

# DATA SCIENCE-DS (DSCI)

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## DSCI 100 First Year Seminar in Data Science Credit: 1 (0-0-1)

**Course Description:** Introduction to problems and techniques in data science.

**Prerequisite:** None.

**Registration Information:** Freshman or sophomore Data Science majors only.

**Term Offered:** Fall.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

## DSCI 235 Data Wrangling Credits: 2 (1-0-1)

**Course Description:** Introduce tools and techniques for handling, cleaning, extracting, and organizing data.

**Prerequisite:** (CS 150B with a minimum grade of C or CS 152 with a minimum grade of C) and (CS 165 with a minimum grade of C).

**Registration Information:** Must register for lecture and recitation.

Sections may be offered: Online.

**Term Offered:** Spring.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

## DSCI 320 Optimization Methods in Data Science Credits: 3 (3-0-0)

**Course Description:** Linear and non-linear programming, convex sets and functions, convex and non-convex optimization problems, duality, Newton's methods, barrier methods, linear equality and inequality constraints. Emphasis on computation methods and programming.

**Prerequisite:** (CS 163 or CS 164 or CS 165 or CS 220 or DSCI 235) and (MATH 255 or MATH 256 or MATH 261) and (DSCI 369 or MATH 369).

**Term Offered:** Fall.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

## DSCI 335 Inferential Reasoning in Data Analysis Credits: 3 (3-0-0)

**Course Description:** Sources of data collection errors and uncertainties, type of studies, interaction versus confounding, fair use of data, confidentiality and disclosure.

**Prerequisite:** (CO 300 or CO 301B or CO 302 or JTC 300) and (STAT 301 or STAT 315).

**Term Offered:** Spring.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

## DSCI 336 Data Graphics and Visualization Credit: 1 (1-0-0)

**Course Description:** Data graphics and visualization techniques for data science.

**Prerequisite:** STAT 341.

**Registration Information:** This is a partial semester course.

**Term Offered:** Spring.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

## DSCI 369 Linear Algebra for Data Science Credits: 4 (3-0-1)

**Course Description:** Techniques in linear algebra related to data science. Matrices, bases, subspaces, linear independence, dimension, change of basis, projections, linear systems of equations, least squares, matrix factorizations. Singular value decomposition, angles between subspaces.

**Prerequisite:** MATH 157 and MATH 159 or MATH 155 or MATH 156 or MATH 160 or MATH 161.

**Registration Information:** Must register for laboratory and recitation.

Sections may be offered: Online.

**Terms Offered:** Fall, Spring.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

## DSCI 445 Statistical Machine Learning Credits: 3 (3-0-0)

**Course Description:** Algorithms and statistical methods for regression, classification, and clustering; hands-on experience in analyzing data and running machine learning experiments.

**Prerequisite:** (DSCI 369 or MATH 369) and (STAT 341).

**Registration Information:** Credit not allowed for both CS 345 and DSCI 445.

**Term Offered:** Fall.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

## DSCI 473 Introduction to Geometric Data Analysis Credits: 2 (2-0-0)

**Course Description:** Geometric techniques for analyzing high-dimensional and complex data. Techniques for data reduction and analysis.

**Prerequisite:** DSCI 369.

**Registration Information:** This is a partial semester course.

**Term Offered:** Fall.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

## DSCI 475 Topological Data Analysis Credits: 2 (2-0-0)

**Course Description:** Topological techniques for analyzing high-dimensional or complex data. Topics include clustering, dendrograms, a visual introduction to topology, data modeling and visualization, and selected topics from nonlinear dimensionality reduction, graph-based models of data, Reeb graphs, multi-scale approaches to data, and persistent homology.

**Prerequisite:** DSCI 369 or MATH 369.

**Registration Information:** This is a partial semester course.

**Term Offered:** Spring.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

## DSCI 478 Capstone Group Project in Data Science Credits: 4 (0-0-8)

**Course Description:** Group-project-based capstone, in which small groups of students from each Data Science degree concentration work collectively on a problem in data science.

**Prerequisite:** DSCI 445.

**Restriction:** Must be a: Undergraduate.

**Registration Information:** Senior standing only.

**Term Offered:** Spring.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**DSCI 510 Linux as a Computational Platform Credit: 1 (1-0-0)**

**Course Description:** Use of the Linux operating system for computational work using command-line tools; basic Linux commands, running and managing jobs, installing software.

**Prerequisite:** None.

**Restriction:** Must be a: Graduate.

**Registration Information:** Graduate standing. This is a partial semester course. Credit allowed for only one of the following: CS 580A4, DSCI 510, or NSCI 580A4.

**Term Offered:** Fall.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**DSCI 511 Genomics Data Analysis in Python Credits: 2 (1-0-1)**

**Course Description:** Analyzing complex data sets using Python.

**Prerequisite:** DSCI 510, may be taken concurrently.

**Restriction:** Must be a: Graduate.

**Registration Information:** Graduate standing. Must register for lecture and recitation. This is a partial semester course. Credit not allowed for both DSCI 511 and NSCI 580A5.

**Term Offered:** Fall.

**Grade Mode:** Traditional.

**Special Course Fee:** No.

**DSCI 512 RNA-Sequencing Data Analysis Credit: 1 (0-2-0)**

**Course Description:** Hands-on experience with tools for analysis of next generation sequencing data.

**Prerequisite:** DSCI 510, may be taken concurrently.

**Restriction:** Must be a: Graduate.

**Registration Information:** Graduate standing. This is a partial semester course. Credit not allowed for both DSCI 512 and NSCI 580A3.

**Term Offered:** Fall.

**Grade Mode:** Traditional.

**Special Course Fee:** No.