CORE: DATA AND DISCOVERY (CDAD-UH)

CDAD-UH 1001Q Data (4 Credits)
Typically offered Spring
Data are everywhere. We have massive datasets keeping track of humanity's everyday minutiae from babies born to calories consumed, friends made to crimes committed. How can we use these data to make useful predictions and gain insights into ourselves and humanity in general? This course introduces the basics of learning from data and covers topics such as wrangling, exploration, analysis, prediction, and storytelling through data visualization.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Data Discovery
- Bulletin Categories: Design Minor Electives
- Bulletin Categories: Interactive Media:Media Design Thinking Elective
- Crosslisted with: Core: Data Discovery
- Crosslisted with: Design
- Crosslisted with: Interactive Media Minor: Required
- Crosslisted with: Interactive Media

CDAD-UH 1002Q Space (4 Credits)
Typically offered Fall
What's out there? For centuries, curious astronomers peered up into the night sky and saw stars, planets, and the occasional comet. Nowadays, astronomers have a suite of tools at their disposal to observe objects in space and help to answer the fundamental questions about the intricate workings of the Universe. From arrays of radio dishes spanning continents to gamma-ray detectors on satellites orbiting the Earth, astronomy is now truly Multi-Wavelength. This course is a journey of discovery, where students peer at objects such as quasars, stellar nurseries, galaxy clusters, supernovae, black holes, extrasolar planets, neutron stars, molecular clouds and gamma-ray bursts through various telescopes. Research and presentation will form a core part of the course, and experimental and quantitative methods will be brought to bear on our understanding of other worlds. How these results can be communicated to the scientific community and the public will be discussed, along with the relevance to society, including spin-off technologies. Data & Discovery Core courses develop the ability to use experimental and quantitative methods to understand the world - and in this course - other worlds!
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Data Discovery
- Crosslisted with: Core: Data Discovery

CDAD-UH 1004E Microbes (4 Credits)
Typically offered occasionally
Microbes are the most abundant organisms on Earth. They practically exist in every environment on our planet and play major roles in defining our atmospheric composition, sustaining the food webs that feed us and significantly influencing our health. Yet, microbes are diverse; they vary in size from 0.2 micrometers (1/300th diameter of a human hair) to a few millimeters. Some microbes are loners while others live in communities that talk to each other and coordinate behavior. The class will introduce students to microbes by examining their importance, ecology and diversity. The class will take students on a journey of how early microbiologists classified microbes, isolated and cultured them and how today DNA sequencing has revolutionized the way scientists classify microbes. Throughout the course, students will isolate samples to image and culture microbes and isolate their DNA from around the NYU Abu Dhabi campus and the emirate of Abu Dhabi. DNA samples will be sequenced using portable DNA sequencing technology (MinION technology), which generates data rapidly.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Data Discovery
- Crosslisted with: Core: Data Discovery

CDAD-UH 1005EQ Forensic Science: Guilty or Not Guilty? (4 Credits)
Typically offered occasionally
"Every contact leaves a trace." This phrase, coined by the pioneer of forensic science Edmond Locard, is the starting point of all forensic investigations. Scientific measurements are used to discover traces left at the crime scene and connect them to a person, object, or place. But what is it about science that allows us to make these connections? And how are facts determined by scientific measurements different from those recorded during an interrogation? Does the word "fact" carry the same meaning in the legal system as it does to you or to an experienced scientist? In this course, students explore these questions while analyzing samples left at a crime scene using biological, chemical, and physical laboratory techniques used in forensics. Exploring the underlying scientific principles and analyzing adjudicated cases, they discuss the capabilities and limitations of forensics, how it relates to the criminal justice system, and its impact on society.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Data Discovery
- Bulletin Categories: Experimental Inquiry
- Bulletin Categories: Quantitative Reasoning
- Crosslisted with: Core: Data Discovery

CDAD-UH 1007EQ The Mind (4 Credits)
Typically offered Fall and Spring
This course explores definitions and theories of the mind and how it may work. Students will learn how philosophers, psychologists, computer scientists, and neuroscientists have studied the mind and will consider several demanding but stimulating questions about thought, memory, and behavior. Readings and discussions will review the historical and scientific developments that led to contemporary understandings of the mind and the challenges and answers that these views pose to our common-sense understanding of, for instance, the unconscious mind, the irrational mind, and the subjective nature of memories.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Data Discovery
- Crosslisted with: Core: Data Discovery

CDAD-UH 1008EQ Seven Wonders of the Invisible World (4 Credits)
Typically offered Fall and Spring
"In the year of 1657 I discovered very small living creatures in rain water." This quote is attributed to Anton van Leeuwenhoek, a Dutch merchant whose skillful use of glass lenses allowed him to peer into a world of microorganisms that would otherwise be invisible to the naked eye. His careful observations gave way to advances in microscopy that have allowed scientists to observe detailed structures of plants, viruses invading cells, intricate crystal lattices, and the seemingly chaotic motion of small particles. In this course, microscopy is explored, first by examining the fundamental optical systems used to magnify objects, and eventually by using sophisticated microscopes to make observations. We explore seven wonders of the invisible world - natural animate and inanimate phenomena that include micro-animals, plant and animal cells, bacteria and viruses, fungi, proteins, and naturally occurring crystals.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Data Discovery
- Crosslisted with: Core: Data Discovery

CDAD-UH 1010EQ Diversity (4 Credits)
Typically offered Fall
Diversity is everywhere. We see it in the 8+ billion human beings and the 4-7,000 languages they speak. It is present at every scale from the cell types making up complex organisms to the different species present in an ecosystem. It is even present in the opinions people have on diversity itself. Talking about the worldwide loss of biodiversity and languages or about present and past human diversity thus requires clarifying and discussing important concepts. Understanding patterns of genetic diversity within species to unravel their evolutionary history requires a critical analysis of patterns and processes. This has consequences for our understanding of human evolution but also for our understanding of endangered species. During this course we will need a common language to clarify and discuss important concepts (what is diversity, how can it be quantified, how is it represented across scales, but also what is science, is it just a narrative among others, diverse narratives, can the idea of model and consistency be useful to identify scientific from other types of discourses?)
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Data Discovery
- Crosslisted with: Core: Data Discovery

CDAD-UH 1016EQ Where the City Meets the Sea: Studies in Coastal Urban Environments (4 Credits)
Typically offered Fall and Spring
Over half of the human population lives within 100 km of a coast and coastlines contain more than two-thirds of the world's largest cities. As a result, the world's natural coastal environments have been substantially modified to suit human needs. This course uses the built and natural environments of coastal cities as laboratories to examine the environmental and ecological implications of urban development in coastal areas. Using data from multiple coastal cities, student teams use field-based studies and Geographic Information System (GIS) data to examine patterns and processes operating in coastal cities. This course uses the local terrestrial, marine, and built environments as a laboratory to address these issues, and team projects requiring field work form a core component of the learning experience. As part of the NYU Global Network University this course is being offered simultaneously in several NYU sites globally and students are collaborating extensively with students from their sister campuses through the duration of this course.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Data Discovery
- Bulletin Categories: Environmental Studies: Envr Science
- Bulletin Categories: Urbanization Courses
- Bulletin Categories: Urbanization
- Crosslisted with: Core: Data Discovery
- Crosslisted with: Environment
- Crosslisted with: Environmental Studies
- Crosslisted with: Urbanization Courses
- Crosslisted with: Urbanization

CDAD-UH 1017EQ Symmetry (4 Credits)
Typically offered Spring
Symmetries are ubiquitous in nature and permeate the arts. Beginning with both intuitive definitions and more formal mathematical descriptions, the course will explore the symmetries in the subatomic constituents of matter and their interactions, larger-scale chemical and biological compounds, and the macroscopic natural world. Students will explore ways in which the human psyche is primed to find symmetry beautiful and examine the symmetries that underlie artistic creations, from geometrical patterns in artwork, to rhythm and chord progression in musical composition, and meter and rhyme in poetry. After a thorough study of symmetry, the course will end with a discussion of asymmetries and broken symmetries in nature and aesthetics.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Data Discovery
- Crosslisted with: Core: Data Discovery

CDAD-UH 1019Q Heat and the Universe (4 Credits)
Typically offered Spring
The study of temperature and of heat, as formulated in the laws of thermodynamics, will be used as a unifying guide to examine a variety of phenomena in our natural world. In the physical world, course topics will encompass the cooling of the Universe in its early minutes as well as the dramatic expansion in the first seconds after the Big Bang and the role that temperature fluctuations have played in the Earth's history. In the animal world, the course covers the surprising discovery of heat-loving bacteria and the techniques mammals, including humans, have adopted for temperature regulation. Readings will include materials from various scientific realms such as cosmology, biology, and geology.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Data Discovery
- Crosslisted with: Core: Data Discovery

CDAD-UH 1024Q Reading Like a Computer (4 Credits)
Typically offered Fall
How do computers "read" text, and how can computer-assisted analysis of texts give us new access to information about ourselves and the cultural legacies we have inherited? This course explores quantitative methods for discovering and analyzing diverse texts of the human record. It also offers a glimpse into possible futures of reading. Students will both discuss, and put into practice, forms of computer-assisted textual analysis that have revolutionized research in humanities and social science fields in recent years. They will also take a critical look at the "ubiquitous analytics" and the "ubiquitous virtuality" of everyday life. By engaging with the idea of data in the humanities, the course encourages students to reconsider our common-place assumptions about how reading works. Course materials, discussions, and classroom exercises will push students to examine how basic ideas about a text such as author, subject, setting, character or even style might look different when a non-human is involved in the interpretation. The course assumes no prior computer or coding skills, but a willingness to explore new technologies is essential for success.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Data Discovery
- Bulletin Categories: Digital Arts Humanities Minor: Electives
- Bulletin Categories: Interactive Media:Media Design Thinking Elective
- Crosslisted with: Core: Data Discovery
- Crosslisted with: Digital Arts Humanities
- Crosslisted with: Interactive Media Minor: Required
- Crosslisted with: Interactive Media

CDAD-UH 1027E 5000 Years of Notable Lives: Measuring Influence across Cultures (4 Credits)
Typically offered Fall
In the world of Big Data, information is everywhere; for example, Wikipedia biographies collect information for millions of individuals, translated into more than 200 languages for the most famous. The information is, however, not easily accessible for a quantitative analysis. The class will collect and analyze Wikipedia biographical information of one million biographies from 3000 BCE to now, with data scraping tools and text recognition techniques. It will extend the database (currently 1.9 million pages just in European languages) to terra incognita: based on students' skills, editions in Arabic, Chinese, Japanese, Persian, Russian, Polish, Dutch, Magyar, Turkish, Ukrainian, etc. will be added to the current stock of knowledge. Students will learn tools to scrape the internet and collect information (Python); to transform text into a proper database; to check and minimize errors; to analyze the reciprocal causation relations between the concentration of scientists, artists, politicians on the one hand, and the economic and political expansion of large cities on the other, using basic econometric techniques.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Data Discovery
- Crosslisted with: Core: Data Discovery

CDAD-UH 1032Q Stability (4 Credits)
Typically offered Spring
What makes a system stable or unstable? How does a lack of stability translate into chaos or turbulence? Every new device, experiment, or idea, requires a check for system stability. Important in science, engineering, politics, economics, and daily life, understanding stability enables predictability and control. In the late nineteenth century, philosophers, physicists, and mechanical engineers laid the foundations of hydrodynamic stability, the field which analyzes the stability and onset of instability of fluid flows. How have these breakthroughs helped us to determine whether a given flow is stable or unstable, or to describe how possible instabilities can cause turbulence? And how might insights drawn from such fields offer insight into other areas of our lives, from monetary or political systems to bridges to interpersonal relationships?
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Data Discovery
- Crosslisted with: Core: Data Discovery

CDAD-UH 1033EQ Data and Human Space (4 Credits)
Typically offered Fall
Societies have traditionally used maps to represent, even construct, the spaces in which we live as well as the territories over which we assert control. But what has become of the map in the (post-)digital age? Has our relationship to human space changed in our data-rich world? Are we unknowingly map-makers by virtue of walking around with our devices? This course explores the specific role that technology can play in our understanding of both historical and contemporary map making. Through regional and global examples of urban culture mapping, the course's focus on data discovery extends beyond working with official data to creating our own data within familiar environments. In addition to seminar discussion of readings and audiovisual materials, the course will host guest speakers. It also has a lab component with two main assignments. First, we focus on the larger Arabian Gulf region through the eyes of historical cartographers and colonial geographers. Second, we will turn to the city of Abu Dhabi itself to see how (and why) we might map some of its spaces of human culture using simple technology. The course assumes no prior computer skills.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Data Discovery
- Bulletin Categories: Digital Arts Humanities Minor: Electives
- Bulletin Categories: Heritage Studies: Mgt Research Methods Electives
- Crosslisted with: Core: Data Discovery
- Crosslisted with: Digital Arts Humanities
- Crosslisted with: Heritage Studies

CDAD-UH 1034Q Numbers, Models, and Chaos (4 Credits)
Typically offered Spring
The hallmark of a successful scientific theory is its ability to predict the outcome of experiments. Yet the last century's most shocking scientific development is the mathematical theory of chaos, with the subsequent realization that predictability has intrinsic limits. Such limits may have no practical importance (as in many engineering problems). Sometimes they shape an entire branch of science (as in meteorology). This course provides a challenging, but accessible, way to understand predictability's limits, while still appreciating the bedazzling richness of phenomena that only theories which face these limits can possibly describe. The course brings together, in a cohesive whole, ideas about numbers and infinities; the inner working of computing machines; nuances and concessions occurring in model-building; the meaning of randomness and of determinism. Students will participate in the construction of mathematical models (mostly inspired by population biology) under the form of iterated maps, and interact with simple computer simulations of those models to illustrate key concepts of nonlinear dynamics: stability, limit cycles, attractors, and predictability.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Data Discovery
- Bulletin Categories: Counts towards IM 2000-Level
- Bulletin Categories: IM 2000-Level
- Bulletin Categories: Interactive Media: Computational Media Elective
- Crosslisted with: Core: Data Discovery
- Crosslisted with: Interactive Media Minor: Required
- Crosslisted with: Interactive Media

CDAD-UH 1037 Cyberwarfare (4 Credits)
Typically offered Spring
Einstein once said, "I know not with what weapons World War III will be fought, but World War IV will be fought with sticks and stones." The answer to part one of his statement is here: World War III will likely be a cyber war. Election hacking, power grid cyberattacks, troll farms, fake news, ransomware, and other terms have entered our daily vocabularies and are here to stay. This course aims to introduce students to the cyberwarfare landscape: the actors, capabilities, techniques, impacts, legal and geopolitical issues, and defense systems it necessitates. How has the threat of cyber war transformed our definitions of privacy and security, on individual, national, and international planes? We will dive in with specific case studies, such as power grid cyberattacks, and we will perform cyber tabletop exercises. The first half of the course establishes the technical foundations needed for understanding cyberspace; the second half approaches the problem from different angles, attempting to understand the repercussions of technological, legislative, and political changes.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Arts, Design Technology
- Bulletin Categories: Core: Data Discovery
- Bulletin Categories: Peace Studies Minor: Electives
- Crosslisted with: Core: Arts, Design Technology
- Crosslisted with: Core: Data Discovery
- Crosslisted with: Peace Studies Minor: Required
- Crosslisted with: Peace Studies

CDAD-UH 1039EQ Search (4 Credits)
Typically offered Spring
How do we find what we're looking for? How do we know when we've found it? If we can't tell the future, how do we make choices that impact the rest of our lives, such as finding a life partner, a fulfilling career, or even a good Core course? This course examines the nature and implications of such search processes. Questions addressed include why marital selection (when and whom to marry) has changed so much over time. Why do more women than men now go to college in some parts of the world? What does the data suggest explains these major societal changes? Students will be tasked with obtaining country-level evidence on how changing legislation in different countries is observed to affect societal outcomes. Students will not only learn the nature of causal inference in data, but will better understand how and why society is changing. Additional topics include the search for knowledge (scientific method and causality), navigation (the search for home [and time dilation with GPS]), returns to matching (insect swarms and Tinder) and even shopping at the carpet souk.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Data Discovery
- Bulletin Categories: Core: Structures of Thought Society
- Crosslisted with: Core: Data Discovery
- Crosslisted with: Core: Structures of Thought Society

CDAD-UH 1040 Artificial Intelligence and Human Decisions (4 Credits)
Typically offered Spring
How do we make decisions? How fully do we trust our capacity to weigh evidence and decide correctly, whether as individuals or as members of juries or other collective bodies? Does Artificial Intelligence promise objective decision-making or threaten to reproduce human biases? This course approaches such questions by examining artificial decision-making systems (ADMS), which are now used in a range of settings, from predicting consumer behavior or diagnosing diseases to managing self-driving cars. Students will explore the psychological and neural bases of decision-making as well as the ethics and social and political consequences of our turn to AI as an alternative. The most advanced ADMS employ complex machine-learning to deduce decision rules from vast data sets. They improve themselves by learning from their past decisions (correct or incorrect). However, the data sets used to train ADMS are human generated and hence may reproduce biases and problems. For a deeper understanding of the topic, students will consider the potential use of ADMS in the legal domain, where currently only human beings make decisions, but where changes might loom in the near future.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Data Discovery
- Bulletin Categories: Digital Arts Humanities Minor: Electives
- Crosslisted with: Core: Data Discovery
- Crosslisted with: Digital Arts Humanities

CDAD-UH 1041EQ Decisions and the Brain (4 Credits)
Typically offered Spring
Where do errors come from? How can we make better decisions? Should intuition be trusted? Can we nudge others to make better decisions, and should we? This course examines neural bases for human decisions and cognitive biases. Drawing from economics, psychology, and neuroscience, it takes an interdisciplinary perspective on topics including decision-making under risk (how humans deal with probabilities), intertemporal decisions (saving for the future), and social decisions (interpersonal allocations and fairness). Students will explore different notions of rational behavior, how data on human behavior and brain activity is collected, and how we can use these data to improve decisions. Hands-on experience will include lab visits (both behavioral and brain imaging) and data collection through online platforms as students gain familiarity with different models of decision-making (including expected utility theory vs. prospect theory for decisions under risk, exponential vs. hyperbolic discounting for intertemporal decisions, and selfish vs. social preferences for interpersonal decisions) and examine how these models reflect available neural evidence.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Behavioral Institutional Design Minor: Electives
- Bulletin Categories: Core: Data Discovery
- Crosslisted with: Behavioral Institutional Design
- Crosslisted with: Core: Data Discovery

CDAD-UH 1043EQ Data and Society (4 Credits)
Typically offered Fall
Why is data science so influential and popular in business, government and academic research? What are the benefits we gain with expending resources to collect and analyze data, and what is lost when we make decisions about how to classify events? In this class, students will gain a foundational understanding of statistics, data science, and computational data analysis using data sets drawn from real-life problems, primarily with the R statistical software package. They will also be exposed to the philosophical underpinnings of quantitative analysis via scientific inquiry, along with criticism of methods and the way that data-driven analysis can be used to obscure as much as inform. Students will also undertake a group project that will involve independent data analysis on a topic of relevance to world affairs.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Data Discovery
- Bulletin Categories: Digital Arts Humanities Minor: Electives
- Crosslisted with: Core: Data Discovery
- Crosslisted with: Digital Arts Humanities

CDAD-UH 1044Q Human-Centered Data Science (4 Credits)
Typically offered Fall and Spring
Data science is changing our lives. While the importance of data science is widely acknowledged, there are also great concerns around it. How are data generated? How can they be used to make predictions and inform insights? What can be the potential dangers of applying data science techniques? What are the social and human implications of their uses? This multidisciplinary course explores these questions through hands-on experience on key technical components in data science and critical reviews of human and social implications in various real-world examples, ranging from social science to arts and humanities to engineering. In the course, students will 1) learn basic concepts and skills in data science (e.g., crawling and visualization); 2) apply these skills in a creative project; 3) discuss social and human implications of data science, including data privacy; algorithmic bias, transparency, fairness, and accountability; research ethics; data curation and reproducibility; and societal impacts. This course encourages students to reconsider our common-place assumptions about how data science works and be critical about the responsible use of data.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Data Discovery
- Bulletin Categories: Digital Arts Humanities Minor: Electives
- Crosslisted with: Core: Data Discovery
- Crosslisted with: Digital Arts Humanities

CDAD-UH 1045EQ Science of Food & Cooking (4 Credits)
Typically offered Fall and Spring
What is the real shape of your food? How do you define cooking on a molecular sense? Are all calories the same? Is industrial food really as diverse as it seems? The ever-rising wave of general interest in food has helped to knock down the barriers of science and cooking, where science found its way into house-kitchen and cooking into laboratories and industrial plants in the past three decades. This course attempts to integrate some of the broad questions, as the ones given above, by taking food as a molecular architecture and its preparation as a hypothesis-driven scientific event. The answers to these questions would touch upon matters of health, nutrition, environment and ethics of eating. The laboratory sessions would complement the in-class topics by providing hands-on activities on elucidating the science of cooking, preparation of chemical cuisines and quantitative/qualitative analysis of food components in commercial food and drinks.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Data Discovery
- Crosslisted with: Core: Data Discovery

CDAD-UH 1046EQ Infectious Diseases: Preventing and Stopping Epidemics (4 Credits)
Typically offered Spring
What determines how a disease spreads in human populations? Biomedical scientists have greatly expanded our knowledge of the diseases caused by viruses, parasites, fungi or bacteria. Yet every year, epidemics of infectious diseases still cause large amounts of suffering, bereavement and economic loss throughout the world. Climate change, deforestation, and the globalization of economic activity might even accelerate the emergence of new infections and usher in an "era of pandemics." In this course, students will draw on literature from the biomedical and social sciences, as well as historical accounts of outbreaks, to understand the dynamics of contagion. They will learn the tools used by epidemiologists and public health specialists to prevent the emergence, limit the spread, or even eliminate infectious diseases. They will investigate the ethical, behavioral, and political obstacles that might limit the adoption of protective behaviors during epidemics. Students will engage in debates and research related to the current COVID-19 pandemic, as well as in case studies of diseases including smallpox, influenza, malaria, HIV/AIDS, and Ebola.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Data Discovery
- Bulletin Categories: Core: Structures of Thought Society
- Bulletin Categories: SRPP: Social Structure Global Processes
- Crosslisted with: Core: Structures of Thought Society
- Crosslisted with: SRPP: Major Soc Sci Required
- Crosslisted with: Social Research Public Policy

CDAD-UH 1048Q Microbial Self: Microbes and Identity (4 Credits)
Typically offered Fall and Spring
What is self? What is identity? Do our perceptions of self and identity change over our lifetimes? This course discusses fundamental questions about biological concepts of self and identity, which are changing in the current era of genomics, as we are starting to appreciate ourselves better in the context of our environments. An emerging concept in biology is the link between self and the microbiome. Historically viewed as harmful pathogens, non-pathogenic microbes are vital for our existence and they are omnipresent in human bodies and the environment. These microbes change over our lifetimes mirroring our development from infancy to adulthood. Does this microbial development influence our perception of self?
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Data Discovery
- Crosslisted with: Core: Data Discovery

CDAD-UH 1049EQ Random Walks in Science (4 Credits)
Typically offered Spring
This course aims to address the question of randomness around us. Students will delve into the science of random processes and seek answers to the following questions: How can we study the outcome of something that is random in nature? Can we use "random walks' - a term for processes in which there are no observable patterns or trends - to bypass mathematical challenges or to understand complex processes happening in our daily lives? Are there any governing rules that help us to predict the outcome of random things? How can randomness lead to non-random outcomes? Can we harvest randomness to gain order? Can randomness be classified or characterized? Giving examples from natural and social sciences, mathematics, engineering as well as computer science, the course launches an interdisciplinary survey into the world of Stochastic processes and considers ways in which randomness is shaping our daily lives.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Data Discovery
- Crosslisted with: Core: Data Discovery

CDAD-UH 1063 Digital Archive (4 Credits)
Typically offered occasionally
How do digital technologies impact efforts to archive human experience and culture? How do they change how we access that archive? In the age of ubiquitous smart devices, when we are all curators of digital content, what constitutes the digital archive? This course explores the implications of digital archive creation tools and practices for historical memory and understanding. Students will conduct reviews of digital archives and online repositories and will be invited to assess the role of digitization in the construction of history and memory. Focusing on the curatorial and technical decisions underlying digitization processes and the ways in which these decisions determine what is discoverable, accessible, and searchable, students will be introduced to relevant terms and concepts, such as metadata creation, machine-readable data, open access, the digital divide, algorithmic bias, the possibilities and the ethics of crowdsourcing, distant reading, etc. Offering a gentle introduction to computer-readable corpus creation and text analytics, the course takes a Humanities approach to interrogating digital tools and platforms we encounter on a daily basis.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Arts, Design Technology
- Bulletin Categories: Core: Data Discovery
- Bulletin Categories: Digital Arts Humanities Minor: Electives
- Crosslisted with: Core: Arts, Design Technology
- Crosslisted with: Core: Data Discovery
- Crosslisted with: Digital Arts Humanities

CDAD-UH 1064 Sustainable Supply Chains (4 Credits)
Typically offered occasionally
What are supply chains, and what do we mean when we talk about their sustainability? As corporations work to become more sustainable, what does this mean in practice? Supply chains are the backbone of large corporations; ensuring their sustainability typically means ensuring the sustainability of the corporation itself. What challenges do corporations face when moving towards environmentally sustainable or socially responsible practices? How are these dimensions of sustainability evaluated and weighed against one another? This course examines elements of a supply chain, including purchasing, inventory, manufacturing, operations management, transportation and logistics, scheduling, and network design. It asks how attention to health, human rights, and the environment can be incorporated into supply chain design by studying economic, environmental, and social impacts. Applying these principles to maritime, airline, and global manufacturing industries - whose supply chains can be strongly affected by external and unplanned factors such as pandemics - students will explore their impact in real-life applications.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: BOS: General Business Electives
- Bulletin Categories: Core: Data Discovery
- Bulletin Categories: Environmental Studies: Envr Science
- Bulletin Categories: Urbanization Courses
- Bulletin Categories: Urbanization
- Crosslisted with: Business, Organizations, and Society
- Crosslisted with: Core: Data Discovery
- Crosslisted with: Environment
- Crosslisted with: Environmental Studies
- Crosslisted with: Urbanization Courses
- Crosslisted with: Urbanization

CDAD-UH 1065E What is Life? (4 Credits)
Typically offered Spring
What distinguishes living organisms from non-living systems, and how did the latter transition to living? How do organisms evolve, and can we expect to find life elsewhere in the universe like ours? Answering these questions allows us to better understand life on our planet and how new evolutionary trajectories can arise, resulting in the appearance of more complex species as well as new viruses and pathogens. The course begins with analyzing the distinguishing features of living organisms and examining the boundaries that non-living systems had cross to become living. The class then explores how extant organisms use their DNA as blueprints to replicate themselves and evolve. In the last segment, students will learn how researchers are editing DNA and have re-written life's genetic code to generate synthetic life indistinguishable from natural ones. The course uses lectures and laboratory exercises to interrogate these questions.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Data Discovery
- Bulletin Categories: Experimental Inquiry
- Crosslisted with: Core: Data Discovery

CDAD-UH 1067Q Epidemiology for Global Health (4 Credits)
Typically offered occasionally
By the end of this course students will develop the ability to understand the evolution and current role of epidemiology as an approach to assessing public health problems; describe epidemiological approaches to defining and measuring health problems in defined populations; understand how epidemiologic studies are designed, implemented and analyzed; understand the concepts of measurement of test performance and be able to apply these concepts of testing and screening in a range of health and other settings; understand and apply epidemiological criteria needed to establish cause and effect relationships; understand, and apply key ethical issues to the conduct of epidemiological and other scientific investigations; conduct library research to find information on diseases and other health conditions; and critically read and understand health information.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Data Discovery
- Bulletin Categories: Core: Structures of Thought Society
- Bulletin Categories: SRPP. Methods Electives
- Crosslisted with: Core: Data Discovery
- Crosslisted with: Core: Structures of Thought Society
- Crosslisted with: SRPP. Major Soc Sci Required
- Crosslisted with: Social Research Public Policy

CDAD-UH 1069EQ Climate Change (4 Credits)
Typically offered occasionally
Climate change is among the most complex and challenging problems that we have confronted as a civilization, but the responses and impacts will vary largely across space and the global population. This course is designed to give you an overview of the scientific basis of climatic change, and will expose you to multiple facets of a very interdisciplinary and encompassing field. You will be introduced to the physical science of our climate system, the contributing system components, and the basic mechanisms that govern how the climate system responds to drivers of change. We'll then explore climate change from multiple perspectives: paleoclimatic change, recent historical variability and change, future climate projections as well as social and economic issues. Each session will start with a discussion about a scientific paper (or parts of the IPCC report) followed by a one hour lecture and practical work at the end of each session. The practical work will have large components of learning scientific writing and presentation.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Data Discovery
- Bulletin Categories: Environmental Studies: Envr Science
- Bulletin Categories: Experimental Inquiry
- Bulletin Categories: Quantitative Reasoning
- Crosslisted with: Core: Data Discovery
- Crosslisted with: Environment
- Crosslisted with: Environmental Studies

CDAD-UH 1071EQ Stereotyping (4 Credits)
Typically offered Fall
Stereotypes are socially shared and affect us collectively. At a personal level, they shape our self-concepts, abilities, social identities, and our social interactions. At the societal level, stereotypes pervade our culture, our institutions, and our science in subtle ways that often escape our awareness. In this course, we will explore the origins and the social transmission of stereotypes, the (often unconscious) processes by which stereotypes operate, and the way they are transmitted from person to person and from generation to generation. We will analyze the way in which stereotypes permeate all aspects of our society (including science) and how public policies can curtail their negative effects. These questions will be addressed from different vantage points and analyzed through existing and self-generated data able to uncover blatant and hidden stereotypes. Hands-on experiences will include data collection from different sources (publicly available statistics, google trends, etc.) as well as the design of a small-scale empirical study; this will allow you to gain familiarity with both correlational and experimental methods
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Behavioral Institutional Design Minor: Electives
- Bulletin Categories: Core: Data Discovery
- Bulletin Categories: Experimental Inquiry
- Bulletin Categories: Gender Studies: Empirical Analysis of Gender
- Bulletin Categories: Quantitative Reasoning
- Crosslisted with: Behavioral Institutional Design
- Crosslisted with: Core: Data Discovery
- Crosslisted with: Gender Studies

CDAD-UH 1072Q Nothing (4 Credits)
Typically offered Spring
How can a course be about nothing? How can anything be about nothing? We all use the word "nothing" (probably several times a day) without hesitation, but if we stopped to think about its meaning, we would realize that "nothing" is a complex, multi-faceted, ever-changing concept. To talk about "nothing," we need to first set rules and boundaries. This course explores the evolution of the concept of nothing in mathematics, philosophy and, especially, physics over the centuries. We will discuss the history of the concept of zero, ideas of nothing and everything in ancient philosophy, the concept of limit, which is at the heart of modern mathematics, and the theories of relativity and quantum physics, which represent the foundations of our modern understanding of the universe. We will ask age-old questions that have occupied natural philosophers for millennia: Why is there something rather than nothing? Where does everything come from? Can something come from nothing? What is nothing anyway? Along the way, we will see how developing scientific theories requires taking basic concepts---like the concept of "nothingness"---and making them precise enough to support scientific inquiry. We will discover that such a process can lead to a radical revision of basic concepts we might have thought were unambiguous.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No
- Bulletin Categories: Core: Data Discovery
- Bulletin Categories: Quantitative Reasoning
- Crosslisted with: Core: Data Discovery

CDAD-UH 1073Q Science of Complexity (4 Credits)
Our world is a collection of wondrously complex systems. We may wonder why stock markets suddenly crash or how our bodies work so well for so long. We may wonder why climate changes or how our decisions affect others and the ecology we are part of. We may even wonder why we wonder, i.e., how our brain works. What makes systems complex, and what makes some questions particularly difficult to answer? The science of complexity can illuminate all of these apparently disconnected systems and behaviors. It aims to understand how complex behaviors emerge when relatively simple, single elements are brought together into a collective. In this course, we study the science of complexity through examples from the physical sciences, the social sciences, and the arts. We will learn the tools and concepts needed to extract simple insights about complex systems and will use these concepts and tools to better understand our own absorbing questions about the world around us.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No

- Bulletin Categories: Core: Data Discovery
- Bulletin Categories: Quantitative Reasoning
- Crosslisted with: Core: Data Discovery

CDAD-UH 1074EQ Science of Martial Arts (4 Credits)
Typically offered occasionally
Martial arts are ubiquitous in the world and are practiced for many reasons beyond warfare, including sport, spiritual development, cultural heritage, and entertainment. In fulfilling their purpose in attack or defense, martial arts techniques must be honed for effectiveness and efficiency, since an optimal movement can make the difference between safety and harm. What enables and limits motions of the human body? In this course, we will learn and analyze the physical and biomechanical laws that govern the basic striking and throwing techniques as well as defenses against these attacks, both theoretically and practically in a PHYED portion and laboratory experiments. We will investigate the science of arms and armor, including modern protective equipment, and discuss the similarities and differences in techniques in different martial arts. The secondary aspect of the course will focus on the link between martial arts and the societies in which they developed, as well as how they have spread to other cultures. How have the society shaped the martial arts practiced and vice versa? We will examine the development of martial techniques into spiritual paths and into modern day sports, as well as depictions of martial arts in popular culture.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No

- Bulletin Categories: Core: Data Discovery
- Bulletin Categories: Experimental Inquiry
- Bulletin Categories: Physical Education Courses
- Bulletin Categories: Physical Education
- Bulletin Categories: Quantitative Reasoning
- Crosslisted with: Core: Data Discovery
- Crosslisted with: Physical Education Courses
- Crosslisted with: Physical Education

CDAD-UH 1075EQ Quantum Computing for Everyone: Embracing the Quantum Revolution (4 Credits)
Typically offered occasionally
Is Schrödinger's cat dead or alive? This famous thought experiment highlights the mysterious nature of quantum mechanics, a powerful theory that explains the principles of nature at the atomic level. In 1982, Feynman suggested the utilization of the principles of quantum mechanics to construct a quantum computer for investigating the quantum world we live in. Quantum technology is expected to revolutionize the world. Are we ready for it? The objective of this course is to acquaint students with the mysterious nature of Quantum Mechanics and its role in computing. Along with fundamental theories, students will engage in practical exercises on a 2-qubit quantum computer at NYUAD's Quantum Lab. They will acquire knowledge about the fundamentals of quantum mechanics and quantum computing, and comprehend the real-world applications of quantum computing across several domains, including finance, ultra-secure communication, sensing, physics, chemistry, and biology. The course will also delve into the influence of quantum computing beyond science and technology, extending into the realms of arts and humanities.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No

- Bulletin Categories: Core: Data Discovery
- Bulletin Categories: Experimental Inquiry
- Bulletin Categories: Quantitative Reasoning
- Crosslisted with: Core: Data Discovery

CDAD-UH 1077 Chemophobia (4 Credits)
Typically offered Spring
The first rule of confronting chemophobia is not to use the word chemophobia. Only by proper communication and education can anti-scientific opinions be confronted more effectively. Chemophobia, an aversion to or prejudice against chemicals or even against chemistry, is one of the most pervasive and challenging science-related phobias to confront. How have people come to distrust chemicals in everyday use and does this distrust threaten public health and security? What are the origins of this phenomenon? This course examines key historical events (exposure to pesticides, industrial disasters, uses of chemicals in warfare) and social and sub-cultural trends that triggered the chemophobia epidemic. Acknowledging the dangers and damages associated with hazardous chemical processes, misuses, and accidents, we analyze both rational and irrational bases that led to the emergence of chemophobic sentiments. We examine whether one can measure and compare levels of chemophobia and anti-scientific attitudes across societies. We also consider how chemists and journalists can help reduce the level of chemical paranoia through education and communication and why this is so important.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No

- Bulletin Categories: Core: Data Discovery
- Crosslisted with: Core: Data Discovery

CDAD-UH 1078EQ Inclusive Data Literacy (4 Credits)
In a world that is increasingly data-driven, where quantitative empirical methodologies drive leadership decisions and shape our experienced reality, basic data literacy has become as important as traditional language literacy. Equally essential for an inclusive society is a fundamental appreciation for the gaps in existing data infrastructures and potential blind spots in rigorous quantitative empirical approaches. Can evidence-based leaders avoid being "evidence-biased"? This inclusive data literacy course will present students with basic skills and foundational concepts of both rigorous program evaluation and inclusion issues. Through reading and reflection, cross-disciplinary conversation, and group project work, students gain awareness of who is represented in evidence-based policy decisions, deepen understanding of the implicit biases hidden within data structures, and practice techniques to tackle the complexities of inclusion in a data-driven future.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No

- Bulletin Categories: BOS: Methods and Analytics Electives
- Bulletin Categories: Core: Data Discovery
- Bulletin Categories: Econ Conc: Appl Economics/Economic Policy Elective
- Bulletin Categories: Economics: Development Economic History Track
- Bulletin Categories: Experimental Inquiry
- Bulletin Categories: Gender Studies: Empirical Analysis of Gender
- Bulletin Categories: Political Science: Methods
- Bulletin Categories: Quantitative Reasoning
- Bulletin Categories: SRPP: Methods Electives
- Crosslisted with: Business, Organizations, and Society
- Crosslisted with: Core: Data Discovery
- Crosslisted with: Economics Major: Required
- Crosslisted with: Economics
- Crosslisted with: Gender Studies
- Crosslisted with: Political Science Major: Social Science Required
- Crosslisted with: Political Science
- Crosslisted with: SRPP: Major Soc Sci Required
- Crosslisted with: Social Research Public Policy

CDAD-UH 1079EQ The Science of Making Music (4 Credits)
Typically offered Fall
What distinguishes noise from music, and why do the musical instruments that we love create just the right sound mixtures to achieve this? When organized properly, sound waves can have a profound emotional impact on the human mind, enabling artistic expression and connecting people within and across diverse cultures. But what does it mean to organize sound waves properly? In this course, we will examine ways that the fundamental physics underpinning sound and timbre contribute to the psychoacoustic principles of consonance, dissonance, and the emergence of musical systems. We will survey the modern music production toolkit, using a digital audio workstation for audio recording, spectral analysis, sound synthesis, and music production. We will analyze the music of a variety of cultures, seeking connections between the physics underpinning their unique harmonic structures with the acoustic characteristics of their musical instruments and the contexts in which their music is performed.
Grading: Ugrd Abu Dhabi Graded
Repeatable for additional credit: No

- Bulletin Categories: Core: Data Discovery
- Bulletin Categories: Quantitative Reasoning
- Crosslisted with: Core: Data Discovery