DIGITAL AND COMPUTATIONAL STUDIES

Overview & Learning Goals
Overview

Digital and computational studies (DCS) is "computation in context"— a focus on digital objects (e.g., a computer program) that exist in digital environments. Analysis includes:

- Artifacts: objects of study, which are shared with many fields in the liberal arts. The questions explored include asking how digital objects are interpreted in physical, social, historical, and cultural contexts.
- Architectures: the infrastructures that give rise to the objects, their use, or their study, which are also shared with other fields. The questions explored include consideration of the consequences of these associated infrastructures, data, technology, and labor for understanding the object.
- Abstractions: the models built and theories tested through those models. The questions explored include asking what different models reveal about objects and what common ground exists between different fields that use those models.
- Agency: interpretation and decision-making. The questions explored include examination of how computation or the existence of a digital object shape who can make decisions, how results are interpreted, or how empowerment to act or express knowledge are influenced under the above conditions.
- Accountability: consequences and responsibility. An evaluative and critical exploration of ethical considerations of artifacts and the unintended outcomes of their deployment.

Objects are not merely analyzed—they are also created. A significant part of the student experience in DCS is collaborative and creative across fields of expertise. This creation can connect with virtually any discipline on campus.

Learning Goals

1. Critically evaluate existent and emergent digital technologies through the DCS analytical framework.
2. Design, create and deploy alternative digital technology emphasizing its positive impact on the common good.
3. Productively integrate DCS methods and tools into other epistemological fields and practices in the liberal arts and daily life.
4. Practice critical data assessment and agile project design.
5. Communicate effectively when sharing DCS research and topics.

Options for Majoring or Minoring in the Program

Students may elect to coordinate a major in digital and computational studies with any other department/program major. Students pursuing a coordinate major may not normally elect a second major. Non-majors may elect to minor in digital and computational studies.

Program Website (https://www.bowdoin.edu/digital-and-computational-studies/)

Faculty

Mohammad T. Irfan, *Program Director*

Monica Gallego, *Program Coordinator*

Professor: Eric L. Chown
Associate Professors: Crystal Hall‡, Mohammad T. Irfan (Computer Science)
Assistant Professor: Fernando Nascimento
Adjunct Lecturer: Aaron Gilbreath (spring semester)

Faculty/Staff Website (https://www.bowdoin.edu/digital-and-computational-studies/faculty-and-staff/)

Requirements
Digital and Computational Studies Coordinate Major

Students coordinate their study of digital and computational studies (DCS) with any department/program at Bowdoin that offers a major. To satisfy the requirements for the coordinate major in DCS, students must complete the eight credits detailed below as well as the major requirements within their coordinated department/program.

Code	Title	Credits
Required Courses:		
DCS 1100	Introduction to Digital and Computational Studies	1
DCS 2450	Technology and the Common Good	1
DCS 3900	DCS Capstone Implementation and Design	1
Select one 3000-level DCS course [a]		1
Select one of the following:		1
DCS 2335	GIS and Remote Sensing: Understanding Place	
DCS 2350	Social and Economic Networks	
DCS 2470	Artificial Intelligence in the World	
DCS 2500	Digital Text Analysis	
Select three more DCS courses of your choice. [b]		3

[a] Independent studies (numbered 2970-2999 and 4000-4049) and honors projects (numbered 4050 or higher) will not fulfill this advanced seminar requirement.

[b] These three DCS courses should intentionally connect to the coursework in the student's coordinated major discipline to foster exploration of their complementary nature and must be selected in consultation with a faculty advisor in the Digital and Computational Studies Program. With prior approval from the program director, courses offered outside of DCS may be used to fulfill this requirement.

Digital and Computational Studies Minor

Code	Title	Credits
DCS 1100	Introduction to Digital and Computational Studies	1
Four other courses in DCS, at least three of which should be at the 2000 level or above		4

Additional Information

- Courses count toward the major or minor if grades of C- or better are earned.
- One course taken with the Credit/D/Fail grading option may count toward the major or minor as long as a CR (credit) grade is earned.
- One first-year writing seminar may count toward the major or minor.

- A maximum of two independent studies can count toward the major at either the intermediate or advanced level. Independent studies do not count toward the minor.
- The director of digital and computational studies works with students to discuss double-counting cross-listed courses with other departments or programs.
- With prior approval, two courses from a one-semester study-away program may be counted toward the major; three courses may be counted toward the major from a yearlong program. One course from a one-semester study-away program may be counted toward the minor.

Information for Incoming Students (p. 2)

Digital and Computational Studies addresses topics that span disciplines across campus, uniting them through computational thinking, data analysis, critique of digital objects, and creative problem solving. In particular, computation is not presented merely as a technique to be exploited, but as an object of study with corresponding strengths and weaknesses. Students in DCS classes have the opportunity to work on digital projects, many of them in collaboration with other students.

The following courses are open to first year students and count toward the requirements for the DCS coordinate major or minor. DCS 1100 Introduction to Digital and Computational Studies, offered every fall, and DCS 1500 Understanding and Deploying Computational Methods. The latter requires completion of DCS 1100 Introduction to Digital and Computational Studies as a prerequisite and will be open to first-year students in the spring.

The following courses, when offered, are also open to first year students and count toward electives for the DCS coordinate major or minor. DCS 1020 How to Read a Million Books and HIST 1024 Serious Games: Critical Play for History, both first-year writing seminars, and PHIL 1336 Ethics for a Digital World.

All of these courses assume no background in any of the subjects covered, ranging from humanities, social sciences, computer science, and mathematics. Several DCS courses are cross-listed with other disciplines. They may be open to first year students, and may count as electives.

Courses

DCS 1020 (c)   How to Read a Million Books
Every Other Fall. Enrollment limit: 16.

Confronts the challenges of having too many things to read and limited attention spans to persuade someone that a written interpretation is valid. Explores different methods of reading (i.e. close, surface, text mining, thematic) at different scales, from 1 book to millions of data points from Bowdoin's library collections. Activities evaluate both the process and rationale for different reading and writing methods. Assumes no knowledge of programming.

Previous terms offered: Fall 2022, Spring 2021, Fall 2020, Fall 2019.

DCS 1024 (c, FYS)   Serious Games: Critical Play for History
Non-Standard Rotation. Enrollment limit: 16.

Did you know that Monopoly began life a game that criticized modern capitalism? Have you ever wondered what sense it makes that in Sid Meier's Civilization, Abraham Lincoln can found the American tribe in 4,000 BCE? This course explores how commercial video and board games can help us understand the past. In return, understanding something about how the discipline of history works will help us think about games as representations of the past. Games to be studied and played may include: Catan, Diplomacy, Monopoly, Sid Meier's Civilization V, Spirit Island, and Twilight Struggle. Students should expect to complete four structured writing assignments and several shorter writing assignments. The course includes a weekly evening game lab. Note: This course is part of the following field(s) of study: US. (Same as: HIST 1024)

Previous terms offered: Fall 2019.

DCS 1025 (c)   Digital Games and History
Non-Standard Rotation. Enrollment limit: 16.

This first-year writing seminar explores how digital games represent the past. We begin by focusing on the emergence of digital culture in recent decades, seeking to understand the role electronic simulations play in our lives. We move on to exploring the representation of history in commercial video games, from Sid Meier's Civilization series, to Assassin's Creed IV: Black Flag. Why are video games such a popular way of depicting past events? What constraints does the digital game format impose on these representations? How are these constraints conditioned by the nature of these games as commercial products sold in a global marketplace? Finally, how should we approach some games' representation of difficult histories—those that may involve war, colonialism, and racism? Along the way, we will learn how to access campus information sources, use intellectual property responsibly, and write essays for the college level. This course includes a weekly required evening lab for dedicated gaming time and film screenings. (Same as: HIST 1025)

Previous terms offered: Fall 2022.

DCS 1100 (c)   Introduction to Digital and Computational Studies
Eric Chown.
Every Fall. Fall 2023; Spring 2024. Enrollment limit: 35.

Examines the impact of digital artifacts, networked interaction, and computational analysis on the ways in which we establish new knowledge, engage in creative and social practices, and understand the self. Studies how the combination of large-scale digital data and computational modeling methods shape our agency as decision-makers. Emphasis on how the Liberal Arts shape and are shaped by these processes. Coursework includes quantitative analysis, machine learning, text and network analysis, critical readings in the field, and short, exploratory projects. Assumes no knowledge of programming or any software that will be used.

Previous terms offered: Spring 2023, Fall 2022, Spring 2022, Fall 2021, Spring 2021, Fall 2020, Fall 2019.

DCS 1200 (MCSR)   Data Driven Societies
Every Spring. Enrollment limit: 35.

What sorts of questions can and should be answered using digital and computational methods? How can such methods in conjunction with data can reveal new insights and questions about the world? How do we construct models to help us better understand social phenomena? Covers topics such as data gathering, validation, analysis, and presentation, as well as statistics and programming. Provides substantive experience in digital and computational methods, and a critical lens for understanding and evaluating what computers can (and cannot) bring to the study of our world.

Previous terms offered: Spring 2020.

DCS 1209 (b, DPI, MCSR)   Using "Big Data" to Investigate and Suggest Solutions to Economic and Social Problems
Non-Standard Rotation. Enrollment limit: 20.

Students will use "big data" to understand and address some of the most important social and economic problems of our time. The course will give students an introduction to cutting edge research and policy applications in economics in a non-technical manner that does not require prior coursework in economics or statistics, making it suitable both for students exploring economics for the first time, and for more advanced students who are interested in the class's topics. Social and economic problems that we will cover include equality of opportunity, education, racial disparities, criminal justice, labor market participation, entrepreneurship, health care and public health, the opioid crisis, climate change, and environmental justice. In the context of these topics, the course will also provide an introduction to basic methods in data science, including regression, causal inference, and machine learning. Students will use software packages R, Stata, Arc GIS, and Excel. (Same as: ECON 1099)

Previous terms offered: Fall 2022.

DCS 1500 (MCSR)   Understanding and Deploying Computational Methods
Mohammad Irfan.
Every Semester. Spring 2024. Enrollment limit: 50.

Computational tools, including programming, are increasingly important across the liberal arts. Such tools, however, cannot be effectively created or used without a fundamental understanding of computation. This course provides a foundation for the use of these tools in conjunction with the critical framework of DCS. A major goal of the course is to teach introductory programming, but with a focus on how programming can be used to complement and even to implement methodologies including text analysis, network analysis, GIS and visualization. Students will use these methods in the service of critically engaging with data. E.g., where computer science focuses mainly on problem solving, this course is fundamentally about exploration and often problem discovery. No prior programming knowledge is required.

Prerequisites: DCS 1100.

Previous terms offered: Spring 2023, Fall 2022.

DCS 1650 (c)   Ethics for a Digital World
Non-Standard Rotation. Enrollment limit: 50.

Digital technologies make our lives easier in many ways—e.g., we can communicate with others around the world, we can order devices to play music, we can get instant directions to go basically anywhere! But is there any ethical cost to enjoying the benefits that come from these types of technologies? This course investigates a variety of ethical issues arising from and connected with digital technology. Topics covered might include privacy and big data, algorithmic bias, surveillance capitalism, social media and mental manipulation, fake news, internet shaming, and the moral status of superintelligence. (Same as: PHIL 1336)

Previous terms offered: Fall 2022.

DCS 2100 (c, IP)   Digital Florence
Every Other Spring. Enrollment limit: 35.

Asks what a digital representation of a city could and should be, particularly in a moment when travel is limited, using Florence, Italy as a case study. Examines digital image, text, and spatial data about the city, juxtaposing it against non-digital primary sources, secondary critical readings, reflections on experiences of urban and other spaces, and data that we will create in class. Emphasizes shifting definitions across time, language, and digital artifacts of what and who is Florentine in these representations. Coursework happens in three phases: going "under the hood" of the popular digital artifacts that provide an experience of Florence in order to evaluate strengths and weaknesses of representation; expanding our definition of Digital Florence to find local perspectives on what the essential features of the city could be; and proposing a digital intervention that better reflects the values we have identified throughout the semester. Assumes no programming knowledge. Taught in English. (Same as: ITAL 2100, URBS 2100)

Previous terms offered: Spring 2022.

DCS 2272 (b, DPI, IP)   Digital Media and Society
Non-Standard Rotation. Enrollment limit: 35.

Explores how digital media construct societies and cultures, and in turn how social institutions, interactions, and identities get reflected in/through digital media. Draws from multiple socio-cultural contexts to take a global and transnational approach to understand sociological themes such as self, social interaction, and community; social control and surveillance; constructions of gender, sexuality, race, social class, and religion; generations; transnational migration; emotional/affective labor; and social movements and change. Challenges binary dystopian and utopian representations of digital media to cultivate a more nuanced understanding. (Same as: SOC 2272)

Prerequisites: SOC 1101.

Previous terms offered: Fall 2022.

DCS 2310 (a)   Big Data in Astrophysics and Cosmology
Non-Standard Rotation. Enrollment limit: 18.

Astronomy has been transformed in recent years by the open availability of large data sets. This course uses several astronomical "case studies" to introduce methods and computational tools for analysis of data, after which students will design, complete, and present an astronomical data analysis project of their own. Students will examine the abilities and limitations of these methods, and their impact on the types of questions we can answer and who has access to research. Possible topics include but are not limited to: using galaxy surveys to find large-scale structure in the universe, finding and characterizing exoplanets or binary star systems from light curves, or using supernova data to estimate cosmological parameters. Computation is an important part of the course, but programming experience is not required. (Same as: PHYS 2310)

Prerequisites: PHYS 1130 or PHYS 1510.

Previous terms offered: Spring 2021.

DCS 2331 (b, MCSR)   The Nature of Data: Introduction to Environmental Analysis
Eileen Sylvan Johnson.
Every Spring. Fall 2023. Enrollment limit: 20.

Examines emerging digital techniques in environmental management and analysis within government, academic, and media sectors. Provides an overview of social science methods including analysis of qualitative data, text analysis, spatial analysis, survey design and analysis, and social network analysis. Topics include collaborative resource management, leveraging the power of social networks, spatial analysis, social-ecological system management, the role of volunteered information and citizen science, and expanding capacities for adaptation and resilience. Labs as part of class time provide students exposure to standard software programs used in social science research, including NVivo, ArcGIS, and Gephi and introduce the basics of R as a programming language for text analysis, and spatial analysis. (Same as: ENVS 2331)

Previous terms offered: Fall 2020, Spring 2020.

DCS 2335 (a, MCSR)   GIS and Remote Sensing: Understanding Place
Eileen Sylvan Johnson.
Every Year. Fall 2023. Enrollment limit: 20.

Geographical information systems (GIS) organize and store spatial information for geographical presentation and analysis. They allow rapid development of high-quality maps and enable powerful and sophisticated investigation of spatial patterns and interrelationships. Introduces concepts of cartography, database management, remote sensing, and spatial analysis. Examines GIS and remote sensing applications for natural resource management, environmental health, and monitoring and preparing for the impacts of climate change from the Arctic to local-level systems. Emphasizes both natural and social science applications through a variety of applied exercises and problems culminating in a semester project that addresses a specific environmental application. Students have the option of completing a community-based project. (Same as: ENVS 2004, URBS 2004)

Previous terms offered: Fall 2022, Fall 2021, Spring 2021, Spring 2020.

DCS 2340 (b, MCSR)   Building Resilient Communities
Eileen Sylvan Johnson.
Every Year. Spring 2024. Enrollment limit: 20.

Explores approaches by communities and regions to build resilience in the face of changing environmental and social conditions. Examines the ways communities establish policies and collaborate with state, federal, private and nonprofit sectors towards strengthening local economies, safeguarding environmental values, protecting public health, addressing issues of economic and social justice, and implementing mitigation and adaptation strategies. Provides students with firsthand understanding of how digital and computational technologies including Geographic Information Systems (GIS) are playing an increasingly important role in understanding and informing effective approaches for expanding resilience at a community level to inform policy decision. Students gain proficiency with GIS as part of the course. (Same as: ENVS 2301, URBS 2301)

Previous terms offered: Spring 2023, Fall 2020.

DCS 2350 (a)   Social and Economic Networks
Mohammad Irfan.
Non-Standard Rotation. Fall 2023. Enrollment limit: 22.

Examines the social and economic aspects of today's connected world from a multitude of perspectives; namely, network science, computer science, sociology, and economics. The fundamental questions to be addressed are: What are the properties of real-world networks? What are the effects of networks on our behavioral choices like quitting smoking or eating healthy? How do cascades in networks lead to outcomes like videos going viral? How does Google search the Internet and make money doing so? Debates issues around centrality in networks. Uses game theory to study strategic interactions in networks and markets. (Same as: CSCI 2350)

Prerequisites: DCS 1100 or CSCI 1101 or CSCI 1103 (same as DCS 1300).

Previous terms offered: Spring 2022, Fall 2020, Fall 2019.

DCS 2450 (c)   Technology and the Common Good
Fernando Nasc.
Non-Standard Rotation. Spring 2024. Enrollment limit: 35.

As the pace of technological change continues to accelerate, it raises questions about the impacts, positive and negative, on society. Will technology make our lives more comfortable and pleasant or will it destroy human society and lead us to a catastrophic ending? The answers largely depend on our ability to consider new technology advancements in light of desires to live good lives within just institutions. Students engage with topics of current relevance such as artificial intelligence, gene editing, virtual reality, robotics, and the internet of things. Discusses the underlying technological aspects of each and the possible implications for society. Students apply philosophical and ethical concepts and frameworks to consider how technology can become a positive force for the common good and debate possible ways to evaluate and avoid undesirable effects of current and future technologies. No prior programming experience required.

Prerequisites: DCS 1100.

Previous terms offered: Spring 2023, Spring 2022, Spring 2021, Spring 2020.

DCS 2460 (c, MCSR)   Smart Phones, Mobile Selves
Every Fall. Enrollment limit: 35.

Mobile Devices are increasingly present in our lives. More and more "smart," they transform how we communicate, access information, experience our physical spaces, create and maintain friendships, monitor our health, and have fun. In this course, we will critically consider the consequences of these technological artifacts for how we define our personal identities, our interpersonal relationships, and the organization of our societies. In order to deepen our discussions, within the experiential context of DCS, we will learn how the software of mobile devices is structured, how they communicate with each other, with local sensors and other wearable devices. We will also study the physical and social architectures that connect our mobile experiences, including how they are likely to change in the coming years and their possible implications. This course does not require any prior knowledge in computer science or mobile communications.

Prerequisites: DCS 1100.

Previous terms offered: Fall 2022, Fall 2020.

DCS 2470 Artificial Intelligence in the World
Every Spring. Enrollment limit: 35.

Artificial Intelligence (AI) is changing the world. It is being widely deployed by governments, police forces, and businesses. AI algorithms are touted as being without bias, and claims are made that AI regularly outperforms humans on a wide variety of tasks. The truth is far more complex. In this class, we will examine the systems being deployed in the world, the algorithms behind them, and their impact on the world. In particular, we will focus on the relationship between the data used by AI systems and their performance. Special attention will be paid to machine learning systems and students will engage in project-based machine learning activities.

Prerequisites: DCS 1100.

Previous terms offered: Spring 2020.

DCS 2475 (c)   Ethics in the Age of Artificial Intelligence
Eric Chown; Michael Franz; Allison Cooper; Fernando Nasc.
Non-Standard Rotation. Fall 2023. Enrollment limit: 35.

Artificial intelligence (AI) is increasingly transforming nearly every aspect of society and our personal lives. This course invites students to explore fictional and non-fictional worlds transformed by AI and consider them in light of ethics, politics, and their impact on individuals. Students will use an array of literary and cinematic narratives to enrich their understanding of AI as it relates to those who develop it, those who use it, and those who seek to create policies governing its applications in society. AI-based artifacts will be examined from both conceptual and functional perspectives. The course will culminate with a look at how human agency can shape AI in order to move it closer to serving the common good.

DCS 2500 (MCSR)   Digital Text Analysis
Fernando Nasc.
Every Year. Spring 2024. Enrollment limit: 35.

Explores how digital techniques can enhance our understanding of text. Investigates how to make sense of the burgeoning number of textual sources in a timely manner and what new questions can be raised and answered by computer-based text analysis. Students learn to apply tools for analyzing large texts to problems drawn from areas throughout the liberal arts, such as psychology, philosophy, and literature. In addition, students address questions ranging from authorship of Supreme Court opinions, to using thirty years of newspapers to reexamine historical questions, to interpreting Raphael's masterpiece "School of Athens" through an analysis of Aristotle's and Plato's works. While doing so they also study the strengths and weaknesses of these approaches. No previous computer programming experience is required.

Prerequisites: DCS 1020 or DCS 1100.

Previous terms offered: Spring 2023, Fall 2021, Spring 2020.

DCS 2550 (b, MCSR)   Mapping American History using Geographic Information Systems (GIS)
Patrick Rael; Aaron Gilbreath.
Non-Standard Rotation. Fall 2023. Enrollment limit: 16.

In this intermediate seminar we will use Geographic Information Systems to explore historical problems in 19th-century US history. We will introduce and practice basic statistical techniques, and use the class GIS database to investigate problems, construct our own historical datasets, and make our own maps. Class projects will challenge students to develop critical thinking skills in historical and computational methods, and practice effective data presentation. We will work with a wide array of history data, including information on race, ethnicity, gender, religion, agriculture, slavery, and voting behavior in the period in question. Throughout, we will probe the possibilities and limitations of GIS as a digital technology and methodological approach to historical analysis. This course is part of the following field(s) of study: United States. (Same as: HIST 2625)

Previous terms offered: Fall 2021, Fall 2020.

DCS 2640 (c, VPA)   Interactivity, Computation, and Media Architecture
Non-Standard Rotation. Enrollment limit: 18.

The use of media architecture has become an increasingly common way to engage with our surroundings. Explores how embedded computation affects the way the built environment is experienced. Students consider how digital media is changing notions of place and how we interact with and learn about it. Through short- and long-term projects, students explore how to design and prototype computationally driven experiences, which are embedded into architectural spaces. Reading and writing assignments enhance skills in questioning new media and guide consideration of issues surrounding privacy, surveillance, the digital city, geography of cyberspace, representation and identity, technology in the new global economy, space, and audience. Using the graphical programming language Max, students work with data to alter environments using light, sound, and projection and create digital installations. No previous experience with programming is required.

Prerequisites: DCS 1000 - 2969 or DCS 3000 or higher or CSCI 1000 - 2969 or CSCI 3000 or higher.

Previous terms offered: Fall 2019.

DCS 2645 (VPA)   Filmmaking and Born-Digital Storytelling
Non-Standard Rotation. Enrollment limit: 18.

Considers filmmaking in a networked world, as well as the cultural implications of new technologies. Students will create innovative, internet-based films that engage in the changing digital landscape of ubiquitous computing. Students will learn the basics of film production, including digital camera operation, sound recording, lighting, nonlinear editing, basic compositing, and green screen—tools needed to create compelling films, interactive videos, VR and AR experiences, and innovative transmedia projects. Additionally, students will study the history and proliferation of cinema engaged with digital technologies and the internet. (Same as: CINE 2645)

Prerequisites: DCS 1000 - 2969 or DCS 3000 or higher or CINE 1000 - 2969 or CINE 3000 or higher.

Previous terms offered: Spring 2021, Fall 2019.

DCS 2800 (DPI)   Digital Privilege
Every Other Fall. Enrollment limit: 35.

The promise of the internet was that it was a world without "prejudice or privilege". Instead it has exacerbated the elements of privilege already prominent in society. This course examines issues of privilege in digital environments both through the lens of algorithms and through interactions with others, with a particular emphasis on social media. The course begins with an examination of supportive environments, the consequences when the supportive components fail, and the roots of those failures. We will then use that perspective to look at digital environments, examining different forms of privilege, including race, gender, age, and class among others to show how the digital environment often makes issues around privilege worse rather than better. Meanwhile, many groups are simply unable to take advantage of the digital world at all. Work for the course will consist of a series of short papers and a culminating project that takes on one form of privilege in more detail.

Prerequisites: DCS 1100 or DCS 1200.

Previous terms offered: Fall 2021.

DCS 3012 (c, IP)   Informatica Umanistica and Digital Humanities
Non-Standard Rotation. Enrollment limit: 16.

This course asks how different computational text analysis can be in two cultural environments: the digital humanities as practiced in the US and informatica umanistica in Italy. Our case study for texts to study will be Italian epic poetry of the Renaissance, the equivalent of today's Marvel comic universe in terms of range of characters, complexity of plotlines, action sequences, humor, popularity, and fan-fiction spinoffs. We will draw on the multiple language backgrounds of all students in the course and the combined skills of advanced students in DCS and Italian. We will practice collaborative, iterative research development around the geographies, networks, and textual features of our texts. Activities will include discussion, hands-on use of digital tools, assigned readings, and a culminating project. (Same as: ITAL 3012)

Prerequisites: DCS 2335 or DCS 2350 (same as CSCI 2350) or DCS 2470 or DCS 2500 or ITAL 2408.

Previous terms offered: Spring 2023.

DCS 3301 (b, DPI, MCSR)   Putting Inequality on the Map: Analyzing Inequality with Geographic Information Systems
Aaron Gilbreath.
Non-Standard Rotation. Spring 2024. Enrollment limit: 20.

Course uses geographic information systems (GIS) and R statistical software to analyze issues of inequality in the United States. Investigates the roles of maps and mapping technology in creating and reinforcing racial and economic inequality. Readings will contextualize these methods in the fields of economics, environmental studies, and sociology. Topics include environmental justice, segregation and housing policy, educational inequalities, crime and policing. Students will learn data management and statistical techniques using R, and mapping and spatial analysis using GIS. Students will produce independent projects at the end of the semester.

Prerequisites: Two of: DCS 1100 and either DCS 2335 or DCS 2350 (same as CSCI 2350) or DCS 2470 or DCS 2500.

Previous terms offered: Spring 2023.

DCS 3350 (a, MCSR)   Contagion
Every Spring. Enrollment limit: 16.

Project-based advanced networks course. Investigates how the historic perspective of contagion has inspired its expansive contemporary view, ranging from interventions in epidemics to diffusion in social networks to network effects on behavioral aspects like smoking, obesity, and happiness. Studies various network models and their properties. Programming projects involve implementation of network models and applying these models to large-scale, real-world networks with millions of agents, with a particular focus on critically assessing the models and algorithms using computational thinking. Projects also involve creating computer simulations to study models of residential segregation by race. Takes a critical view of the implications of various predictive algorithms, including techniques for disease prediction.

Prerequisites: DCS 1100 or CSCI 1101 or CSCI 1103 (same as DCS 1300).

Previous terms offered: Spring 2021, Spring 2020.

DCS 3400 (a)   Cognitive Architecture
Eric Chown.
Non-Standard Rotation. Spring 2024. Enrollment limit: 16.

Advances in computer science, psychology, and neuroscience have shown that humans process information in ways that are very different from those used by computers. Explores the architecture and mechanisms that the human brain uses to process information. In many cases, these mechanisms are contrasted with their counterparts in traditional computer design. A central focus is to discern when the human cognitive architecture works well, when it performs poorly, and why. Conceptually oriented, drawing ideas from computer science, psychology, and neuroscience. No programming experience necessary. (Same as: CSCI 3400)

Prerequisites: CSCI 2101 or BIOL 2135 or PSYC 2040 or PSYC 2740.

Previous terms offered: Fall 2022.

DCS 3450 Cognition in Analog and Digital Environments
Every Fall. Enrollment limit: 16.

Human cognition was shaped by an environment unlike the one we live in today. The human capacity for perception and thought are not neutral; rather, they are attuned to the physical world in which the mind evolved. The digital world presents the mind with a very different environment, one in which the human capacity to effectively process information is often stretched to its limit. Meanwhile, large corporations are using psychology, AI, and machine learning in order to more effectively capture and keep our attention. This course examines the relationship of cognition to the environment, whether it be analog or digital, and focuses on the unusual challenges to cognition that come from operating in today's digital world.

Prerequisites: DCS 1100 or DCS 1200.

Previous terms offered: Spring 2022, Fall 2019.

DCS 3600 (c) Visual Literacy in a Digital World
Pamela Fletcher.
Non-Standard Rotation. Fall 2023. Enrollment limit: 12.

Seminar. We live in an image-saturated world: social media platforms, the news, smart phones, remote learning, video games, streaming services, emoticons. We communicate, learn, and express ourselves in a highly mediated world of visual tools and images. Yet all too often we treat images as transparent vehicles of communication, immediately comprehended and obvious to all. This class brings the art historical tools of close looking and visual analysis to the materials of the digital world, from its roots in the nineteenth-century technologies of reproduction to its current screen-based forms, with an emphasis on media and materiality. Topics will vary, but may include early mass media, including wood engraving and photography; family albums and scrapbooks; the news media; the visual architecture of the internet; social media platforms; video games, advertising; digital art; and NFTs. (Same as: ARTH 3400)

Prerequisites: ARTH 1000 - 2969 or ARTH 3000 or higher or DCS 1000 - 2969 or DCS 3000 or higher.

DCS 3750 (b, MCSR) Digital Economics and Artificial Intelligence
Zorina Khan.
Every Other Year. Spring 2024. Enrollment limit: 16.

Analyzes the role of artificial intelligence and digital technologies in the modern economy, from the perspective of economic theory and empirical research. Topics include cryptocurrencies, blockchain technology, robotics, machine learning and artificial intelligence, "big data," social and economic networks, open-source software, intellectual property, and piracy of digital media. Assesses the extent to which such emerging technologies and processes disrupt markets, hierarchies and the state; including the organization of firms and industries, money and finance, technological innovation, productivity and growth, the law, and government policy. (Same as: ECON 3550)

Prerequisites: ECON 2555.

DCS 3900 DCS Capstone Implementation and Design
Fernando Nasc.
Non-Standard Rotation. Fall 2023. Enrollment limit: 16.

Provides a culminating experience allowing students to connect DCS to their other chosen discipline. Guided development and implementation of data creation, methodology evaluation, contextualization of topic and results in scholarly conversations, and translation of results and implications across digital media. Students can combine the course units into a single, unifying research project or propose alternative assignments that demonstrate DCS analytical skills and connections across core DCS topics. Assigned readings will address themes in interdisciplinary research, weekly activities will focus on developing best practices, and all work will have opportunities for peer review throughout the semester.

Prerequisites: Two of: DCS 1100 and DCS 2450.

Previous terms offered: Fall 2022.

DCS 3998 Capstone Design
Every Fall. Enrollment limit: 16.

Guided development of the outline and proposal for the DCS senior coordinate major project. Concentrates on evaluating methodologies appropriate to the topic, developing a data set along with biography and management plan, practicing iterative project design, and establishing a foundational and interdisciplinary research bibliography. Assigned readings will address best practices in the field for starting and maintaining long-term projects; weekly activities will focus on developing the scholarly rationale for project design choices and presenting updates; and proposal components will have an opportunity for peer review throughout the semester.

Prerequisites: DCS 1100.

Previous terms offered: Fall 2021.

DCS 3999 Capstone Implementation
Every Spring. Enrollment limit: 18.

Guided independent implementation of the DCS senior coordinate major project. Concentrates on contextualization of methods and results, articulation of critical analysis, evaluation of possible project expansion or next steps, and presentation of the final outcome(s). Assigned readings will focus on interdisciplinary research models; weekly activities will engage with the scholarly communities represented by the project; and project components will have an opportunity for peer review throughout the semester.

Prerequisites: DCS 3998.

Previous terms offered: Spring 2022, Spring 2021.