Data Science (DASC)

Courses

DASC 10003. Introduction to Data Science. 3 Hours.
Introduction to Data Science is a course providing an overview of Data Science and preparation of Data Science First Year students for the Data Science program and for choosing one of the Data Science program concentrations. Corequisite: MATH 24004 or MATH 24005. Prerequisite: Students must be a DTSCBS or DTSCFR major. (Typically offered: Fall)

DASC 100H3. Honors Introduction to Data Science. 3 Hours.
Introduction to Data Science is a course providing an overview of Data Science and preparation of Data Science First Year students for the Data Science program and for choosing one of the Data Science program concentrations. Corequisite: MATH 24004 or MATH 24005. Prerequisite: Students must have honors standing and be a DTSCBS or DTSCFR major. (Typically offered: Fall)
This course is equivalent to DASC 10003.

DASC 10103. Success in Data Science Studies. 3 Hours.
This course provides preparation for Data Science First Year students for the Data Science program and for learning about University campus resources for students. This course is focused on students who are not MATH 24004 Calculus I or MATH 24005 Calculus I with Review ready. Prerequisite: Students must be a First Year Data Science Major. (Typically offered: Fall)

DASC 11004. Programming Languages for Data Science. 4 Hours.
Programming Languages for Data Science provides a semester-long introduction to basic concepts, tools, and languages for computer programming using Python and R, two powerful programming languages used by data scientists. This class will introduce students to computer programming and provide them with the basic skills and tools necessary to efficiently collect, process, analyze, and visualize datasets. Students will gain hands-on experience with de novo programming in R and Python, finding and utilizing packages, and working in both interactive (Jupyter and RStudio) and non-interactive (Unix) environments. Corequisite: Lab component. Prerequisite: Students must be a DTSCBS or DTSCFR major. (Typically offered: Fall)

DASC 12004. Introduction to Object Oriented Programming for Data Science. 4 Hours.
Introduction to Object Oriented Programming for Data Science, introduces object-oriented programming in Python. It covers object-oriented programming elements and techniques in Python, such as primitive types and expressions, basic I/O, basic programming structures, abstract data type, object class and instance, Methods, Python File I/O, object inheritance, collections and composite objects, advanced input /output: streams and files, and exception handling. Students will gain hands-on programming experience using Python. Corequisite: Lab component. Prerequisite: DASC 11004 and must be a DTSCBS or DTSCFR major. (Typically offered: Spring)

DASC 12203. Role of Data Science in Today's World. 3 Hours.
Role of Data Science in Today's World is a survey course providing an overview of the Data Science Curriculum and an introduction to the essential elements of data science: data collection and management; summarizing and visualizing data; basic ideas of statistical inference; predictive analytics and machine learning. Students will continue their hands-on experience using the Python and R programming languages and Jupyter notebooks.Prerequisite: DASC 10003 and DASC 11004 and must be a DTSCBS or DTSCFR major. (Typically offered: Spring)

DASC 122H3. Honors Role of Data Science in Today's World. 3 Hours.
Role of Data Science in Today's World is a survey course providing an overview of the Data Science Curriculum and an introduction to the essential elements of data science: data collection and management; summarizing and visualizing data; basic ideas of statistical inference; predictive analytics and machine learning. Students will continue their hands-on experience using the Python and R programming languages and Jupyter notebooks. Prerequisite: DASC 10003, DASC 11004, honors standing and must be a DTSCBS or DTSCFR major. (Typically offered: Spring)
This course is equivalent to DASC 12203.

DASC 1880V. Special Topics in Data Science. 1-6 Hour.
Special Topics in Data Science is a course for data science topics not covered in other courses. Corequisite: Lab component. Prerequisite: Students must be a DTSCBS or DTSCFR major and Instructor Permission Only. (Typically offered: Fall, Spring and Summer) May be repeated for up to 9 hours of degree credit.

DASC 188HV. Honors Special Topics in Data Science. 1-6 Hour.
Special Topics in Data Science is a course for data science topics not covered in other courses. Corequisite: Lab component. Prerequisite: Students must be a DTSCBS or DTSCFR major, have honors standing and by instructor permission only. (Typically offered: Fall, Spring and Summer) May be repeated for up to 9 hours of degree credit.
This course is equivalent to DASC 1880V.

DASC 21003. Data Structures & Algorithms. 3 Hours.
Data Structures & Algorithms focuses on fundamental data structures and associated algorithms for computing and data analytics. Topics include the study of data structures such as linked lists, stacks, queues, hash tables, trees, and graphs, recursion, their applications to algorithms such as searching, sorting, tree and graph traversals, divide-and-conquer, greedy algorithms, and dynamic programming, and the theory of NP-completeness. Students will gain hands-on experience using Python or Java. Prerequisite: (DASC 12004 or CSCE 20004) and must be a DTSCBS major. (Typically offered: Spring)

DASC 21103. Principles and Techniques of Data Science. 3 Hours.
Principles and Techniques in Data Science is an intermediate semester-long data science course that follows an overview of data science in today's world. This class bridges between introduction to data science and upper division data science courses as well as methods courses in other concentrations. This class equips students with essential basic elements of data science, ranging from database systems, data acquisition, storage and query, data cleansing, data wrangling, basic data summarization and visualization, and data estimation and modeling. Students will gain hands-on experience using Python and various packages in Python. Corequisite: Lab component. Prerequisite: MATH 25004 and student must be a DTSCBS major. (Typically offered: Fall)

DASC 21303. Data Privacy & Ethics. 3 Hours.
Data Privacy and Ethics (DASC 21303) explores the intersection of ethics and contemporary (big) data analytics. In particular, we will discuss how data analytics impacts ethical issues like privacy, autonomy, transparency, discrimination, data ownership, and justice, while also investigating its impact on the cohesiveness of society and democracy. Pre- or Corequisite: (DASC 10003 and must be a DTSCFR or DTSCBS major) or (must be a PHILBA major). (Typically offered: Fall and Spring)

DASC 22003. Data Management and Data Base. 3 Hours.
Data Management and Data Base focuses on the investigation and application of data science database concepts including DBMS fundamentals, database technology and administration, data modeling, SQL, data warehousing, and current topics in modern database management. Prerequisite: MATH 25004, (DASC 12004 or CSCE 20004) and students must be a DTSCBS major. (Typically offered: Spring)

DASC 22103. Data Visualization and Communication. 3 Hours.
Data Visualization and Communication is a seminar providing an essential element of data science: the ability to effectively communicate data analytics findings using visual, written, and oral forms. Students will gain hands-on experience using data visualization software and preparing multiple formats of written reports (technical, social media, policy) that build a data literacy and communication toolkit for interdisciplinary work. In essence, this is a course emphasizing finding and telling stories from data, including the fundamental principles of data analysis and visual presentation conjoined with traditional written formats. Prerequisite: DASC 11004 and DASC 12203 and students must be a DTSCBS major. (Typically offered: Fall)

DASC 25904. Multivariable Math for Data Scientists. 4 Hours.
Multivariable Mathematics for Data Scientists provides an in depth look at the multivariate calculus and linear algebra necessary for a successful understanding of modeling for data science. Students will gain an understanding of the mathematical and geometric concepts used in optimization and scientific computation using mathematical and computational techniques. At the end of the course, students will be equipped with the calculus and linear algebra skills and knowledge to be successful in courses in optimization and advanced data science methods. Corequisite: Lab component. Prerequisite: MATH 25004 and DASC 11004 and the student must be a DTSCFR or DTSCBS major. (Typically offered: Fall)

DASC 2900V. Special Topics in Data Science. 1-6 Hour.
Special Topics in Data Science is a course for data science topics not covered in other courses. Prerequisite: Students must be a DTSCBS or DTSCFR major and Instructor Permission Only. (Typically offered: Fall, Spring and Summer) May be repeated for up to 9 hours of degree credit.

DASC 290HV. Honors Special Topics in Data Science. 1-6 Hour.
Special Topics in Data Science is a course for data science topics not covered in other courses. Prerequisite: Honors standing and students must be a DTSCBS or DTSCFR major and Instructor Permission Only. (Typically offered: Fall, Spring and Summer) May be repeated for up to 9 hours of degree credit.
This course is equivalent to DASC 2900V.

DASC 31003. Big Data Analytics with Cloud Computing. 3 Hours.
Big Data Analytics with Cloud Computing provides an in-depth exploration of big data analytics with cloud computing platforms, focusing on the tools, techniques, and methodologies used to extract valuable insights from large and complex datasets. Students will learn the fundamentals of cloud computing, explore different cloud-based big data tools and technologies, and create scalable and efficient solutions with large amounts of data. The course emphasizes hands-on experience with real-world datasets and practical applications of big data analytics in various domains. It provides insights into the challenges and considerations of using cloud computing solutions. Technologies used include Hadoop, Spark, Hive, and AWS. Prerequisite: DASC 25904 and DASC 22003 and student must be a DTSCBS major. (Typically offered: Fall)

DASC 310H3. Honors Cloud Computing and Big Data. 3 Hours.
Cloud Computing and Big Data covers: introduction to distributed data computing and management, MapReduce, Hadoop, cloud computing, NoSQL and NewSQL systems, Big data analytics and scalable machine learning, real-time streaming data analysis. Students will gain hands-on experience using Amazon AWS, MongoDB, Hive, and Spark. Prerequisite: DASC 25904, DASC 22003, honors standing and student must be a DTSCBS major. (Typically offered: Fall)
This course is equivalent to DASC 31003.

DASC 32003. Optimization Methods in Data Science. 3 Hours.
Optimization Methods in Data Science is an advanced mathematical course providing the foundations and concepts of optimization that are essential elements of machine learning algorithms in data science, ranging from mathematical optimization to convex optimization to unconstrained and constrained optimization to nonlinear optimization to stochastic optimization. Students will gain hands-on experience using Python and various optimization packages in Python. Prerequisite: DASC 21103 and DASC 25904 and student must be a DTSCBS major. (Typically offered: Spring)

DASC 32103. Statistical Learning. 3 Hours.
Statistical Learning is a course providing an in depth look at the theory and practice of applied linear modeling for data science: including model building, selection, regularization, classification and prediction. Students will gain hands-on experience using statistical software to learn from data using applied linear models. Prerequisite: DASC 11004 and ((MATH 30103 and STAT 30043) or (INEG 23104 and INEG 23203)) and student must be a DTSCBS major. (Typically offered: Spring)

DASC 32203. Cyber Crime and Cyber Terrorism. 3 Hours.
Cyber Crime and Cyber Terrorism (CCCT) is an overview of the study of cybercrime and cyber terrorism for students of data science, criminology, and law discussing crimes committed via Internet, ranging from various white-collar financial crimes to the spread of viruses, malicious code, stalking, bullying, and web-based exploitation. Criminological, social-psychological explanations will be examined and the investigative and legal strategies employed to combat cyber-crime and cyber terrorism will be discussed. Prerequisite: (DASC 21103 and must be a DTSCBS major) or ((CRIM 20003 or SOCI 10103), have junior or senior standing, and must be a SOCIBA or CRIMBA major). (Typically offered: Fall)

DASC 3900V. Special Topics in Data Science. 1-6 Hour.
Special Topics in Data Science is a course for data science topics not covered in other courses. Prerequisite: Student must be a DTSCBS or DTSCFR major and by Permission Only. (Typically offered: Irregular) May be repeated for up to 9 hours of degree credit.

DASC 390HV. Honors Special Topics in Data Science. 1-6 Hour.
Special Topics in Data Science is a course for data science topics not covered in other courses. Prerequisite: Student must have honors standing, be a DTSCBS or DTSCFR major and by permission only. (Typically offered: Irregular) May be repeated for up to 9 hours of degree credit.
This course is equivalent to DASC 3900V.

DASC 400HV. Honors Thesis in Data Science. 1-3 Hour.
Honors Thesis in Data Science (DASC 400HV) is a course to develop an Honors Thesis in Data Science. The Honors Thesis can be an independent thesis or can be related to the Data Science Practicum I and II Courses Project. Prerequisite: Student must be a DTSCBS major, have honors standing, and by Permission Only. (Typically offered: Fall, Spring and Summer) May be repeated for up to 3 hours of degree credit.

DASC 41103. Machine Learning. 3 Hours.
Machine learning covers: logistic regression, ensemble methods, support vector machines, kernel methods, neural networks, Bayesian inference, reinforcement learning, learning theory, and their applications in text, image, and web data processing. Students will gain hands-on experience of developing machine learning algorithms using Python and scikit-learn. Prerequisite: DASC 21003 and DASC 32003 and student must be a DTSCBS major. (Typically offered: Fall)

DASC 411H3. Honors Machine Learning. 3 Hours.
Machine learning covers: logistic regression, ensemble methods, support vector machines, kernel methods, neural networks, Bayesian inference, reinforcement learning, learning theory, and their applications in text, image, and web data processing. Students will gain hands-on experience of developing machine learning algorithms using Python and scikit-learn. Prerequisite: DASC 21003, DASC 32003, honors standing and student must be a DTSCBS major. (Typically offered: Fall)
This course is equivalent to DASC 41103.

DASC 41203. Social Problems in Data Science and Analytics. 3 Hours.
This course explores the ways data analytics and data science are impacted by or intersect with issues of social justice, poverty and economic inequality, racial and ethnic relations, gender, crime, education, health and healthcare, and other contemporary social problems. Prerequisite: (DASC 12203 and student must be a DTSCBS major) or (SOCI 10103, SOCI 33003, SOCI 33001, SOCI 33103, have senior standing, and must be a SOCIBA major). (Typically offered: Fall)

DASC 45303. Information Retrieval. 3 Hours.
Information Retrieval is a course providing expertise in processing unstructured data as a key component of data science. It covers text processing, file structures, ranking algorithms, query processing, and web search. Students will gain hands-on experience developing their own search engine from scratch, using Python, C, C++, or Java on a Linux server and making their search engine web accessible. Note: Prior user-level knowledge of Linux for file and directory management and remote login is required for this course. Corequisite: Lab component. Prerequisite: DASC 21003 and student must be a DTSCBS major. (Typically offered: Irregular)

DASC 48902. Data Science Practicum I. 2 Hours.
Application of data science, analytics, business intelligence, data mining, machine learning, and data visualization to existing problems. Data Science techniques using current and relevant software and problem-solving methods are applied to current problems for presentation to management. This is the first semester of the required full-year multi-college interdisciplinary practicum using real-world data to solve real-world problems. Prerequisite: DASC 21103, DASC 22103, DASC 32003, ((STAT 30133 and STAT 30043) or (INEG 23104 and INEG 23203)), and student must be a DTSCBS major. Pre- or Corequisite: DASC 32103, DASC 41103, and DASC 41203. (Typically offered: Fall)

DASC 489H2. Honors Data Science Practicum I. 2 Hours.
Application of data science, analytics, business intelligence, data mining, machine learning, and data visualization to existing problems. Data Science techniques using current and relevant software and problem-solving methods are applied to current problems for presentation to management. This is the first semester of the required full-year multi-college interdisciplinary practicum using real-world data to solve real-world problems. Prerequisite: DASC 21103, DASC 22103, DASC 32003, ((STAT 30133 and STAT 30043) or (INEG 23104 and INEG 23203)), honors standing and the student must be a DTSCBS major. Pre- or Corequisite: DASC 32103, DASC 41103, and DASC 41203. (Typically offered: Fall)
This course is equivalent to DASC 48902.

DASC 4900V. Special Topics in Data Science. 1-6 Hour.
Special Topics in Data Science is a course for data science topics not covered in other courses. Prerequisite: Students must be a DTSCBS major and Instructor Permission Only. (Typically offered: Fall, Spring and Summer) May be repeated for up to 9 hours of degree credit.

DASC 490HV. Honors Special Topics in Data Science. 1-6 Hour.
Special Topics in Data Science is a course for data science topics not covered in other courses. Prerequisite: Honors standing and students must be a DTSCBS major and Instructor Permission Only. (Typically offered: Fall, Spring and Summer) May be repeated for up to 9 hours of degree credit.
This course is equivalent to DASC 4900V.

DASC 49903. Data Science Practicum II. 3 Hours.
Application of data science, analytics, business intelligence, data mining, machine learning, and data visualization to existing problems. Data Science techniques using current and relevant software and problem-solving methods are applied to current problems for presentation to management. This is the second semester of the required full-year multi-college interdisciplinary practicum using real-world data to solve real-world problems. Corequisite: Lab component. Prerequisite: DASC 48902 with a grade of C or better and student must be a DTSCBS major. (Typically offered: Spring)

DASC 499H3. Honors Data Science Practicum II. 3 Hours.
Application of data science, analytics, business intelligence, data mining, machine learning, and data visualization to existing problems. Data Science techniques using current and relevant software and problem-solving methods are applied to current problems for presentation to management. This is the second semester of the required full-year multi-college interdisciplinary practicum using real-world data to solve real-world problems. Corequisite: Lab component. Prerequisite: DASC 48902 with a grade of C or better, and student must be a DTSCBS major, and have honors standing. (Typically offered: Spring)
This course is equivalent to DASC 49903.