatable for Credit.

**DSCI 535 - APPLIED MACHINE LEARNING AND DATA SCIENCE  
PROJECTS**

**Short Title:** DATA SCIENCE PROJECTS

**Department:** Data Science

**Grade Mode:** Standard Letter

**Course Type:** Lecture/Laboratory

**Credit Hours:** 4

**Restrictions:** Enrollment limited to students in the MDS, OMCS or OMDS programs. Enrollment is limited to Graduate level students.

**Course Level:** Graduate

**Description:** In this project-based course, student teams will complete semester-long data science research or analysis projects selected from a variety of disciplines and industries. Students will also learn best practices in data science. Cross-list: COMP 549. Graduate/Undergraduate Equivalency: DSCI 435. Repeatable for Credit.