CIS115 Experiential Design and Application
This course, co-taught with Director of Physical Plant Operations Mike Conte, will allow students to work directly with facilities employees to design and execute modifications and repairs to existing Wesleyan spaces. The specific projects will change from semester to semester, but could include designing and building informal learning spaces, and planning and carrying out repairs and modifications to mechanical and plumbing systems. Students will learn design and engineering by carrying out projects to improve Wesleyan’s facilities. Students must be willing to work with tools and machinery with supervision. The grading in this quarter-credit repeatable course will be based primarily on active participation, and the class meetings will be held on location and at times built around participants’ schedules.
Offering: Host
Grading: Cr/U
Credits: 0.25
Gen Ed Area: NSM-CIS
Prereq: None

CIS116 Designing Books
This intensive course will help students to understand how books are physically designed and created. Students will learn to use the book format in their work as a means of expanding, preserving, and restructuring ideas. After a visit to Special Collections and Archives to look at examples of artists’ books and a review of 1200 years of Eastern and Western book binding types, students will make at least eight books, including an accordion book, a long-stitch book, a Coptic stitch book, side-sewn bindings including a Japanese four-hole stitch books, variations on pamphlet binding and a map fold book, as well as a simple box. The properties of bookbinding materials will be discussed in detail. No prior experience is necessary.
Offering: Host
Grading: Cr/U
Credits: 0.50
Gen Ed Area: NSM-CIS
Prereq: None

CIS121 Wesleyan Mathematics and Science Scholars Colloquium I
This weekly colloquium of participants in the Wesleyan Mathematics and Science Scholars (WesMaSS) Program will provide participants with a framework for taking full advantage of the educational opportunities in the natural sciences and mathematics available at Wesleyan. Class sessions and assignments are designed to help students to develop effective individual and group study skills, to promote cohort-building, and to navigate the “hidden curriculum” in higher education.
Offering: Host
Grading: Cr/U
Credits: 0.25
Gen Ed Area: NSM-CIS
Prereq: None

CIS122 Wesleyan Mathematics and Science Scholars Colloquium II
This weekly colloquium of participants in the Wesleyan Mathematics and Science Scholars (WesMaSS) Program will be focused on strategies for success in science and math higher education.
Offering: Host
Grading: Cr/U
Credits: 0.25
Gen Ed Area: NSM-CIS
Prereq: None

CIS135 Mindfulness
During this course, students will be introduced to various techniques of mindfulness practice and awareness, including sitting meditation and yoga. These modalities are designed to aid in stress and anxiety reduction and, when practiced diligently, may also offer opportunities for greater self-awareness and personal development. The goal is to give students not only a peer community but also a contemplative toolbox that is portable, replicable, and sustainable. Students will gain an understanding of the roles these practices can play in leading a happier, healthier, and more fulfilling life.
Offering: Host
Grading: Cr/U
Credits: 0.25
Gen Ed Area: SBS-CIS
Prereq: None

CIS150 The Science Behind Popular Scientific Literature
The Science Behind Popular Scientific Literature. This course focuses on academic STEM writing and is an exploration of the scientific literature in the reference list of Elizabeth Kolbert’s “The Sixth Extinction.” Assignments will consist of numerous low-stakes writing prompts with extensive peer and instructor feedback, and a term project paper constructed along the lines of a STEM review paper. This course fulfills a key need in developing science literacy and teaching students how to find and use reliable sources to critically evaluate popular science writing.
Offering: Host
Grading: A-F
Credits: 1.00
Gen Ed Area: NSM-CIS
Identical With: WRCT150
Prereq: None

CIS150F The Science Behind Popular Scientific Literature (FYS)
The Science Behind Popular Scientific Literature. This course focuses on how to present material to a scientific audience and is an exploration of the scientific literature in the reference lists of Rachel Carson’s “Silent Spring.” Assignments will consist of numerous low-stakes writing assignments with extensive peer and instructor feedback, and a term project paper constructed along the lines of a STEM review paper. This course fulfills a key need in developing science literacy and teaching students how to find and use reliable sources to critically evaluate popular science writing.
Offering: Host
Grading: OPT
Credits: 1.00
Gen Ed Area: NSM-CIS
Identical With: WRCT150F
Prereq: None

CIS160 Life in the Oceans in the Anthropocene and Beyond
Little is known about life in the deep sea, the largest habitat on Earth, even about the largest animals living there, such as the giant squid. Humans, however, are severely affecting even these most remote areas of our planet, and wildlife populations in the oceans have been badly damaged by human activity. We will look at the amazing diversity of ocean life and the disparate building plans of its animals, and see how oceanic ecosystems are fundamentally different from land ecosystems. Then we will explore how human actions are affecting oceanic ecosystems directly, for instance by overfishing (especially of large predators and filter feeders), addition of nutrients (eutrophication) and pollutants, and the spread of invasive species, as well as indirectly, through emission of carbon compounds into the atmosphere. Rising atmospheric CO2 levels lead to ocean acidification and global warming, affecting the all-important metabolic rates of ocean life, as well as oceanic oxygen levels and stratification, thus productivity. We will try to predict the composition of future ecosystems by looking at ecosystem changes during periods of rapid warming in the geological past and
CIS170 Introduction to Design and Engineering
This course will provide a hands-on introduction to design and engineering. Students will engage in individual and team projects in a studio environment where we seek to develop a shared practice and understanding of the engineering design process. We will study biological organisms to find inspiration for design of hoppers, swimmers, and climbers. Students will build skills using computer-aided design (CAD) software and using tools for fabrication and prototyping including laser cutting and 3D printing. We will also hone skills in identifying which scientific and engineering principles need to be understood to achieve design goals.
Offering: Crosslisting
Grading: A-F
Credits: 1.00
Gen Ed Area: NSM-CIS
Identical With: IDEA170, PHYS170
Prereq: None

CIS173 Introduction to Sensors, Measurement, and Data Analysis
This course is an engineering fundamentals course supporting the Integrated Design, Engineering, and Applied Science (IDEAS) minor. It will involve a sequence of hands-on projects that introduce students to basic measurement devices and data analysis techniques using inexpensive modern sensors, a microprocessing platform (Arduino), and a computational software package (Matlab). The course will provide foundational knowledge of available resources and techniques that allow students to more confidently implement measurement systems in subsequent courses of the IDEAS minor and better understand experimental devices used in scientific research activities.
Offering: Crosslisting
Grading: A-F
Credits: 1.00
Gen Ed Area: NSM-CIS
Identical With: IDEA173
Prereq: None

CIS175 Principles of Engineering
Students will learn about engineering mechanics, electronic control systems, and physical actuators (e.g., for movement) using a microprocessor platform, sensors and motors. The final project will require a student team to ideate, design, analyze, and optimize a mechatronic system. This course will allow students to better understand components, methods, and challenges in mechatronics systems commonly found in automation and robotics. This course fulfills the project-based Design & Engineering course requirement for the Integrated Design, Engineering and Applied Science (IDEAS) minor degree program.
Offering: Crosslisting
Grading: A-F
Credits: 1.00
Gen Ed Area: NSM-CIS
Identical With: IDEA175
Prereq: None

CIS221 Research Frontiers in the Sciences I
This seminar is designed to introduce students to the exciting and cutting-edge research activity at Wesleyan across all the sciences and mathematics, and to introduce faculty with active research labs to students interested in working in a lab. The course showcases what research at the college level actually entails, and which projects Wesleyan faculty are actively researching. CIS 221 is scheduled in the fall, CIS 222 in the spring. Both are gateway classes to admission into the CIS, but also recommended to students broadly interested in the sciences who have not yet decided on a major. There is no overlap in speakers between CIS 221 and CIS 222, and students may take both.
Offering: Host
Grading: Cr/U
Credits: 0.50
Gen Ed Area: NSM-CIS
Prereq: None

CIS222 Research Frontiers in the Sciences II
This seminar is designed to introduce students to the exciting and cutting-edge research activity at Wesleyan across all the sciences and mathematics, and to introduce faculty with active research labs to students interested in working in a lab. The course showcases what research at the college level actually entails, and which projects Wesleyan faculty are actively researching. CIS 221 is scheduled in the fall, CIS 222 in the spring. Both are gateway classes to admission into the CIS, but also recommended to students broadly interested in the sciences who have not yet decided on a major. There is no overlap in speakers between CIS 221 and CIS 222, and students may take both.
Offering: Host
Grading: Cr/U
Credits: 0.50
Gen Ed Area: NSM-CIS
Prereq: None

CIS231 Modeling and Data Analysis: From Molecules to Markets
The development of models to describe physical or social phenomena has a long history in several disciplines, including physics, chemistry, economics, and sociology. With the emergence of ubiquitous computing resources, model building is becoming increasingly important across all disciplines. This course will examine how to apply modeling and computational thinking skills to a range of problems. Using examples drawn from physics, biology, economics, and social networks, we will discuss how to create models for complex systems that are both descriptive and predictive. The course will include significant computational work. No previous programming experience is required, but a willingness to learn simple programming methods is essential.
Offering: Crosslisting
Grading: A-F
Credits: 1.00
Gen Ed Area: NSM-PHYS
Identical With: PHYS221, QAC221
Prereq: None

CIS239 Proseminar: Machine Learning Methods for Text, Audio and Video Analysis
In this course, students will learn machine learning techniques to analyze text, audio, and video data. The course consists of three parts: text analysis, audio analysis and video analysis. Each part will first introduce how these non-traditional data can be converted into mathematical objects suitable for computer processing and, particularly, for the application of machine learning techniques. Then students will learn a selection of supervised and unsupervised learning algorithms that are effective for text, audio, image/video analysis. Finally, students will explore major applications of these techniques such as sentiment analysis, speech emotion recognition, face recognition, pedestrian detection, keyframe extraction.
Offering: Crosslisting
Grading: A-F
Credits: 1.00
Gen Ed Area: NSM-QAC
Identical With: QAC239
Prereq: COMP112 OR QAC155 OR QAC156
CIS241 Introduction to Network Analysis
This is an interdisciplinary hands-on course examining the application of network analysis in various fields. It will introduce students to the formalism of networks, software for network analysis, and applications from a range of disciplines (history, sociology, public health, business, political science). We will review the main concepts in network analysis and learn how to use the software (e.g., network analysis and GIS libraries in R) and will work through practice problems involving data from several sources (Twitter, Facebook, airlines, medical innovation, historical data). Upon completion of the course, students will be able to conduct independent research in their fields using network analysis tools.
Offering: Crosslisting
Grading: A-F
Credits: 1.00
Gen Ed Area: SBS-QAC
Identical With: QAC241
Prereq: None

CIS251 Data Visualization: An Introduction
This course will introduce students to the principles and tools necessary to present quantitative information in a visual way. While tables and graphs are widely used in our daily lives, it takes skill to deconstruct what story is being told. It also takes a perceptive eye to know when information is being misrepresented with particular graphics. The main goals of the course are for students to learn how to present information efficiently and accurately so that we enhance our understanding of complex quantitative information and to become proficient with data visualization tools. Beginning with basic graphing tools, we will work our way up to constructing map visualizations and interactive graphs. This course will require a substantial amount of computation in R. No prior programming experience is necessary, but learning does require willingness and time.
Offering: Crosslisting
Grading: A-F
Credits: 1.00
Gen Ed Area: NSM-QAC, SBS-QAC
Identical With: QAC251
Prereq: None

CIS265 Bioinformatics Programming
This course is an introduction to bioinformatics and programming for students with interest in the life sciences. It introduces problem areas and conceptual frameworks in bioinformatics. The course assumes little or no prior programming experience and will introduce the fundamental concepts and mechanisms of computer programs and examples (e.g., sequence matching and manipulation, database access, output parsing, dynamic programming) frequently encountered in the field of bioinformatics.
Offering: Crosslisting
Grading: A-F
Credits: 1.00
Gen Ed Area: NSM-BIOL
Identical With: BIOL265, MB&B265, COMP113
Prereq: [MB&B181 or BIOL181]

CIS266 Bioinformatics
This course is an introduction to bioinformatics for students with interest in the life sciences. The course is similar to BIOL265 but only meets in the second half of the semester (with BIOL265) and is designed for students with programming background, ideally in Python. The course introduces problem areas and conceptual frameworks in bioinformatics and discusses programming approaches used in bioinformatics such as sequence matching and manipulation algorithms using dynamic programming, clustering analysis of gene expression data, analysis of genetic nets using Object Oriented Programming, and sequence analysis using Hidden Markov Models, Regular Expressions, and information theory.
Offering: Crosslisting
Grading: A-F
Credits: 1.00
Gen Ed Area: SBS-QAC, NSM-QAC
Identical With: QAC307
CIS310 Genomics Analysis
This course is an introduction to genomics and analysis for students with interest in life sciences. It introduces current applications of genomics techniques, covers how to build a genomics workflow, and introduces statistical analyses in R programming language. This course assumes little or no prior programming experience and will provide hands-on experience in taking raw next-generation sequencing data through a custom workflow and ending with analyses in R statistical software.
Offering: Crosslisting
Grading: A-F
Credits: 1.00
Gen Ed Area: NSM-BIOL
Identical With: BIOL310, MB&B311
Prereq: [MB&B181 or BIOL181]

CIS320 Advanced Academic Writing
This course is designed to help students master the skills needed for thesis-level academic writing. The course uses an example-driven approach emphasizing an iterative revision process, with an emphasis on expository writing skills appropriate for publishable literature. Students will be encouraged to focus on their own independent research work as subject matter of writing exercises.
Offering: Crosslisting
Grading: OPT
Credits: 1.00
Gen Ed Area: NSM-CIS
Identical With: CIS520
Prereq: None

CIS321 Special Topics in Integrative Sciences
This colloquium provides students the opportunity to discuss and present their research to their peers and mentors, as well as explore current topics of interest to the group. A key goal will be developing students' presentation skills because this is the primary means of promoting research. Faculty and peers will provide insights and advice. Mentors from the primary department or programs will also be invited.
Offering: Host
Grading: Cr/U
Credits: 0.50
Gen Ed Area: NSM-CIS
Prereq: None

CIS322 Senior Colloquium II: Integrative Sciences
This colloquium provides students the opportunity to discuss and present their research to their peers and mentors, as well as explore current topics of interest to the group. A key goal will be developing students' presentation skills because this is the primary means of promoting research. Faculty and peers will provide insights and advice. Mentors from the primary department or programs will also be invited.
Offering: Host
Grading: Cr/U
Credits: 0.50
Gen Ed Area: NSM-CIS
Prereq: None

CIS323 Bayesian Data Analysis: A Primer
This course introduces the applied principles of Bayesian statistical analysis. The Bayesian paradigm is particularly appealing in research where prior research and historical data are available on parameters of interest. This course will teach students appropriate techniques for analyzing data of this nature as well as broaden computational skills in R. The course will lay the foundation for Bayesian data analysis that students can use to further develop skills in decision making.
Offering: Crosslisting
Grading: A-F

CIS340 STEM Equity and Inclusion
This course is open to all students at Wesleyan interested in learning about equity and inclusion in STEM. A weekly seminar will provide an overview of topics related to STEM equity, including the demographics of STEM fields, relevant sociology/psychology research (implicit bias, stereotype threat, impostor syndrome, mindset, etc.), ethics, social justice, and best practices for inclusive departments and programs. Students will be required to develop and evaluate proposals for activities to increase STEM equity and inclusion at Wesleyan, using the information provided during the seminar component of the course.
Offering: Host
CIS342 Molecules to Medicine
This course will explore the process of drug development, including target selection, lead discovery using computer-based methods and combinatorial chemistry/high-throughput screening, organic synthesis, bioavailability, clinical trials, and other factors (some economics and politics) involved in bringing a drug to the marketplace. Critical consideration of the variables to contend with at each step will be described and discussed, including aspects of research ethics and patent law. The basic science of molecular recognition, computer-aided drug design, and the role of factors from synthetic chemistry to toxicology will be presented. Case studies of the development of drugs recently successful in making the journey from molecule to medicine will be discussed, as well as the story of some that did not, and why. Emerging new design strategies such as fusion-protein therapies, crisper technology, and enhanced use of rational design and combinatorial methods will be emphasized, and how pharmaceutical research is evolving in the postgenomic era, particularly with biologics. Job opportunities in the pharmaceutical industry will be discussed.
Offering: Crosslisting
Grading: A-F
Credits: 1.00
Gen Ed Area: NSM-CHEM
Identical With: BIO1342, MB&B342, CHEM342
Prereq: CHEM252 OR MB&B208
CIS375 Mass Extinctions in the Oceans: Animal Origins to Anthropocene
Geoscientists are debating whether we are living in the Anthropocene, defined as a period during which humans are having a significant effect on atmospheric, geologic, hydrologic, and biospheric earth system processes. There is considerable discussion whether we are indeed affecting the biosphere to such an extent that life on Earth will suffer an extinction similar in magnitude to these that have occurred during earth history. Studies of the fossil record provide unique evidence that is used to evaluate the large extinctions of the past and compare them to ongoing extinction processes, extinctions rates and patterns, and magnitude. Organisms with hard skeletons are most easily and most abundantly preserved in the rock record. Many of these are invertebrates that lived in the oceans (e.g., clams, sea urchins, corals). In the first part of this course, students will become familiar with the nature of the fossil record, the most common marine animals in the fossil record, and their evolution and diversification. Lectures will be combined with studying fossils. In the second part of the course, possible causes for mass extinction will be considered, together with their specific effects on environments and biota, and these predicted effects will be compared to what has been observed. Potential causes include asteroid and comet impacts, large volcanic eruptions, “hypercanes,” and “methane ocean eruptions,” and more exotic processes. Students will present in class on these topics, and we will compare rates and magnitude of environmental change with severity and patterns of extinction.
Offering: Crosslisting
Grading: A-F
Credits: 1.00
Gen Ed Area: NSM-EES
Identical With: E&ES236
Prereq: E&ES101 OR E&ES115 OR E&ES199 OR ASTR155 OR MB&B181
CIS400 Professional Development and Graduate School Preparation Seminar
The objectives of this course are (1) to build a supportive cohort that will help students sustain their goals when they enter graduate school and (2) to provide students with skills they will need to succeed in graduate school. Students will work on writing, presentation, and discussion skills. This will be done by reading classic books on writing, critiquing the ability of different figures and graphs to convey information, reading and discussing scientific papers, and giving research presentations.
Offering: Host
Grading: A-F
Credits: 0.50
Gen Ed Area: NSM-EES
Prereq: None
CIS401 Individual Tutorial, Undergraduate
Topic to be arranged in consultation with the tutor.
Offering: Host
Grading: OPT
CIS402 Individual Tutorial, Undergraduate
Topic to be arranged in consultation with the tutor.
Offering: Host
Grading: OPT
CIS411 Group Tutorial, Undergraduate
Topic to be arranged in consultation with the tutor.
Offering: Host
Grading: OPT
CIS412 Group Tutorial, Undergraduate
Topic to be arranged in consultation with the tutor.
Offering: Host
Grading: OPT
CIS420 Student Forum
Student-run group tutorial, sponsored by a faculty member and approved by the chair of a department or program.
Offering: Host
Grading: Cr/U
CIS423 Advanced Research Seminar, Undergraduate
Advanced research tutorial; project to be arranged in consultation with the tutor.
Offering: Host
Grading: OPT
CIS424 Advanced Research Seminar, Undergraduate
Advanced research tutorial; project to be arranged in consultation with the tutor.
Offering: Host
Grading: OPT
CIS492 Teaching Apprentice Tutorial
The teaching apprentice program offers undergraduate students the opportunity to assist in teaching a faculty member’s course for academic credit.
Offering: Host
Grading: OPT
CIS520 Advanced Academic Writing
This course is designed to help students master the skills needed for thesis-level academic writing. The course uses an example-driven approach emphasizing an iterative revision process, with an emphasis on expository writing skills appropriate for publishable literature. Students will be encouraged to focus on their own independent research work as subject matter of writing exercises.
Offering: Host
Grading: OPT
Credits: 1.00
Gen Ed Area: NSM-CIS
Identical With: CIS320
Prereq: None
CIS540 STEM Equity and Inclusion
This course is open to all students at Wesleyan interested in learning about equity and inclusion in STEM. A weekly seminar will provide an overview of topics related to STEM equity, including the demographics of STEM fields, relevant sociology/psychology research (implicit bias, stereotype threat,
 impostor syndrome, mindset, etc.), ethics, social justice, and best practices for inclusive departments and programs. Students will be required to develop and evaluate proposals for activities to increase STEM equity and inclusion at Wesleyan, using the information provided during the seminar component of the course.

Offering: Crosslisting
Grading: Cr/U
Credits: 0.50
Gen Ed Area: None
Identical With: CIS340
Prereq: None