# COLLEGE OF INTEGRATIVE SCIENCES

The College of Integrative Sciences (CIS) aims to equip students with the creative and quantitative skills needed to address current and emerging global challenges in science and technology. These challenges are multifaceted, requiring problemsolving approaches that integrate expertise from multiple perspectives.

The CIS promotes an interdisciplinary and integrative approach to scholarship and learning across mathematics and the life, physical, and behavioral sciences. By encouraging creative synergies among faculty and students of disparate disciplines, the CIS academic structure complements existing departments and has the flexibility to evolve with the needs of an ever-changing world.

Research is key to the CIS. With a faculty mentor, student researchers pursue inquiry-based learning that explores open questions and provides new perspectives. They develop the necessary problem-solving skills and build expertise at the frontiers of science. Through research, students are transformed from consumers into creators of knowledge.

Students interested in the CIS are advised to follow a course of study that emphasizes a core science background, achieved by pursuing a major in one of the departments or programs in natural science and mathematics (NSM). The linked major offered by the CIS combines the intellectual depth in one area (the major) with breadth achieved through courses and research in the linked major.

# **AFFILIATED FACULTY**

#### **Gloster Aaron**

BA, Oberlin College; PHD, University of Pennsylvania Associate Professor, Integrative Sciences; Associate Professor of Biology; Chair, Biology; Associate Professor, Neuroscience and Behavior

#### Elan Louis Abrell

BA, University of California, Santa Cruz; JD, University of California, Berkeley; PHD, CUNY The Graduate Center

Assistant Professor of the Practice, Science and Technology Studies; Assistant Professor of the Practice in Environmental Studies; Coordinator, Animal Studies Minor; Coordinator, Sustainability and Environmental Justice; Assistant Professor of the Practice, Integrative Sciences; Faculty Coordinator of Sustainability Environmental Justice Initiatives; Assistant Professor of the Practice, Continuing Studies

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PHD, Massachusetts Institute of Technology; SB, Brown University Assistant Professor of the Practice in Biology and CIS; Assistant Professor of the Practice, Integrative Sciences

#### David L. Beveridge

BA, College of Wooster; MAA, Wesleyan University; PHD, University of Cincinnati

Professor, Integrative Sciences, Emeritus; Co-coordinator, Molecular Biophysics; Joshua Boger University Professor of the Sciences and Mathematics, Emeritus; Research Professor of Chemistry; Visiting Researcher

#### Michael A. Calter

BS, University of Vermont; PHD, Harvard University Professor, Integrative Sciences; Professor of Chemistry; Beach Professor of Chemistry

#### Frederick M. Cohan

BS, Stanford University; PHD, Harvard University Professor, Integrative Sciences; Chair, Environmental Studies; Professor, Environmental Studies; Professor of Biology; Huffington Foundation Professor in the Bailey College of the Environment

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#### Joseph David Coolon

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BS, U.S. Coast Guard Academy; MS, Ohio State University; PHD, Wesleyan University

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#### **Meredith Hughes**

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#### Barbara Jean Juhasz

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**Vleck Professor of Computer Scienc** 

MA, Yonsei University; MPHIL, Yale University; MS, Yale University; PHD, Yale University

Assistant Professor of Psychology; Assistant Professor, Integrative Sciences

#### Tsampikos Kottos

BA, University of Crete; MS, University of Crete; PHD, University of Crete Professor, Integrative Sciences; Professor, Mathematics; Professor of Physics; Lauren B. Dachs Professor of Science and Society

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# Robert P. Lane

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#### Edward C. Moran

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Professor, Integrative Sciences; Co-Coordinator, Planetary Science; Director, Graduate Studies; Professor of Astronomy; John Monroe Van Vleck Professor of Astronomy; Director, Van Vleck Observatory; Director of Graduate Studies

#### Andrea Negrete

BA, University of Washington; MED, University of Washington; PHD, University of Virginia Assistant Professor of Psychology; Assistant Professor, Integrative Sciences

## **Brian Hale Northrop**

BA, Middlebury College; PHD, University of California, Los Angeles Professor, Integrative Sciences; Chair, Chemistry; Professor of Chemistry; E. B. Nye Professor of Chemistry

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BS, Binghamton University; PHD, Montana State University Assistant Professor, Integrative Sciences; Assistant Professor, Biology; Assistant Professor of Chemistry; Assistant Professor, Neuroscience and Behavior

#### Suzanne OConnell

BA, Oberlin College; MS, SUNY at Albany; PHD, Columbia University Professor, Integrative Sciences; Professor of Earth and Environmental Sciences; Harold T. Stearns Professor of Earth Science

# Donald B. Oliver

BS, Brandeis University; MAA, Wesleyan University; PHD, Tufts University Professor, Integrative Sciences; Chair, Molecular Biology and Biochemistry; Professor of Molecular Biology and Biochemistry; Daniel Ayres Professor of Biology

# **Rich Olson**

BA, Cornell University; PHD, Columbia University Associate Professor, Integrative Sciences; Associate Professor of Molecular Biology and Biochemistry; Coordinator, Molecular Biophysics

# Teresita Padilla-Benavides

BS, Escuela Nacional de Ciencias B; MS, Centro de Investigacion y Estu; PHD, Centro de Investigacion y Estu Assistant Professor of Molecular Biology Biochemistry; Assistant Professor, Integrative Sciences

#### Michael Perez

BA, University Texas Arlington; PHD, Texas A&M University Assistant Professor of Psychology; Assistant Professor, Integrative Sciences

#### Seth Redfield

BM, New Eng Consv Music; BS, Tufts University; MS, University of Colorado Boulder; PHD, University of Colorado Boulder

Professor, Integrative Sciences; Co-Coordinator, Planetary Science; Professor of Astronomy

#### Meng-ju Renee Sher

BA, Wesleyan University; MA, Harvard University; PHD, Harvard University Assistant Professor, Integrative Sciences; Assistant Professor, Environmental Studies; Assistant Professor of Physics

#### Colin A. Smith

BA, New York University; PHD, University of California, San Francisco Assistant Professor, Molecular Biology and Biochemistry; Assistant Professor, Integrative Sciences; Assistant Professor of Chemistry

#### Francis W. Starr

BS, Carnegie Mellon University; MS, Boston University; PHD, Boston University Professor, Molecular Biology and Biochemistry; Chair, Physics; Professor, Integrative Sciences; Professor, Design and Engineering Studies; Professor of Physics; Foss Professor of Physics

#### Brian A. Stewart

BS, Stanford University; PHD, Massachusetts Institute of Technology

Professor, Integrative Sciences; Professor, Environmental Studies; Professor of Physics

#### Erika Taylor

BS, University of Michigan; PHD, University of Illinois Urbana Professor, Integrative Sciences; Professor, Molecular Biology and Biochemistry; Professor, Environmental Studies; Professor of Chemistry; Director of the Wesleyan Mathematics and Science Scholars Program

#### Greg A. Voth

BS, Wheaton College; MS, Cornell University; PHD, Cornell University Professor, Integrative Sciences; Professor of Physics; Associate Director, College of Design and Engineering Studies

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BS, University of Sussex; PHD, University of Pennsylvania Co-Coordinator, Informatics and Modeling; Professor, Integrative Sciences; Professor of Biology

#### Sarah Wellons

AB, Princeton University; MA, Harvard University; PHD, Harvard University Assistant Professor of Astronomy; Assistant Professor, Integrative Sciences

#### T. David Westmoreland

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Associate Professor, Integrative Sciences; Associate Professor of Chemistry



#### Ellen Thomas

BS, University of Utrecht; MS, University of Utrecht; PHD, University of Utrecht Harold T. Stearns Professor of Integrative Sciences, Emerita; Smith Curator of Paleontology of the Joe Webb Peoples Museum

# FACULTY

#### Joseph David Coolon

BS, Kansas State University; PHD, Kansas State University Associate Professor, Integrative Sciences; Associate Professor of Biology; Director, College of Integrative Sciences; Director of the College of Integrative Sciences

#### Kelly M. Thayer

BA, Regis College; PHD, Wesleyan University

Associate Professor of the Practice in Integrative Sciences; Associate Professor of the Practice, National Education Equity Lab; Associate Professor of the Practice in Liberal Studies

 Undergraduate College of Integrative Sciences Major (https:// catalog.wesleyan.edu/departments/cis/ugrd-cis/)

Master of Arts in the College of Integrative Sciences (https:// catalog.wesleyan.edu/departments/cis/grad-cis-ma/)

#### **CIS101 Success in STEM Seminar**

This weekly seminar series will provide participants with tools and skills helpful in the pursuit of STEM studies, especially with introductory courses in STEM fields (biology, chemistry, physics, and mathematics). In particular, this seminar series is designed to facilitate the transition from high school academics to collegiate-level studies, and it is available only for first-year students.

Offering: Host

Grading: Cr/U Credits: 0.25 Gen Ed Area: NSM-CIS Prereq: None

#### **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

#### 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 and metacognative 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: Crosslisting Grading: Cr/U Credits: 0.50 Gen Ed Area: SBS-CIS Identical With: CSPL135 Prereq: None

#### **CIS135Z Introduction to Mindfulness**

In this retreat-style, experiential course, students delve into a set of practices meant to cultivate self-awareness, alleviate the impact of the stress response, and move attention to the present moment. During this 10-day class on contemplative practices, students will be introduced to various individual and relational techniques developed to cultivate non-judgemental attention and self-awareness in the present moment, as well as metacognitve learning strategies.

Offering: Crosslisting Grading: Cr/U Credits: 0.50 Gen Ed Area: SBS-CIS Identical With: CSPL135Z Prereq: None

#### **CIS154 Working with MATLAB**

The content of this course focuses on learning the basics of utilizing MATLAB to program and solve basic problems. We will operate on the assumption that students have no prior experience with programming. The goals of the course will be to develop algorithmic thinking, problem solving, and quantitative skills within the context of MATLAB. The course will cover essential mechanics of programming, many of which are common to all programming languages, as well as some selected advanced topics. With the expectation that students with a broad background with various motivating factors lead them to enroll in the course, students will be invited to apply the skills learned in the course to completing the culminating final project related to their specific interests.

Grading: OPT Credits: 0.50 Gen Ed Area: NSM-QAC, SBS-QAC Identical With: QAC154, IDEA154 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 see whether future ecosystems will become dominated by jellyfish, as they were 600 million years ago.

Offering: Crosslisting Grading: A-F Credits: 1.00 Gen Ed Area: NSM-EES Identical With: E&ES160, BIOL160 Prereq: None

#### **CIS170** Introduction to Mechanical 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: **Cr/U** Credits: **1.00** Gen Ed Area: **NSM-CIS** Identical With: **IDEA170**, **PHYS205** 

Prereq: None

#### **CIS170Z** 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: OPT Credits: 1.00 Gen Ed Area: NSM-CIS Identical With: IDEA170Z, PHYS170Z 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: OPT Credits: 1.00 Gen Ed Area: NSM-CIS Identical With: IDEA173 Prereq: None

#### CIS175 Introduction to Electrical Design & 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.

Offering: Crosslisting Grading: Cr/U Credits: 1.00 Gen Ed Area: NSM-CIS Identical With: IDEA175, PHYS206 Prereq: None

#### CIS185 Form and Code

This introductory survey explores practices in design and digital media through a sequence of design exercises, workshops, and hands-on projects. Advancing towards an independent final project, participants will hone their skills as makers and thinkers while developing a portfolio of original work for both print and web. While primarily concerned with visual experimentation and expression, this course exposes students to critical topics in media and design through readings, seminars and student presentations. Techniques surveyed in this course include: digital imaging and animation (Adobe Creative Cloud), creative coding (Processing), digital printing, and light fabrication.

Offering: Crosslisting Grading: OPT Credits: 1.00 Gen Ed Area: HA-CIS Identical With: IDEA185 Prereq: None

#### CIS185Z Form and Code

This introductory survey explores practices in design and digital media through a sequence of design exercises, workshops, and hands-on projects. Advancing towards an independent final project, participants will hone their skills as makers and thinkers while developing a portfolio of original work for both print and web. While primarily concerned with visual experimentation and expression, this course exposes students to critical topics in media and design through readings, seminars, and student presentations. Techniques surveyed in this course include: digital graphics, creative coding, and digital fabrication (if taught in person).

Students will require access to a personal computer and Adobe Creative Cloud. If the course runs remotely, students are responsible for locating these resources individually.

Offering: Crosslisting Grading: OPT Credits: 1.00 Gen Ed Area: NSM-CIS Identical With: IDEA185Z Prereq: None

#### **CIS210** How Things Fail: Mechanics and Materials

This lab/lecture engineering course is a foundational cornerstone of structural analysis and mechanical design. It will provide students with a theoretical and practical understanding of static equilibrium force systems, material response to loading, and analysis of failure modes for each of the fundamental types of stress and strain (axial, flexural, and torsional). These skills are vital for students from a range of disciplines, including mechanical engineering and architecture. The final project will require the design, implementation, and performance testing of an optimized structural system model, such as a truss bridge, building, or other structure.

Offering: Crosslisting Grading: A-F Credits: 1.00 Gen Ed Area: NSM-IDEA Identical With: IDEA210, PHYS210 Prereq: IDEA170 AND (PHYS111 OR PHYS113)

#### 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

#### CIS239 Proseminar: Machine Learning Methods for Audio and Video Analysis

In this course, students are introduced to machine learning techniques to analyze image, audio, and video data. The course is organized in three parts, and in each part we will first introduce how these nontraditional data can be converted into appropriate (mathematical) objects suitable for computer processing, and, particularly, for the application of machine learning techniques. Students then will learn and work with a number of machine learning algorithms and deep learning methods that are effective for image and audio analysis. We will also explore major applications of these techniques such as object detection, face recognition, image classification, audio classification, speaker detection, and speech recognition.

Offering: Crosslisting Grading: A-F Credits: 1.00 Gen Ed Area: NSM-QAC Identical With: QAC239 Prereq: COMP112 OR QAC155 OR QAC156 OR COMP1122

#### **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

#### **CIS251Z** 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: QAC251Z Prereq: None

#### CIS263 Demystifying Data: Introductory Data Analysis and Modeling

How do scientists make sense of the data they collect, especially as datasets grow in size and complexity? In this course, students will learn fundamental concepts in data collection, statistics, and modeling through hands-on analysis of publicly available datasets from the COVID-19 pandemic. We will cover the effects of biases in data collection, models of epidemic growth and spread, and the principles of studying a rapidly evolving pathogen. While we will use motivating examples from the life sciences, students can expect to learn techniques and ways of thinking that will form a foundation for evaluating and analyzing data across scientific disciplines. Students will learn the basics of using the R programming language to visualize, analyze, and model data, so no previous programming experience is expected.

Offering: Host Grading: A-F Credits: 1.00 Gen Ed Area: NSM-BIOL Identical With: BIOL263 Prereq: MB&B181 OR BIOL182

#### 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: 0.50 Gen Ed Area: NSM-BIOL Identical With: BIOL266, COMP266, MB&B266 Prereq: [MB&B181 OR BIOL181]

#### **CIS270 Systems Biology with Programming**

Systems--collections of entities that interact to form an interconnected whole-are present at every scale of organization in the life sciences. Biologists can take advantage of computational and mathematical tools to understand how these systems function and predict how they might change over time. This approach is critical in applications ranging from epidemic modeling to evolutionary theory. In this course, students will learn how simple rules and interactions can lead to complex behavior using examples from three main areas: regulatory networks, population genetics, and ecology. Students will spend the first part of the course learning how to program in Python in order to model, simulate, and visualize these systems. No previous programming experience is expected.

Offering: Crosslisting Grading: A-F Credits: 1.00 Gen Ed Area: NSM-BIOL Identical With: BIOL270 Prereq: BIOL181 OR BIOL181Z AND BIOL182 OR BIOL182Z

#### **CIS271 Systems Biology with Programming**

This course is similar to BIOL270, but only meets in the second half of the semester with BIOL270 and is designed for students with a solid background in programming in Python. Systems--collections of entities that interact to form an interconnected whole--are present at every scale of organization in the life sciences. Biologists can take advantage of computational and mathematical tools to understand how these systems function and predict how they might change over time. This approach is critical in applications ranging from epidemic modeling to evolutionary theory. In this course, students will learn how simple rules and interactions can lead to complex behavior using examples from three main areas: regulatory networks, population genetics, and ecology.

Offering: Crosslisting Grading: A-F Credits: 0.50 Gen Ed Area: NSM-BIOL Identical With: BIOL271 Prereq: BIOL181 OR BIOL1812 AND BIOL182 OR BIOL1822

#### CIS284 Data, Art, and Visual Communication

This course looks at the ways the digital arts--broadly defined--can be used to explore the intersections of research, data, design, and art. Following a creative software "bootcamp," students will execute projects intended to help them generate, manipulate, and remix data for the purposes of visual communication and art. Students will use Adobe Creative Suite and Processing, an open source programming language, and integrated development environment (IDE) built for electronic arts, new media, and visual design. In addition to working in the studio, seminars, readings, and student presentations will explore the role of data visualization, "big data," and the web in culture and society today. No prior

software knowledge or coding skills are required. Students working in STEM, humanities, and social sciences are encouraged to enroll.

Offering: Crosslisting Grading: A-F Credits: 1.00 Gen Ed Area: HA-ART Identical With: ARST484 Prereq: None

#### **CIS285 Digital Projects Lab**

This intermediate course in design engages form and process as vital lineaments in digital images, systems, and objects today. Through a series of short, handson, thematic projects, students will move past the basics of digital technique and challenge themselves to articulate how and why things appear as they do. Rather than focus on specific tools or software, assignments will straddle creative platforms and media, incorporating methods such as live signal processing, data moshing, remixing, and interaction design. Early assignments will address narrow thematic concerns while a long-term final project driven by students' own directives will be developed and executed in the second half of term. Offering: **Crosslisting** 

Grading: OPT Credits: 1.00 Gen Ed Area: HA-CIS Identical With: IDEA285 Prereq: None

#### **CIS307** Experimental Design and Causal Inference

The course provides the foundations and statistical thinking to design, collect, and analyze experimental data and introduces appropriate techniques for observational data when causal inference is the objective of the analysis. Throughout the course, we introduce and compare various experimental designs. We will discuss sample size and power calculations as well as the advantages and disadvantages of each of these designs. With observational data, we will explore difference-in-difference models, propensity score matching techniques, regression discontinuity designs. This course gives students the opportunity to develop further their computational skills as we learn how to describe, interpret, control, and draw inferences from experimental and observational data. Offering: **Crosslisting** 

Grading: A-F Credits: 1.00 Gen Ed Area: NSM-QAC, SBS-QAC Identical With: QAC307 Prereq: QAC201 OR PSYC200 OR MATH132 OR ECON300

#### **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. This course emphasizes hands-on computational methodology, bioinformatics data analysis, and interpretation of quantitative information. The primary method of evaluation is through written work and weekly homework assignments and the course will increase students skill in scientific writing and scholarship. Classes will consist of lectures, discussion groups and cloud based computational projects designed to train transferable skills in big data analysis. Lectures, labs, assignments and assessments will promote deep knowledge in genomics and informatics, gaining understanding in the scientific process, thinking analytically and critically about biological questions, and formulating original ideas and testing them with big data. Skills gained during the course will include quantitative, statistical and graphical tools, scientific writing, oral communication and deep thinking about ethics in a genomics-enabled world.

Offering: Crosslisting Grading: A-F Credits: 1.00 Gen Ed Area: NSM-BIOL Identical With: BIOL310, MB&B311 Prereq: MB&B181 OR BIOL181 OR BIOL181Z

#### **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 is a special topics course open to all Wesleyan students to explore subjects that are at the boundaries of the canonical scientific disciplines, that are complex, and that have paramount societal impact (e.g., pandemics and public health, climate change, the search for life in the universe, and artificial intelligence and automation). There are also societal issues that deeply impact and are vital for all the sciences (e.g., diversity, equity and inclusion of our communities, federal funding, and science policy). We will collectively identify one or two topics that we would like to focus on together as a class. With disciplinary humility, we will construct a syllabus that will include readings, classroom discussions, presentations, guest lectures, and writing that will integrate our knowledge, methodologies, and action across the sciences. This course is part of the CIS major, and it is expected that all senior CIS majors will be enrolled.

Offering: Host Grading: Cr/U Credits: 0.50 Gen Ed Area: NSM-CIS Prereg: None

#### **CIS322** Senior Colloquium in Integrative Sciences

This is a special colloquium course focused on skills associated with science communication and, in particular, communicating student's own research to various audiences. Given the broad benefits that research has on society, and the federal funding derived from tax-payer dollars, scientists have an ethical obligation to communicate the results of their work to various stakeholders. In addition, scientists find that communicating and discussing their work with others is an invaluable method of idea generation. Finally, sharing our work with others is fun and gratifying, particularly at the end of a large project (e.g., a thesis)! These skills transcend our particular departments and are common across STEM fields. With disciplinary humility, we will engage in skill-building using various resources available to us on campus. There will be an opportunity for students to identify skill sets that they are particularly interested in, so that they can be incorporated into the course. There will be readings, classroom discussions, presentations, guest lectures, and visits to centers on campus. This course is part of the CIS major, and it is expected that all senior CIS majors will be enrolled.

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 Credits: 0.50 Gen Ed Area: NSM-QAC, SBS-QAC Identical With: QAC323 Prereq: MATH132 OR ECON300 OR GOVT367

# CIS327 Evolutionary and Ecological Bioinformatics

Bioinformatic analysis of gene sequences and gene expression patterns has added enormously to our understanding of ecology and evolution. For example, through bioinformatic analysis of gene sequences, we can now reconstruct the evolutionary history of physiology, even though no traces of physiology exist in the fossil record. We can determine the adaptive history of one gene and all the gene's descendants. We can now construct the evolutionary tree of all of life. Bioinformatics is particularly promising for analysis of the ecology and biodiversity of microbial communities, since well over 99 percent of microorganisms cannot be cultured; our only knowledge of these organisms is through analysis of their gene sequences and gene expression patterns. For example, even when we cannot culture most of a microbial community, we can determine which metabolic pathways are of greatest significance through analysis of community-level gene expression. All these research programs are made accessible not only by breakthroughs in molecular technology but also by innovation in the design of computer algorithms. This course, team-taught by an evolutionary biologist and a computer scientist, will present how bioinformatics is revolutionizing evolutionary and ecological investigation and will present the design and construction of bioinformatic computer algorithms underlying the revolution in biology. Students will learn algorithms for reconstructing phylogeny, for sequence alignment, and for analysis of genomes, and students will have an opportunity to create their own algorithms.

Offering: Crosslisting Grading: A-F Credits: 1.00 Gen Ed Area: NSM-BIOL Identical With: BIOL327, COMP327, BIOL527, COMP527

Prereq: [BIOL182 or MB&B182] OR [BIOL196 or MBB196] OR COMP112 OR COMP211

**CIS331 Video Games as/and the Moving Image: Art, Aesthetics, and Design** Video games are a mess. As a relatively new medium available on a range of platforms and in contexts ranging from the living room to the line for the bathroom, video games make new but confusing contributions to the meaning and possibilities of the moving image. We will work to understand what games are, what they can do, and how successful games do what they do best. Students will complete game design exercises, create rapid prototypes, playtest their games, and iteratively improve their games with play and their players in mind. They will complete analyses of games and game design projects both alone and in groups and participate in studio-style critiques of one another's work. Experience with computer programming is helpful but not essential.

Offering: Crosslisting Grading: A-F Credits: 1.00 Gen Ed Area: HA-FILM Identical With: FILM331 Prereq: None

#### **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 Grading: Cr/U Credits: 0.50 Gen Ed Area: None Identical With: CIS540 Prereq: None

#### CIS350 Computational Media: Videogame Development

This course examines the interplay of art and science in the development of contemporary videogames using the Unity development platform and commercial artistic game tools. Students develop a comprehensive understanding of computational media, including legal and commercial aspects, combined with hands-on experience in a creative process that integrates design, art, and coding. There will be discussions with invited industry leaders in various subject areas. Students will have the opportunity to work as part of development teams and create working prototypes to better understand the challenges and rewards of producing graphic interactive software within a professional context. Offering: **Crosslisting** 

Grading: A-F Credits: 2.00 Gen Ed Area: NSM-IDEA Identical With: IDEA350, FILM250, COMP350 Prereq: None

#### 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&ES376 Prereq: E&ES101 OR E&ES115 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 Prereg: 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

#### CIS408 Senior Tutorial (downgraded thesis)

Downgraded Senior Thesis Tutorial - Project to be arranged in consultation with the tutor. Only enrolled in through the Honors Coordinator. Offering: Host Grading: A-F

#### **CIS409 Senior Thesis Tutorial**

Topic to be arranged in consultation with the tutor. Offering: Host Grading: OPT

#### **CIS410 Senior Thesis Tutorial**

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

#### **CIS419 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

#### 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

#### CIS465 Education in the Field, Undergraduate

Students must consult with the department and class dean in advance of undertaking education in the field for approval of the nature of the responsibilities and method of evaluation. Offering: Host Grading: A-F

#### 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

#### CIS493 Research in Science Fellowship

Wesleyan has established a credit/uncredit course, CIS 493, for students to receive .25 credit upon successful completion of a summer research experience. Summer Research Fellows conduct independent scientific research with faculty mentors in one or more departments (Archaeology, Astronomy, Biology, Chemistry, Earth and Environmental Science, Integrated Design Arts and Engineering Studies, Mathematics and Computer Science, Molecular Biology Biochemistry and Biophysics, Neuroscience and Behavior, Physics, and Psychology). To complement the research experience, this summer program also includes weekly seminars, workshops, and a closing symposium. Students must satisfy the requirements of the fellowship and complete the course assignments in order to receive credit. For more information and application instructions, please visit the College of Integrative Sciences website: https:// www.wesleyan.edu/cis/summer-program/research-fellowships.html If you have any questions, please email scienceresearch@wesleyan.edu. Offering: Host

Grading: **Cr/U** Credits: **0.25** Gen Ed Area: **None** Prereq: **None** 

#### **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** 

#### CIS549 Advanced Research Seminar, Graduate

Advanced research tutorial; project to be arranged in consultation with the tutor.

Offering: Host Grading: OPT

#### CIS550 Advanced Research Seminar, Graduate

Advanced research tutorial; project to be arranged in consultation with the tutor.

#### Offering: Host Grading: OPT

#### IDEA110 Vectors to Volumes: The Fundamentals of Digital Fabrication

This project-based course will cover the fundamentals of digital fabrication in a hands-on introduction to software-driven object making. The central concern will be process rather than concept, with a firm focus on how instead of why, as well as best safety practices. Instruction will be given in four areas sequentially, each building on the last: Vector Design & Execution, 3D Modeling & Printing, CNC Wood Routing, and CNC Metal Milling. Machine setup and best practices will be taught alongside foundational knowledge of applications such as Adobe Illustrator, Adobe Photoshop, Vectric VCarve, Autodesk Fusion360, and Ultimaker Cura. Throughout the course, there will be a consistent emphasis on fabrication methods and finishing techniques.

Offering: Host Grading: Cr/U Credits: 0.50 Gen Ed Area: HA-IDEA, NSM-IDEA Prereq: None

#### IDEA120 Ecological Design I: Being at Home in the World

Being at Home in the World is an introduction to the skills and thinking involved in the ecologically responsible creation of objects. This course is intended to provide a foundational understanding of the language of design, sources of materials, and energy systems. The studio encourages students to develop a rigorous, iterative working method to deeply analyze the nature of land and resources, explore options, and test ideas. This process of making is complemented and supported by an introduction to the history and theory of design, training with techniques and equipment, and active practice in keeping a sketchbook. Early exercises and projects in the course build familiarity and confidence with analytical drawing, making, and modeling techniques, which build toward the creation of a novel piece of design work presented at the final review.

Offering: Crosslisting Grading: A-F Credits: 1.00 Gen Ed Area: HA-ART Identical With: ARST220, ENVS232 Prereq: None

#### **IDEA154 Working with MATLAB**

The content of this course focuses on learning the basics of utilizing MATLAB to program and solve basic problems. We will operate on the assumption that students have no prior experience with programming. The goals of the course will be to develop algorithmic thinking, problem solving, and quantitative skills within the context of MATLAB. The course will cover essential mechanics of programming, many of which are common to all programming languages, as well as some selected advanced topics. With the expectation that students with a broad background with various motivating factors lead them to enroll in the course, students will be invited to apply the skills learned in the course to completing the culminating final project related to their specific interests.

Offering: Crosslisting Grading: OPT Credits: 0.50 Gen Ed Area: NSM-QAC, SBS-QAC Identical With: QAC154, CIS154 Prereq: None

#### **IDEA160** Product Design I

In this introductory product design course, students will experience basic design processes such as problem identification and possible resolutions; the use of design development and communication skills via design observation and research; iterative process and prototyping; and representation and presentation in two and three-dimensional forms. Students will explore how design can play a role in our community and how it can impact our society. Students will work both individually and collaboratively in a studio environment. Field trips to New York City fabricators, galleries, and workshops may be expected as part of this course. Offering: **Crosslisting** 

Grading: A-F Credits: 1.00 Gen Ed Area: HA-ART Identical With: ARST270 Prereq: None

#### IDEA170 Introduction to Mechanical 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: Host Grading: Cr/U Credits: 1.00 Gen Ed Area: NSM-CIS Identical With: CIS170, PHYS205 Prereg: None

#### **IDEA170Z 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: Host Grading: OPT Credits: 1.00 Gen Ed Area: NSM-CIS Identical With: CIS170Z, PHYS170Z Prereq: None

#### IDEA173 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: Host Grading: OPT Credits: 1.00 Gen Ed Area: NSM-CIS Identical With: CIS173 Prereq: None

#### **IDEA175 Introduction to Electrical Design & 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.

Offering: Host Grading: Cr/U Credits: 1.00 Gen Ed Area: NSM-CIS Identical With: CIS175, PHYS206 Prereq: None

#### **IDEA180** Design Studies

This course examines the human dimensions of engineering and design by looking at the ways artifacts are designed, produced, circulated, and used in context. Rather than a comprehensive survey of movements or paradigms in the history of design, this course employs a thematic approach to understanding the ways objects can articulate and reflect social and cultural concerns. Through a series of readings, projects, lectures, and seminars, we will study the surprising ways everyday objects influence and articulate our identities, desires, biases, and experiences.

This course is intended to support students in developing a critical toolkit for use as designers, users, consumers, and citizens. Throughout the term we will seek to challenge our assumptions about the politics of design and interrogate the ways its products mediate and are changed through human activity. We will write about and visualize these relationships, thinking critically how objects are made, what makes them relevant, and whether things have the power to change our economic, environmental, and social realities.

Offering: Host Grading: A-F Credits: 1.00 Gen Ed Area: SBS-IDEA Prereq: None

#### IDEA185 Form and Code

This introductory survey explores practices in design and digital media through a sequence of design exercises, workshops, and hands-on projects. Advancing towards an independent final project, participants will hone their skills as makers and thinkers while developing a portfolio of original work for both print and web. While primarily concerned with visual experimentation and expression, this course exposes students to critical topics in media and design through readings, seminars and student presentations. Techniques surveyed in this course include: digital imaging and animation (Adobe Creative Cloud), creative coding (Processing), digital printing, and light fabrication.

Offering: Host Grading: OPT Credits: 1.00 Gen Ed Area: HA-CIS

#### Identical With: CIS185 Prereq: None

#### IDEA185Z Form and Code

This introductory survey explores practices in design and digital media through a sequence of design exercises, workshops, and hands-on projects. Advancing towards an independent final project, participants will hone their skills as makers and thinkers while developing a portfolio of original work for both print and web. While primarily concerned with visual experimentation and expression, this course exposes students to critical topics in media and design through readings, seminars, and student presentations. Techniques surveyed in this course include: digital graphics, creative coding, and digital fabrication (if taught in person).

Students will require access to a personal computer and Adobe Creative Cloud. If the course runs remotely, students are responsible for locating these resources individually.

Offering: Host Grading: OPT Credits: 1.00 Gen Ed Area: NSM-CIS Identical With: CIS185Z Prereq: None

**IDEA186 Text & Visual Imagination: Introduction to Eco Design for Performance** Eco-scenography is an introduction to design for performance. In this course, students will learn the core principles of design for performance while exploring sustainability and environmental practices with an emphasis on understanding of materials, such as production cycle and manufacturing process, as well as integrating environmental justice paradigms by analyzing specific case studies. Through three specific project-based assignments--1. object design, 2. garment design, and 3. environmental design--students will train their visual imagination, as well as develop an aesthetic literacy and knowledge of performance design concepts and practice within eco-sustainable practices.

This course counts towards the Theater Arts category for the THEA major. Offering: **Crosslisting** Grading: **A-F** Credits: **1.00** Gen Ed Area: **HA-THEA** Identical With: **THEA185** Prereq: **None** 

#### IDEA187 From Shirtwaists to Hoodies: Fashion and Public Life

Pictured prevalently and worn close to the body, fashion is a powerful and personal means of expression and documenting public life. With a focus on the United States, this course presents a loose chronology of fashion, from the late nineteenth century to today, through a selection of themes that will allow students to consider it in terms of its social, political, economic and aesthetic impact. Through the interplay of image, clothing, and text, each week, we will explore the fashion industry from various perspectives, examining the key role makers and consumers play in constructing fashion both historically and today. Guest speakers and museum visits will enhance these perspectives. Specifically, we will question the ways we deploy dress and style to document public life, from the personal to the political, and how it informs our material and visual relationships with the world. In addition to lectures and readings discussion, class time will be allotted to students' fashion documentation projects. Fashion theory will also be introduced to ground our explorations of fashion, variously as a pictured and cultural entity, embodied practice, site of technological innovation, and tool for shaping one's identity.

Offering: Crosslisting Grading: A-F Credits: 1.00 Gen Ed Area: SBS-CSPL Identical With: CSPL187, FGSS187, SOC265 Prereq: None

#### **IDEA190 Digital Foundations**

This course introduces the foundations of digital art through contemporary artistic practice. Students will research the history of digital art and examine relationships of digital media and contemporary art. The class has a theoretical focus on machine use within the process of art making while building foundational digital skills. Projects will focus on four key areas including: Digital Imaging, 3D Modeling and Virtual Design, Time Based Media, and Digital Fabrication. Building on these four areas the course will culminate in an individualized research based final project and presentation. Through experimentation, critical analysis, critique and peer review; students will generate a unique portfolio of digital art works.

Offering: Crosslisting Grading: OPT Credits: 1.00 Gen Ed Area: HA-ART Identical With: ARST190 Prereq: None

#### **IDEA190Z Digital Foundations**

This introduction to the digital studio engages software and electronic media as an expanded field of creative production in contemporary art and design. Through a sequence of workshops, exercises, and hands-on digital projects, students will develop their critical and creative toolkits and learn to conceive, refine, and present original work. Open to all skill levels, this course prioritizes sustained and rigorous engagement with digital practice as well as conceptual and formal problem-solving.

Workshops in image manipulation, compositing, motion graphics, and visual communication will be led synchronously online by the instructor. This will be complemented with weekly online studio sessions, discussions, screenings, and reviews. Students will be provided access to all course materials using Google Drive and other digital platforms. Access to Adobe Creative Cloud software will be provided by Wesleyan, but individual licensing is also encouraged. Course assistants will offer peer mentoring and technical support in person through the DDS and online through Zoom.

Offering: Crosslisting Grading: OPT Credits: 1.00 Gen Ed Area: HA-ART Identical With: ARST190Z Prereq: None

#### IDEA200 Integrative Learning Project 1: Crafting Your Digital Identity

Wondering about how you will explain your Wesleyan experience to someone who doesn't get what it is like to attend an eclectic liberal arts institution? Worried about how your experiences at Wesleyan will translate to your postgraduate life? Want to practice talking about yourself so you are ready to enter the job market or apply for graduate school? This course is for you! Throughout the semester, you will practice writing about yourself and will ultimately place what you write in WordPress, the world's most popular platform for website design. Along the way, you will learn about user experience (UX) design principles and research methodologies, so that the website you create draws in your audience and makes them want to learn more about you. Throughout the semester, we will meet once a week to do all of these things in a relaxed, collaborative environment. Join us and bring along some friends! Offering: Crosslisting Grading: Cr/U Credits: 0.50 Gen Ed Area: None Identical With: WRCT200, RL&L250, AFAM250, CSPL200 Prereq: None

# IDEA203 The Secrets of Ancient Bones: Discovering Ancient DNA and Archaeology

New analyses of ancient DNA preserved for millennia in bones and soils have revolutionized the field of archaeology. Suddenly, archaeologists have gained new insight into human origins, past population migrations, ancient diseases, plant and animal domestication, and even the factors that contributed to the extinctions of megafauna such as woolly mammoths. Recent genetic case studies will provide a lens for learning about the archaeology of diverse world regions and time periods, from Oceania to Mesoamerica and from the Paleolithic through recent history. Topics will include: human evolution and genetic relationships between humans, Neanderthals, and Denisovans; the peopling of the globe; extinction and de-extinction; domestication and the origins of agriculture; paleodiseases and paleodiets; and ethics in genetic research. Offering: **Crosslisting** 

Grading: OPT Credits: 1.00 Gen Ed Area: SBS-ARCP Identical With: ARCP203, ENVS203, ANTH212, STS203 Prereq: None

#### IDEA204 Introduction to Archaeology

What can fragments of pottery, stones, and bones reveal about the lives of people who lived thousands or even millions of years ago? What does the archaeological record reveal about human evolution, past human diets and health, ancient socioeconomic systems, and the emergence of early cities? And how can we preserve archaeological sites and artifacts for future generations? This course will introduce students to the interdisciplinary field of archaeology. We will discuss key methods and principles that archaeologists use to study the human past while covering a survey of world prehistory from the earliest stone tools to the archaeology of contemporary material culture. Students will have the opportunity to examine real archaeological artifacts--including artifacts excavated from historic Middletown--and will be encouraged to think critically about the ways that archaeology informs our understanding of both the past and the present.

Offering: Crosslisting Grading: OPT Credits: 1.00 Gen Ed Area: SBS-ARCP Identical With: ARCP204, ANTH214, ENVS207 Prereq: None

# IDEA205 The Technological Primate: Archaeological Approaches to Ancient Technology

Humans are reliant on technology, in one form or another, for our survival. This obligate use of technology has been a characteristic of our evolutionary history for over 2.5 million years. This course will explore how technology became central to the human way of life. We will discuss both how and why our use of technology has changed through time. This includes considerations of the adaptive roles that technology plays in our evolution, how technology is shared between individuals and cultures, and the role of technology beyond the purely utilitarian. Students will learn about the ways archaeologists analyze and think about ancient technologies. This includes a wide variety of material types, including stone, ceramic, botanicals, bone, metal, and more. In this course students will have an opportunity to handle both actual archaeological materials and replicas. Offering: Crosslisting Grading: A-F Credits: 1.00 Gen Ed Area: SBS-ARCP Identical With: ARCP210, STS211, ANTH210 Prereq: None

IDEA206 Experimental Archaeology: Material Science and Past Behaviors The field of archaeology requires practical ways to move beyond modern observations of materials to the invisible behaviors that produced them in the past. Experimental archaeology generates analogical models for archaeological processes by manipulating modern materials under controlled conditions. The principles established during experiments are applied to archaeological data to reconstruct the behaviors that produced the material record. This course will consider experimental design and practice to address issues relevant at different stages of the archaeological process. This is inclusive of replication of past technologies, experimenting with natural and cultural formation processes, and addressing biases inherent in the methods used by archaeologists. The course includes hands on experimental labs with different types of material culture and critical discussions of published experiments. Students will also be tasked with designing, executing, and reporting on an archaeological experiment. Offering: Crosslisting

Grading: A-F Credits: 1.00 Gen Ed Area: NSM-ARCP Identical With: ARCP360, ANTH360, STS363 Prereq: None

#### **IDEA208** Technologies of Time

Tracking the rhythms, cycles, and ruptures of collective life is essential for studies of sociocultural and environmental dynamics. Yet such studies are mostly undertaken with the unquestioned assumption that Western apparatuses of time reckoning and historical periodization can be applied as universal and stable frames of reference for all kinds of phenomena. Temporal units of years, months, days, minutes are used, rendering insensible relations that do not align with such metrics. These simplifying moves limit our capacity to sense and understand continuity and change; they place many lives and landscapes at risk. This course draws from the social and ecological sciences, humanities, and arts to reimagine such simplifications. Through readings, creative exercises, and field trips, students are invited to notice, record, and engage with multiple temporalities of more-than-human worlds. For final projects, students will research and design speculative timekeeping devices or time machines for worlds otherwise. Offering: **Crosslisting** 

Grading: A-F Credits: 1.00 Gen Ed Area: SBS-SISP Identical With: STS208 Prereq: None

#### IDEA209 Educational Gaming Lab: Project-Based, Game-Based Pedagogy Approaches

In the past two decades, crowdfunding and renewed interest in games--board games, role-playing games, digital games, and instructional games--have created an increased and diverse gaming production, which has become the subject of several studies, articles, and projects related to all areas of education, from hard sciences to language learning and the arts. In an effort to explore how a game-informed pedagogy can work in various types of courses and to highlight analog and/or digital gaming approaches that have worked inside and outside the language classroom, this course will explore the basics of game-based learning (GBL) and discuss how games of all kinds can inform pedagogical discussions and the creation of learning materials.

Educational Gaming Lab is designed as a project-based gaming laboratory that will focus on why and how analog games can be effective tools for pedagogy. Examples will include board games, tabletop role-playing games, escape games, and puzzles. Participants will discuss the application of gaming principles to various subjects and types of classrooms; then, they will engage in a final project in which they will either adapt existing games for specific learning outcomes or create brand new educational games. The course will be conducted in English and games will be created in English.

Offering: Crosslisting Grading: OPT Credits: 1.00 Gen Ed Area: SBS-EDST Identical With: EDST210 Prereq: None

#### IDEA210 How Things Fail: Mechanics and Materials

This lab/lecture engineering course is a foundational cornerstone of structural analysis and mechanical design. It will provide students with a theoretical and practical understanding of static equilibrium force systems, material response to loading, and analysis of failure modes for each of the fundamental types of stress and strain (axial, flexural, and torsional). These skills are vital for students from a range of disciplines, including mechanical engineering and architecture. The final project will require the design, implementation, and performance testing of an optimized structural system model, such as a truss bridge, building, or other structure.

Offering: Host Grading: A-F Credits: 1.00 Gen Ed Area: NSM-IDEA Identical With: CIS210, PHYS210 Prereq: IDEA170 AND (PHYS111 OR PHYS113)

#### **IDEA211** Materials and Design Concepts for Structures

In this course we will explore how innovations in materials have inspired new forms and scales of structures in the built environment. Material discovery has influenced design, building methods, and performance of structures subjected to various forces and constraints of economy, technology, and time. Our case studies will analyze how systems built from wood, steel, concrete, masonry, and alternative materials impact people and the environment. Our inquiry into iconic structures including domes, bridges, and towers will consider structural behavior, aesthetics, and durability. Readings will provide historical context from heritage structures to recent advances in manufacturing techniques and contemporary works that are laser cut, 3D printed, or robotically assembled. Students will pursue research in an area of interest and gain hands-on experience building and testing scaled structures.

Offering: Host Grading: A-F Credits: 1.00 Gen Ed Area: NSM-IDEA Prereq: None

#### IDEA212 Metal Manufacturing Through the Ages: The Science Behind Metal and Impact of Metal in Society

Metal manufacturing has been key to societal change ever since humans first started using it, from the Bronze Age to the Iron Age to the Industrial Revolution to today. In this course, we will explore the science behind why metal is so important, from the molecular level on up. We will study heating and cooling of metals, learn how the structure of metals affects their material properties, and get hands-on experience shaping metal with a variety of processes. We will follow the lifecycle of metal from ore to raw material to finished parts, as well as how it gets recycled. Students will build engineering skills in reading phase diagrams, analyzing heat transfer setups, and understanding the material properties of a wide range of metals. Students will build machining skills both in shaping metal by hand and with modern metal shaping methods.

Offering: Host Grading: A-F Credits: 1.00 Gen Ed Area: NSM-IDEA Prereq: IDEA170

# IDEA215 Introduction to Sensors, Measurement, and Data Analysis

This course is an engineering fundamentals course supporting the Integrated Design, Engineering, Arts, and Society (IDEAS) minor. It will involve a sequence of hands-on projects that introduce students to basic measurement devices and data analysis techniques using sensors, a microprocessing platform, and computational software. The course will provide foundational knowledge of available resources and signal processing 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. Students will complete a final team project of their choice (with approval) exploring areas of interest in measurement, data analysis, machine learning or other avenues. Some previous programming experience is expected. Prior experience in IDEA175 or with Arduino, Raspberry Pi, or other physical computing platforms are preferred, but not required.

Offering: Host Grading: A-F Credits: 1.00 Gen Ed Area: NSM-CIS Prereq: None

#### IDEA221 A Thousand Years of Iteration: Design for an Uncertain Future

The climate emergency is a product of design. Centuries worth of aesthetic and industrial innovation have created extractive infrastructure, efficient machines, and disposable products that make it increasingly easy to consume energy and resources on a global scale. As new conversations about just transitions, a circular economy, and a Green New Deal have begun to proliferate among designers, the discipline's troubled relationship to notions of "progress" remains largely unquestioned.

This reading- and research-intensive studio asks students to examine this history of technology and to critically evaluate shifting theoretical perspectives on nature and human development as they relate to design. Topics will include the lifespan of buildings and products, relationships with and obligations to materials and resources, and strategies for de-growth in indigenous and vernacular design precedents. These will be studied through assigned readings and in-class discussion, a series of design exercises, and the production of a final project from materials immediately at hand in Middletown.

Offering: Crosslisting Grading: A-F Credits: 1.00 Gen Ed Area: HA-ART Identical With: ARST221, ENVS227 Prereq: None

#### **IDEA222 Fluid Mechanics: Theory and Applications**

This course focuses on the behavior of fluids under various conditions. Students will develop a framework to analyze situations involving stationary (fluid statics) or moving fluids (fluid dynamics), discover tools used to predict fluid behavior, and learn how to interpret aspects of this behavior. Homework problems and examples reviewed in-class will help students connect theory with real-world applications, particularly in the areas of mechanical, structural/civil, and aerospace engineering. At the end of this course, students should have the ability

to solve simple fluid problems and apply those solutions in complex engineering situations. Offering: Host Grading: A-F Credits: 1.00 Gen Ed Area: None Prereq: None

#### IDEA228 The Evolution of Audio in Interactive Entertainment; Creating Music with Limiting Technology

In the creative world, introducing limitations demands incredible innovation from an artist. Nowhere has this been truer than in video game audio. An entire generation has grown to hear complex worlds in just a small combination of oscillators and noise generators, and the lengths composers and sound designers went to craft those worlds is nothing short of astounding. In this course we will examine and emulate compositions which used the iconic sound architectures present in home consoles, taking us all the way from the implementation of Beethoven's Sixth Symphony in "Smurfs: Rescue in Gargamel's Castle" (1982), through David Wise's implementation of octave displacement in the NES classic "RC Pro-Am" (1988), the string of composers who all had to create homogeneous yet individualized soundtracks for the "Rockman" game series (starting in 1987), and landing in the nostalgic implementation of these architectures in the practically polar opposite games of SUDA 51: "Killer 7" (2005), "No More Heroes" (2007), and Toby Fox's "Undertale" (2015). Along the way we will cover sound design and emotional impact outside of chiptunes, one big example being the work of Akira Yamaoka in the "Silent Hill" (1999) series. This course will both serve as a survey of these games as well as contain practical projects, where you will be using tools to create work in a similar vein and where you will be presenting and dissecting the sound design of interactive entertainment which carries a particular meaning to you.

Offering: Crosslisting Grading: OPT Credits: 0.50 Gen Ed Area: HA-DDC Identical With: DDC228 Prereq: None

#### **IDEA229 Creating Audio in Interactive Worlds**

Video games have struggled with the issue of audio repetition since their inception. Human existence thrives on entropy: our experience in the world is not defined by easily repeatable sequences, but by interacting with spontaneous behaviors and stimuli. Nothing takes a player out of a virtual world faster than countless NPCs saying "I used to be an adventurer like you, but then I took an arrow to the knee." Likewise, nothing destroys the ambience of a world faster than hearing the same combination of birds and running water over the course of hours. Thankfully, contemporary game design tools can make the process of emulating the natural world both possible and fairly intuitive. In this course we will examine the nature of what it means to create an organicfeeling virtual world and then employ the audio tools in the Unity engine, along with the adaptive sound design middleware FMOD, to craft organic sonic environments which will be both adaptive and varied. We will look at both historical implementations of ambience -- such as the Myst (1994) series -as well as examine modern implementations of environmental audio. Special attention will also be paid to the theory and scholarship of audio in natural sonic environments outside of the realm of gaming, as these practices thrive when applied to virtual worlds.

Offering: Crosslisting Grading: OPT Credits: 0.50 Gen Ed Area: HA-DDC Identical With: DDC229 Prereq: None

#### IDEA233 Studies in Computer-based Modelling and Digital Fabrication

This course operates at the intersection of design and production, introducing students to digital tools critical to contemporary architecture and design. Throughout the semester, students will develop a series of projects that fluidly transition between design, representation, and fabrication with an emphasis on understanding how conceptual design interfaces with material properties. The course will offer a platform for students to research, experiment, and, ultimately, leverage the potential of digital tools toward a wide array of fields and disciplines. Students will be expected to utilize the Digital Design Studio's resources, including 3D printers, laser cutter, and 4-Axis CNC mill, as well a selection of fabrication equipment housed in the school's metal and wood shops to represent, model, and realize a series of design projects.

Offering: Crosslisting Grading: OPT Credits: 1.00 Gen Ed Area: HA-ART Identical With: ARST233 Prereq: None

#### **IDEA234** Architecture I

This course is a synthesis of fundamentals of design principles and introduction to design vocabulary, process methodologies, and craft. Emphasis is placed on developing students' ability to examine the relationship between production (the process of creating things) and expression (the conveying of ideas and meaning) involved in the making of architecture. The intent of the course is to develop students' awareness and understanding of the built environment as a result of the investigations, observations, and inquiries generated in the studio.

Offering: Crosslisting Grading: OPT Credits: 1.00 Gen Ed Area: HA-ART Identical With: ARST235 Prereq: None

#### IDEA235 Activism and Theories of Change

In this course we will explore strategies and theories of change that shape social justice movements, with particular reference to recent movements in the United States. We will discuss the benefits and risks of the many available strategies including direct action, grassroots mobilization, impact litigation, legislative campaigns, electoral campaigns, artistic protest, and public education. What strategic, ethical, or moral questions are raised by various types of protest and communications? The instructors will draw on their own experiences as activists for women's rights, queer rights, and social and economic justice. The course will be co-taught by Distinguished Visiting Professor of Public Policy Leslie Gabel-Brett and guest instructor Beverly Tillery, former Executive Director of the Anti-Violence project in NYC who will focus on the ways BIPOC and Queer BIPOC communities are reshaping the social justice landscape by addressing the safety of trans women, challenging the gender binary and reforming and ending the carceral legal system. We will allow time to apply the course concepts to events that are occurring in real time during the semester including current campus protests. The instructors are deeply committed to maintaining a safe space for inquiry and learning where divergent opinions are welcome and respected. This course will be relevant to students interested in public policy, feminism, racial justice, gender and sexuality studies, and other social sciences, and will provide useful insight for future organizers and activists, lawyers, and public policy makers.

Offering: Crosslisting Grading: OPT Credits: 1.00 Gen Ed Area: SBS-ALLB Identical With: CSPL235, FGSS236, AFAM235 Prereq: None

#### **IDEA236 Fast & Furious**

Fast and Furious is a class which explores the power of the multiple through the production of zines, posters, t-shirts, tote bags, pins and more. Beginning in the 1930s, the production of zines mainly in the sci-fi fan world became popular after the advent of the mimeograph--the first widely available duplicating machine. This way of making content was able to circumvent mainstream and institutional publishing models creating channels for more creatives to distribute their work. Today, there are even more technologies that can be used in the production of zeitgeist material. In this class, we will learn how to create with a Xerox machine, silkscreen, letterpress, polymer, and more. In each assignment we will contend with the power of quantity. What does it mean to make five of something? Ten? Fifty? One hundred? We will also experiment with format. How can a message be told through a wearable garment? How does the narrative change when it's a tote bag? And finally, we will explore the poetics of distribution. What are the artistic possibilities of a zine when it can be sent through the mail or left in a pile for the public?

Offering: Crosslisting Grading: A-F Credits: 1.00 Gen Ed Area: HA-ART Identical With: ARST236 Prereq: None

#### **IDEA243 Introduction to Graphic Design**

This course will open your mind to the world of graphic design, both past and present. You will learn how to analyze and critique design in addition to how to present your work and convey your ideas to others. You'll explore various tools available to a designer including hand skills and computer software. Computers will simply be a possible tool to help complete each project - this is not a software class. Offering: **Crosslisting** Grading: **OPT** 

Credits: **1.00** Gen Ed Area: **HA-ART** Identical With: **ARST243** Prereq: **None** 

#### IDEA246 Graphic Design: Website as Portfolio

Students will focus on the creation of an online portfolio of work as both an extension of their own practice and calling card for the world at large. Emphasis will be placed on the deployment of the site as a space for both interactive and graphic design and the development of writing about/documenting work and projects. Hard coding skills not necessary; focus will be on familiarization with user friendly sketching platforms, research organization systems, and out-of-thebox CMS for website development. Visiting artist talks will also be arranged. Offering: **Crosslisting** 

Grading: A-F Credits: 1.00 Gen Ed Area: HA-ART Identical With: ARST246 Prereq: None

#### IDEA261 Science Materials For a Malagasy Classroom

Students will design and produce a variety of educational science materials to be used in a fifth grade classroom in Madagascar. These items include a science logo, bookmarks, educational science games, posters, and a comic book with conservation themes for children. Students who are interested in design and natural history as a means through which to communicate science themes on wildlife endemism, evolution, and climate change would be appropriate for this course. All students will need to conduct independent research into science topics, distill down the salient features, and use that information to design elementary school materials. Working both individually and in teams, students will conceive, design, critique, and move into product production (MakerSpace). In addition, prototypes of the materials will be reviewed and rated by fifth graders in a Middletown elementary school for feedback.

Offering: Crosslisting Grading: A-F Credits: 1.00 Gen Ed Area: NSM-BIOL Identical With: BIOL161, ENVS261 Prereq: None

#### IDEA267 Engineering Biology: Cells and Tissues

This course explores the intersection of biology, medicine, and engineering, where scientists are developing novel platforms to promote understanding, diagnosis, and treatment of human diseases. We cover modern techniques for manipulating biological systems, spanning single molecules to ensembles of cells. We will examine the trajectory of the field from studying cells in a plastic dish to the advent of organ-on-a-chip and organoid models and discuss how this transition from 2D to 3D biology has propelled increased understanding of both normal physiological homeostasis and also the pathophysiology of disease. Topics will include controlling behavior of cells through cell-matrix interactions, learning through building via synthetic biology, and advances in regenerative medicine. These topics will be explored through the thematic lenses of transport processes (supply of nutrients and removal of waste) and mechanoreciprocity (the sensing of and response to the physical properties of the cellular microenvironment). Lectures will review fundamental concepts in cell biology and physiology before delving into topical examples from current literature. Lectures and assessments will include opportunities to develop skill in thinking analytically and critically about using engineering tools to study fundamental questions in human disease, formulating original ideas and experiments, and communicating science through written and oral formats. Offering: Crosslisting

Grading: A-F Credits: 1.00 Gen Ed Area: NSM-BIOL Identical With: BIOL267, BIOL567 Prereg: MB&B181 OR MB&B1812 AND MB&B182 OR MB&B1822

#### IDEA271 Biodegradable Design: Soft and Hairy

In this part seminar, part studio course, students will go on field trips and read extensively to develop an understanding of mycelium and how it is explored in design. We will explore temporality in design with particular focus on how biodegradable materials such as mycelium can form our experience of an object. We will study how mycelium can be utilized as a living material to form a built ecology. In particular, we will study how to design for impermanence -- sometimes using waste materials -- and develop an understanding for material recovery. Students will work both individually and collaboratively in a studio environment. Field trips to New York City museums, fabricators, and galleries, as well as around CT may be expected as part of this course.

Offering: Crosslisting Grading: A-F Credits: 1.00 Gen Ed Area: HA-ART Identical With: ARST271, ENVS271 Prereq: ARST131 OR IDEA110 OR IDEA180

# IDEA275 Introduction to Archaeological Science: Natural Science Approaches to the Human Past

While archaeology is considered by many to be a social science, natural science approaches are increasingly utilized by archaeologists to explore past environments and behaviors. Archaeological science is defined as the application of scientific techniques from biology, chemistry, geology, and other natural sciences to archaeological materials. This course will survey the different scientific techniques employed by archaeologists and highlight their utility for exploring the human past through archaeological case studies. Students will consider how the integration of natural and social science approaches produces

a more complete understanding of the archaeological record. This includes the reconstruction of climates, landscapes, diets, migrations, population interactions, production behaviors, chronologies, and more. Students will learn the basics of the archaeological applications of ancient DNA, stable isotopes, sedimentology, geochemistry, chronometric dating, 3D scanning, morphometrics, botany, zoology, and other scientific methods.

Offering: Crosslisting Grading: A-F Credits: 1.00 Gen Ed Area: NSM-ARCP Identical With: ARCP275, ANTH275, STS275 Prereq: None

#### **IDEA285** Digital Projects Lab

This intermediate course in design engages form and process as vital lineaments in digital images, systems, and objects today. Through a series of short, handson, thematic projects, students will move past the basics of digital technique and challenge themselves to articulate how and why things appear as they do. Rather than focus on specific tools or software, assignments will straddle creative platforms and media, incorporating methods such as live signal processing, data moshing, remixing, and interaction design. Early assignments will address narrow thematic concerns while a long-term final project driven by students' own directives will be developed and executed in the second half of term. Offering: Host

Grading: OPT Credits: 1.00 Gen Ed Area: HA-CIS Identical With: CIS285 Prereq: None

#### IDEA286 Introduction to Time-Based Media

This course will serve as a comprehensive introduction to time-based media in the expanded field. We will explore the ways video can transform our relationship with ourselves, others, and the material world. Through regular technical exercises, readings, and group discussions, students will gain technical facility and a critical eye for time-based art and culture. What sorts of videos do we consider "art"? In an era of selfies, live-streaming, and state-sanctioned violence (and its digital record), how might we use video as a tool of empathy and accountability? We will pursue answers to these questions through the act of making. Students will be introduced to camera operation, sound recording, and lighting, as well as video and sound editing. Screenings of historical and contemporary video art will contextualize each assignment. We will also investigate vernacular applications of video, and the medium's role beyond the studio.

Offering: Crosslisting Grading: A-F Credits: 1.00 Gen Ed Area: HA-ART Identical With: ARST286, DDC286 Prerea: None

#### IDEA289 Displaying Clothes: Fashion in the Museum

What are clothes doing in the museum and why do they attract so much public attention? This course explores fashion exhibitions in history and the practice of fashion curation today, a key component of critical cultural analysis. Part curatorial workshop, part seminar, in this class students consider issues that influence professional curatorial practices through readings, discussions, and site visits. Topics include the origins of museums, museum architecture, the ethics and cultural impact of collecting and display practices, the role of dress and textile objects in art, history, and science museums, visitor experience research, and the challenges facing museums in the twenty-first century. As a group the students will work on an exhibition project, developing its organization and design, object selection and research, and accompanying texts and label writing. Offering: **Crosslisting** 

# Grading: A-F Credits: 1.00 Gen Ed Area: SBS-CSPL Identical With: CSPL289, FGSS284, SOC279 Prereq: None

#### IDEA291 East Asian Archaeology

This course will introduce students to remarkable archaeological discoveries from East Asia, focusing on the archaeology of ancient China, but also including finds from Japan, Korea, and Mongolia. Beginning with "Peking Man" and Asia's earliest hominin inhabitants, we will explore the lives of Paleolithic hunter gatherers, the origins of domestic rice and pigs, the emergence of early villages and cities, the origins of writing, ancient ritual systems, long-distance interactions through land and maritime Silk Roads, and the archaeology of Chinese diaspora populations living in the 19th-century United States. We will also consider the current state of archaeological research in East Asia, focusing on site preservation, cultural heritage management, and the political roles of archaeology.

Offering: Crosslisting Grading: A-F Credits: 1.00 Gen Ed Area: SBS-ARCP Identical With: ARCP291, ANTH291, CEAS291, ENVS291 Prereq: None

#### **IDEA292** Interdisciplinary Project Lab

Interdisciplinary Project Lab fosters a holistic approach to engineering and design. Inviting students to reconcile vision with precision, hands-on coursework will involve a broad range of fabrication techniques, integration of systems, prototyping, and iterative design methods, culminating in a final project. The theme of this semester will be designing with light. The first half of the semester will focus on developing facility in both modeling and prototyping through digital and analog fabrication practices through a series of short, intensive design and engineering projects. Students will expand their knowledge of materials and fabrication, develop skills for effective communication through visualizations and physical objects, and evaluate the efficacy of their designs. The second half of the semester will focus on a single project, developed in groups, planned in consultation with the instructors, and developed with feedback from alllab reviews and individual desk crits. Complementing each of the lab projects, presentations and workshops will introduce the conceptual underpinnings of the course and develop requisite technical skills. IDEA292: Interdisciplinary Project Lab is a required course for all IDEAS linked major tracks in the College of Design & Engineering Studies. It may also be counted towards the IDEAS minor as an elective in most minor concentrations (see https://www.wesleyan.edu/codes/ for more information).

Offering: Host Grading: A-F Credits: 1.00 Gen Ed Area: NSM-IDEA Prereq: IDEA170 OR ARST190 OR IDEA285 OR IDEA175 OR ARST235

#### IDEA300 Integrative Learning Project 2: Website Incubator

Have you developed knowledge or expertise about a topic through an internship, engagement in a student organization, time studying abroad, or through some other experience that you would now like to share with the world? This is the class for you! Throughout out the semester, you will work to translate your experience into a website. I will help you do this by asking you to think about the content you would like to share, the audience with whom you would like to share it, and the goal you have for that audience. Ultimately, you will share your experience through WordPress, the world's most popular platform for website design. Along the way, you will learn about user experience (UX) design principles and research methodologies, so that the website you create draws in your audience and makes them want to learn more about your chosen topic. Throughout the semester, we will meet once a week to do all of these things in a relaxed, collaborative environment. Join us and bring along some friends! Offering: Crosslisting Grading: Cr/U Credits: 0.50 Gen Ed Area: None Identical With: WRCT300, RL&L350, AFAM320, CSPL300 Prereq: None

#### **IDEA301** Technologies of Time

Tracking the rhythms, cycles, and ruptures of collective life is essential for studies of sociocultural and environmental dynamics. Yet such studies are mostly undertaken with the unquestioned assumption that Western apparatuses of time reckoning and historical periodization can be applied as universal and stable frames of reference for all kinds of phenomena. Temporal units of years, months, days, minutes are used, rendering insensible relations that do not align with such metrics. These simplifying moves limit our capacity to sense and understand continuity and change; they place many lives and landscapes at risk.

This course draws from the social and ecological sciences, humanities, and arts to reimagine such simplifications. Through readings, creative exercises, and field trips, students are invited to notice, record, and engage with multiple temporalities of more-than-human worlds. For final projects, students will research and design speculative timekeeping devices or time machines for worlds otherwise.

Offering: Crosslisting Grading: A-F Credits: 1.00 Gen Ed Area: SBS-SISP Identical With: SISP208 Prereq: None

#### **IDEA305** Lighting Design for the Theater

This course will introduce students to the history, basic principles, and practical application of lighting design through lecture, discussion, demonstration, and practical application. Students will develop a deeper understanding of the methodology and applications of light in storytelling, which will help them communicate with collaborators. Students will have the opportunity to develop skills in computer drafting, lighting console programming, and script analysis for design. This course counts towards the Theater Arts category for the THEA major as a design course and towards the concentration category for the IDEAS Performance Design minor.

Offering: Crosslisting Grading: OPT Credits: 1.00 Gen Ed Area: HA-THEA Identical With: THEA305 Prereq: THEA105 OR DANC105

#### **IDEA308** Comparative Urban Policy

Cities are home to more than half of the world's population, generate more than 80% of world GDP, and are responsible for 75% of global CO2 emissions. Once viewed as minor political players with parochial concerns, they are now-individually and collectively--major players on the global stage. This course will examine how cities are coping with the major policy issues governing our lives-from waste management and public safety to energy and housing policy. We will be examining how policies differ between big cities and small cities, what cities in the global north are learning from the cities in the global south, and how cities are bypassing toxic partisan politics in their nations' capitals to form global networks promoting positive change. The class will involve local field trips and participant observation to see how some of these urban issues are playing out in the city of Middletown.

Offering: Crosslisting Grading: A-F Credits: 1.00 Gen Ed Area: SBS-GOVT Identical With: GOVT308, CEAS308, ENVS308 Prereq: None

#### IDEA311 Media and Environment: In/Sensible Worlds

In this seminar, we will examine the relationship between media technologies, sensory apparatuses, and changing environments. How do various kinds of media shape perceptions and interactions with our surroundings, multispecies ecologies, and planet Earth? How might we study the environment AS media? These seemingly simple questions matter because, like never before, media and environment co-produce who/what becomes sensible or insensible--- and, ultimately, available or not available for life. This seminar will include readings from the fields of Critical Media and Communication Studies, Feminist/ Postcolonial Science, and Technology Studies, Environmental/Digital Arts, and Humanities. Importantly, we will examine a range of creative media projects that explore ecology, environment, and earthly survival: films, games, sensors, and web projects.

Offering: Crosslisting Grading: A-F Credits: 1.00 Gen Ed Area: SBS-SISP Identical With: STS311, ENVS333 Prereq: None

#### IDEA320 Ecological Design II: Worn Out/Broken In

This course will function as a design studio that examines the afterlife of material production. While designers have traditionally focused their attention on the creation, distribution, and consumption of new products, this course asks students to carefully consider everything that follows those acts. By scrutinizing the use, care, maintenance, repair, and eventual demise of designed objects, students come to understand the intended and unintended consequences of making. Rigorous observation and research lead to the creation of analytic drawings and models for presentation at project reviews.

Offering: Crosslisting Grading: A-F Credits: 1.00 Gen Ed Area: HA-ART Identical With: ARST320, ENVS321 Prereq: ARST270 OR ARST235 OR ARST220

#### IDEA321 Wood: Building with the Forest

This studio introduces students to full-scale design and construction through the production of a single, collaborative project over the course of the semester. Working from land-based research and precedent analysis, students develop a detailed design for a structure on a specific site in Middletown, then build it together in the field. Materials will be sourced from the northern hardwood forest and the design crafted to suit its ecosystem.

Offering: Crosslisting Grading: A-F Credits: 1.50 Gen Ed Area: HA-ART Identical With: ARST321, ENVS324 Prereq: ARST270 OR ARST235 OR ARST220

#### **IDEA333 Software Engineering**

Software engineering is the application of engineering principles to the software development process. Eliciting requirements from stakeholders, designing the architecture of a program, performing usability studies, and testing a codebase are some of the aspects that elevate program development to software

engineering. Focusing on web and mobile apps, students in this course will gain expertise in state-of-the-art frontend, backend, and mobile technologies, as well as related tooling. We will also cover the collaborative organization of software projects, software licensing, software business models, and ethical considerations for professional software engineers.

Offering: Crosslisting Grading: OPT Credits: 1.00 Gen Ed Area: NSM-MATH Identical With: COMP333 Prereq: COMP211 AND COMP212

#### IDEA336 Architecture II

This course is a second-level architecture studio whose focus will be a single, intensive research and design project. As the semester progresses, additional design, representation, and production tools will be introduced and used for developing work for the project, from graphics software to the laser cutter. Additional information about the architecture studio at Wesleyan and its past projects may be found at: http://www.facebook.com/wesnorthstudio Offering: **Crosslisting** Grading: **A-F** 

Credits: 1.50 Gen Ed Area: HA-ART Identical With: ARST336 Prereq: ARST235

#### IDEA350 Computational Media: Videogame Development

This course examines the interplay of art and science in the development of contemporary videogames using the Unity development platform and commercial artistic game tools. Students develop a comprehensive understanding of computational media, including legal and commercial aspects, combined with hands-on experience in a creative process that integrates design, art, and coding. There will be discussions with invited industry leaders in various subject areas. Students will have the opportunity to work as part of development teams and create working prototypes to better understand the challenges and rewards of producing graphic interactive software within a professional context. Offering: Host

Grading: A-F Credits: 2.00 Gen Ed Area: NSM-IDEA Identical With: FILM250, COMP350, CIS350 Prereq: None

#### IDEA351 Videogame Architecture and Programming in Unity

Game Architecture and Programming in Unity centers around software design efficiencies and their application to real-time simulation and related interactive media. Students develop working prototypes with the Unity game engine, learn C# programming, and learn to appreciate the efficiencies of different software architectures and project structures. This class is intended to strengthen student knowledge and help bridge to classes such as Wesleyan's existing IDEA350/ COMP350 offering each Spring. By offering more comprehensive training in development platforms, as well as practical experience in technologies that accompany base programming when creating interactive media, students will have a deeper understanding of ways to develop ideas by better understanding the creative tools available. Examples of topics to be covered will include: entitycomponent vs. inheritance systems, singletons and Unity alternatives, and Scene workflows. Digital Artists will learn to integrate visual design programs such as Blender into the Unity platform as well.

Offering: Host Grading: A-F Credits: 1.00 Gen Ed Area: NSM-IDEA Prereq: None

# **IDEA353** Robotics

Students will use hands-on projects, building and programming Arduino-based robots to learn about the field of robotics. Topics will include perception, locomotion, localization, common programming frameworks for robotics, and ethical considerations. Some background in electronics and mechanical construction may be helpful but is not required.

Offering: Crosslisting Grading: OPT Credits: 1.00 Gen Ed Area: NSM-MATH Identical With: COMP353 Prereq: COMP211

#### **IDEA359 Space Design for Performance**

In this course, students will study, construct, and deconstruct the performative space, whether in the theater or site-based, by analyzing the space as a context to be activated by the body of the performer and witnessed by an audience. Through practical assignments, the class will learn the aesthetic history of the theatrical event (considering plays, rituals, street parades, and digital performances, among others), while developing and discovering the student's own creative process (visual, kinetic, textual, etc.). Students will be guided through each step of the design process, including close reading, concept development, visual research, renderings or drawings, model making and drafting.

In this course, special emphasis is given to contemporary performance as a mode of understanding cultural processes as a relational system of engagement within our ecosystem, while looking at environmental and sustainable design, materials, and the environmental impacts of processing. Students will create and design performance spaces, while realizing scale models and drawings and integrating the notions of design and environmental principles and elements.

Students will have the opportunity to develop skills using 3D-drafting and 3D-modeling software.

This course counts towards the Theater Arts category for the THEA major. Offering: Crosslisting Grading: OPT Credits: 1.00 Gen Ed Area: HA-THEA Identical With: THEA359, DANC359, ENVS359 Prereq: THEA105 OR THEA150 OR THEA185 OR ARST131 OR ARST190

#### IDEA360 Media for Performance

This course examines the use of media and technology as it relates to dramaturgy and design for performance. Class time will be used for lecture, discussion, and experimentation, during which we will explore new technologies used in the industry, including projections, motion tracking, and software such as After Effects and Isadora. Throughout the semester, students will use the skills learned to create their own digital performances.

Offering: Crosslisting Grading: OPT Credits: 1.00 Gen Ed Area: HA-THEA Identical With: THEA360, DANC364 Prereq: None

#### **IDEA370 Beyond Product: Regenerative Design**

This course builds on the exploration and knowledge learned in Product Design I to discover opportunities for systems thinking in design. Students will study challenges and opportunities related to aging, education, food, and mobility to investigate potential opportunities through the lens of regenerative design. The course will support students in developing digital modeling skills as well as rapid prototyping and fabrication techniques. Students will work both individually and collaboratively in a studio environment. Field trips to New York City design ateliers, fabricators, and workshops may be expected as part of this course. Offering: **Crosslisting** 

Grading: A-F Credits: 1.00 Gen Ed Area: HA-ART Identical With: ARST370 Prereq: ARST270 OR ARST235 OR ARST220

#### IDEA375 Modeling the Earth and Environment

Models can provide insights into Earth systems that are difficult to obtain by direct experimentation or observation. This course will introduce students to the process of translating Earth systems into idealized mathematical models, specific methods for solving the resulting equations, and implementation of models in MATLAB. We will explore cases from a range of topics in the earth and environmental sciences to gain a better appreciation of the insights models can offer. Students should have MATLAB installed on a laptop computer for in-class work.

Offering: Crosslisting Grading: OPT Credits: 1.00 Gen Ed Area: NSM-EES Identical With: E&ES375, E&ES575 Prereq: MATH120 OR MATH121

#### IDEA383 Introduction to Costume Design for Performance

This course is an exploration of costume design concepts for contemporary performance including theater and other genres. The class will include beginning elements of costume design, including character/script analysis, research, costume lists, action charts, visual design concepts and techniques, and collage and drawing skills.

This course counts towards the Theater Arts category for the THEA major. Offering: Crosslisting Grading: OPT Credits: 1.00 Gen Ed Area: HA-THEA Identical With: THEA383 Prereq: THEA105 OR THEA185 OR ARST131 OR ARST445

#### IDEA387 Virtual Production: The Music Video

This intensive studio course will explore the breadth and depth of the music video genre. Students will learn advanced post-production, motion capture, and video recording techniques. Class sessions will include technical demonstrations, group discussions, and conversations with practitioners in the field. Readings and screenings will examine the relationship between music videos, technology, contemporary art, and popular culture. Students will learn how to use the 3D motion capture studio and record live musical performances. Software will include Adobe AfterEffects, Blender, and DaVinci Resolve. Through weekly exercises and a final independent project, students will learn to work collaboratively and develop a distinct creative voice. The course will culminate with a final music video project, to be screened at the end of the semester. Previous experience in Adobe Premiere Pro software is required. Preference will be given to students who have successfully completed ARST 286, ARST 386,

# DDC 108, or DDC 448. All students must be concurrently enrolled in the virtual

production lab which meets Fridays 1:20 p.m. - 3:20 p.m. in DDC.

Offering: Crosslisting Grading: A-F Credits: 1.00 Gen Ed Area: HA-ART Identical With: ARST387, DDC387

Prereq: None

# IDEA401 Individual Tutorial, Undergraduate

Topic to be arranged in consultation with the tutor. Offering: **Host** Grading: **OPT** 

# IDEA402 Individual Tutorial, Undergraduate

Topic to be arranged in consultation with the tutor. Offering: **Host** Grading: **OPT** 

# IDEA409 Senior Thesis Tutorial

Topic to be arranged in consultation with the tutor. Offering: Host Grading: A-F

# IDEA410 Senior Thesis Tutorial

Topic to be arranged in consultation with the tutor. Offering: Host Grading: A-F

# IDEA411 Group Tutorial, Undergraduate

Topic to be arranged in consultation with the tutor. Offering: Host Grading: OPT

# IDEA419 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

# IDEA420 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

# **IDEA424 Advanced Research Seminar, Undergraduate** Advanced research tutorial, project to be arranged in consultation with the tutor.

Offering: Host Grading: OPT

# IDEA429 Senior Thesis Tutorial

Offering: Host Grading: OPT

# IDEA491 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

# IDEA492 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