

DATA SCIENCE (DTSC)

DTSC 220 Introduction to Data Science 3

Introduction to the field of data science, including both theoretical and applied components. Students will explore the origins of the field, including links to computer science, statistics, and mathematics. Students will use Python and associated data manipulation and visualization libraries to explore and analyze varied data sets.

Core Category: Mathematics

Prerequisites: Students must complete CSCI 175 with a minimum grade of C prior to taking this course.

DTSC 230 Special Topics 3

Core Category: Mathematics

DTSC 230A Special Topics: Data Visualization 3

This course is designed to teach students best practices in data visualization, key trends in the industry, and how to become better storytellers with data. Students will learn the importance of using actionable dashboards that enable their organizations to make data-driven decisions.

Core Category: Mathematics

DTSC 235 Artificial Intelligence for the Liberal Arts 3

This course will introduce students to the ethical, philosophical, and interdisciplinary implications of Artificial Intelligence development through the understanding of how machine learning models are created, trained, and used. Students will learn the basics of data, statistics, and models in order to fully engage in conversations surrounding AI development.

Core Category: Mathematics

DTSC 250 Statistics Using R 3

This course will introduce statistical program R and build upon prior statistics knowledge. Students will both complete hand calculations and execute them in R.

Core Category: Mathematics

DTSC 320 Data Management 3

This course considers the ways data can be organized, cleaned and managed within and between disparate data sets. More formal algorithmic techniques are emphasized with the end of prediction and analysis in mind.

Prerequisites: DTSC 220

DTSC 330 Special Topics 3

Core Category: Mathematics

DTSC 380 Data Wrangling 3

In this course, students will use Python and its libraries to obtain, store, and clean data. Topics include data cleaning, data preparation, data joining and combining, and general data manipulation. This course assumes prior knowledge of Python, NumPy, and Pandas.

Prerequisites: DTSC 220

DTSC 400 Applied Data Science 3

This course serves as a capstone for the Data Science Major. The student will apply the techniques learned to actual data sets in their chosen cognate area.

Prerequisites: DTSC 320 and MATH 316

DTSC 401 Directed Study 1-3

DTSC 420 Ethical and Philosophical Issues in Computing 3

This course will introduce students to various ethical issues related to computing technology and the internet. Free/open source software, cybersecurity, privacy, monopoly power and artificial intelligence will be considered within a Christian framework.

Prerequisites: CSCI 405

DTSC 450 Applied Data Science 3

This course serves as a capstone for the Data Science Major. The student will apply the techniques learned to actual data sets in their chosen cognate area.

Prerequisites: DTSC 250 and DTSC 320

DTSC 495 Internship 2-12

DTSC 498 Teaching Assistant 1-3

DTSC 500 Introduction to Data 1

This course provides an overview of data science and analytics for those with little to no background in coding, statistics, or other technical fields. Students will be introduced to data science and analytics topics, including coding in Python, probability and statistics, critical thinking and problem solving in data contexts, machine learning, and databases. Following the completion of this, students will be fully prepared for DTSC 520: Fundamentals of Data Science.

DTSC 520 Fundamentals of Data Science 3

Introduction to foundational concepts, technologies, and theories of data and data science. This includes methods of data acquisition, cleaning, analysis, and visualization. Taught in Python.

May take Pass/Fail

DTSC 520L Fundamentals of Data Science Lab 0

This course is an optional, 0-credit, ungraded lab section meant to supplement coursework in DTSC 520, and will follow the suggested weekly schedule in the main 520 section. Instruction will take place through live lab sessions in which instructors will provide additional learning materials, such as coding problems and supplemental notebooks. The lab is recommended for students with little or no coding background. Students must be enrolled in DTSC 520 to be eligible for the lab.

Corequisites: DTSC 520

DTSC 540 Introduction to Artificial Intelligence: Theory, Tools, and Applications 3

A comprehensive introduction to the field of artificial intelligence (AI), tailored for graduate students with minimal prior background knowledge in AI or machine learning. The course focuses on foundational theories of AI, ethical and societal implications of AI technologies, and practical skills in using modern AI tools. This is an interdisciplinary course appropriate for learners from all disciplines.

May take Pass/Fail

DTSC 550 Introduction to Statistical Modeling 3

Introduction to foundational concepts, theories, and techniques of statistical analysis for data science. Students will begin with descriptive statistics and probability, and advance through multiple and logistic regression. Students will also conduct analyses in R. This course is approachable for students with little statistical background and prepares them for DTSC 650.

May take Pass/Fail

DTSC 560 Data Science for Business 3

This course explores the various ways data and science can be applied to business contexts. Particular emphasis will be placed on analytics using data to make informed business decisions. Approachable for students who have an understanding of basic statistics and beginner-level experience with R.

DTSC 575 Principles of Python Programming 3

This course will teach students the introductory skills of programming, problem solving and algorithmic thinking in Python. Topics include variables, input/output, conditional statements/logic, Boolean expressions, flow control, loops and functions. Approachable for students who have no experience with Python.

DTSC 580 Data Manipulation 3

This course focuses on the loading, manipulating, processing, cleaning, aggregating, and grouping of data. Students will practice on real world data sets, learning how to manipulate data using Python and continue their study of intermediate and advanced topics from the NumPy and Pandas libraries. Students should have taken DTSC 520 and DTSC 575, or have previous Python for data analysis knowledge/experience.

DTSC 600 Information Visualization 3

This course is designed to teach students the best practices in Data Visualization, the key trends in the industry, and how to become great storytellers with data. Students taking this class will learn the importance of using actionable dashboards that enable their organizations to make data-driven decisions. For this class students will use Tableau, one of the most used visual analytics platforms in the industry.

DTSC 620 Cloud Foundations 3

This course will introduce students to the advantages and vocabulary of cloud computing. Students will gain exposure and experience with cloud-based core resources for compute, storage, database, and networking tasks. Students will explore best practices for cloud architecture, including operational excellence, security, shared responsibility, cost optimization, reliability, and scalability.

DTSC 650 Data Analytics in R 3

This course is a continuation of DTSC 550, with an emphasis on statistical techniques most used in modern data science. Students will explore in greater depth linear and logistic regression, and continue to additional regression and classification techniques with a focus on application. Analyses will be completed in R.

DTSC 660 Data and Database Management with SQL 3

This course offers a comprehensive overview of data organization and management using relational database systems and the SQL programming language. The course introduces students to database systems and their applications with a focus on designing and implementing database solutions based on user and data requirements.

DTSC 670 Foundations of Machine Learning Models 3

Introduction to machine learning landscape. Will address questions such as what is machine learning? Why do we use machine learning? What is machine learning appropriate for? What is it inappropriate for? Will explore supervised and unsupervised learning and regression and classification models. Taught in Python. Students should have either taken DTSC 575: Principles of Python Programming or DTSC 580: Data Manipulation have previous Python for data analysis knowledge/experience.

DTSC 675 Mathematics for Data Science 3

This course provides a comprehensive introduction to the mathematical foundations of data science. Students will explore topics in linear algebra and multivariate calculus, focusing on their applications in data science. The course aims to build the mathematical framework necessary for understanding various machine learning models and algorithms. Python programming will be used throughout the course to reinforce learning concepts.

DTSC 680 Applied Machine Learning 3

Continuation of DTSC 670. This course will further explore modern machine learning applications such as deep learning methods. Special attention will be given to image classification and object detection. Students will also focus on different dimensionality reduction techniques with emphasis on using principal component analysis. Additionally, students will learn to operationalize machine learning models using Flask.

Prerequisites: DTSC 670

DTSC 685 Natural Language Processing 3

This course will introduce the field of Natural Language Processing and its related algorithms and ideas. Students will gain experience writing NLP algorithmic code in python, as well as working through text-based machine learning problems.

Prerequisites: DTSC 580 and DTSC 670

DTSC 690 Data Science Capstone: Ethical and Philosophical Issues in Data Science 3

Part one of the capstone in the Masters in Data Science. Students will explore contemporary ethical and philosophical issues in data science and artificial intelligence. Subjects include basic and advanced issues, ranging from social media privacy to implications of machine learning and artificial intelligence for religiousness.

Prerequisites: Must take at least 15-credits of DTSC courses

DTSC 691 Data Science Capstone: Applied Data Science 3

Part two of the capstone in the Masters in Data Science. Students will also complete a capstone project integrating their learning across courses. Students will complete a project proposal, including their data source, acquisition, cleaning, analysis, and presentation intentions.

Prerequisites: DTSC 670

Course is Pass/Fail

DTSC 692 Data Science Capstone: Applied Data Science Continuation 3

Students who have not successfully completed their DTSC 691 Applied Data Science coursework by the end of DTSC 691 must register for DTSC 692 until the project is completed. Grading is pass/no credit. These credits do not accrue although students are billed for three credits.

Course is Pass/Fail