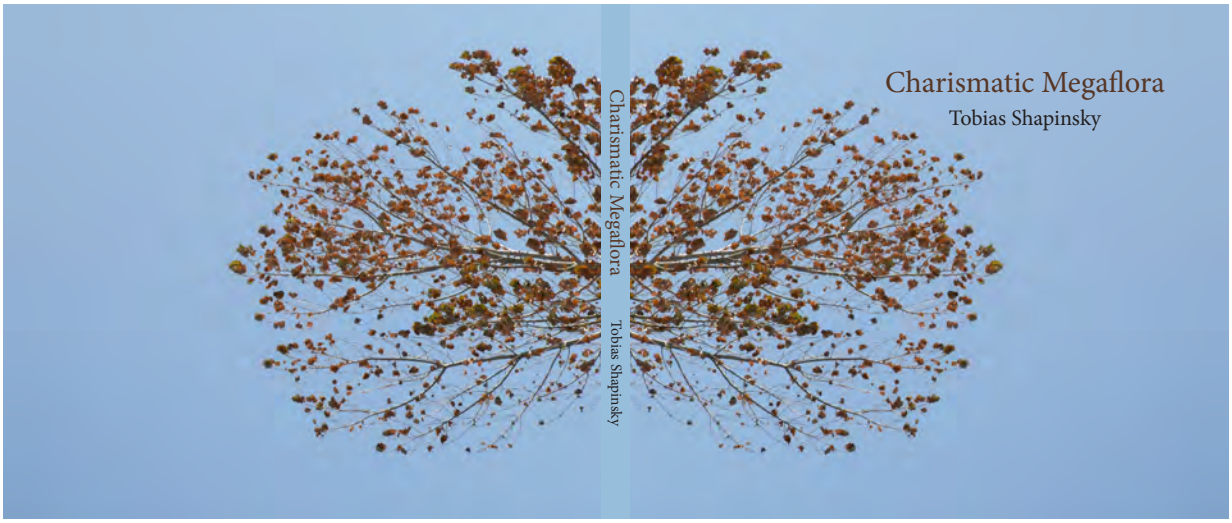
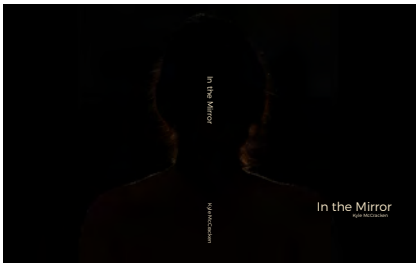
Advanced Digital Photography

AHSE3130 Fall 2024 4, Credits AHSE

with Professor Helen Donis-Keller





In this course participants will create a body of work (i.e., a number of images) based on a self-selected theme and create a photography book as the final deliverable. The project will be well scaffolded with creative image assignments on 1) the idea of visual narrative, 2) critically considering a group of existing photography books, 3) design thinking and doing in book design 4) considering the handmade book versus a professional produced book by companies such as Blurb. Cameras and associated photography equipment and printing capability are supplied as part of the course. It is assumed that participants have some experience with digital photography. Please contact HDK if you have questions (helen.donis-keller@Olin.edu).

Activities include:

- Creative image assignments as warmups for your major project
- Creating a body of work based on a self-determined theme
- Exploring the concept of a personal photography book
- Design and produce your own handmade or professionally printed photography book
- Gallery exhibition of your final project
- On location photography field trip
- Gallery or museum field trip

College as a Living Lab: Building Energy & Operations Optimization
Fall 2024 & Spring 2025

Instructors

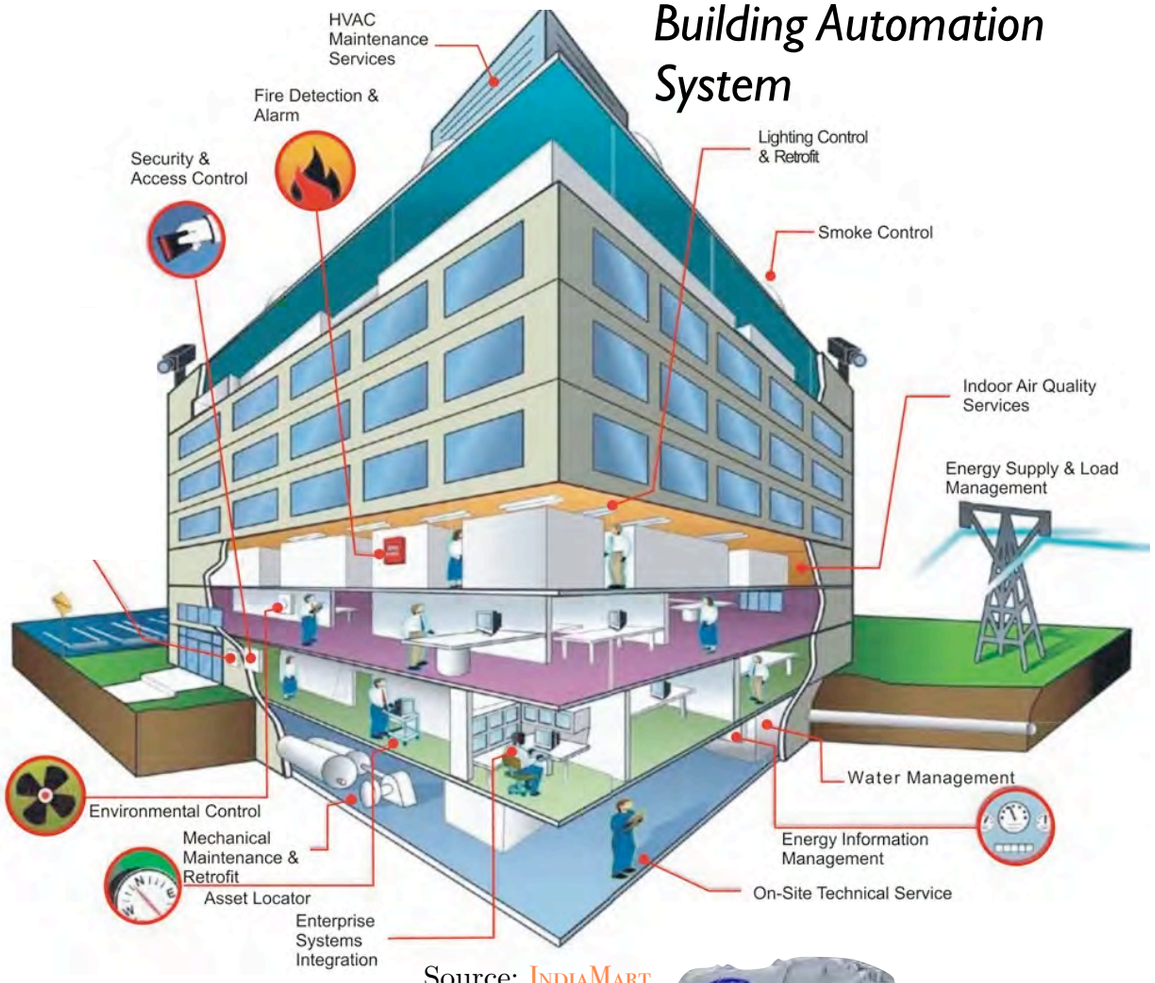
- Victoria Dean | Claire Rodgers | David Shuman | Alessandra Ferzoco (tentative)

Did You Know

- In 2019, natural gas and electricity for Olin's campus made up 58.7% of Olin's measured greenhouse gas emissions (see Climate Action Plan)
- Heating, ventilation, and air conditioning (HVAC) make up a large part of this on-campus usage
- Olin has several years of HVAC data for our buildings [~737M data points across 601 pieces of hardware and 5 years], and we continue to collect such data every 15 minutes

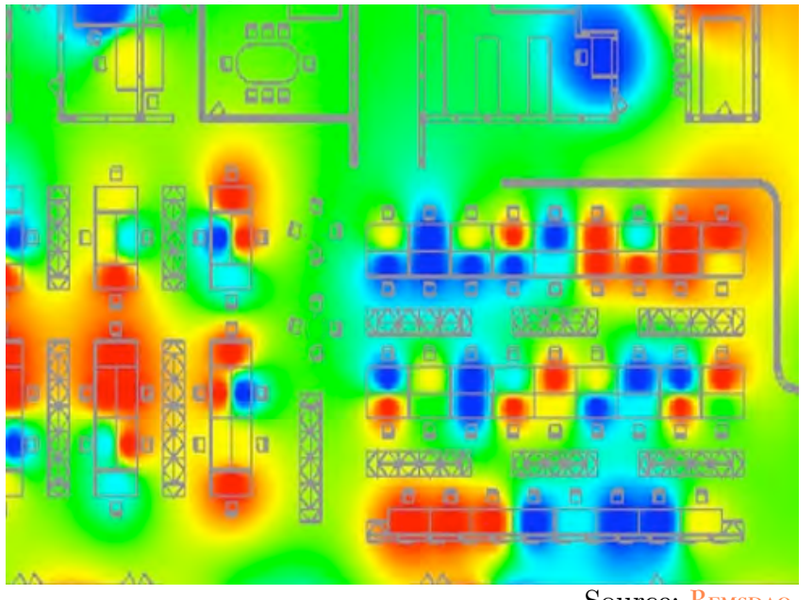
Course Description

This impact-centered learning experience is aimed at improving Olin's building automation and HVAC systems through projects around fault detection and energy efficiency. Throughout the year, groups will work on sub-projects with different topics/goals, including visualization and interpretation of campus data, machine learning on campus data, thermal modeling of campus buildings, software infrastructure to get data on and off of the HVAC control servers, and more. We intend to collaborate with Franklin Cummings Tech Prof. John Terasconi and some students from FCTech's Building Energy Management program.



Source: IndiaMart

"Heat" Map



Source: Remsdaq

Prerequisites

Any one of the following:

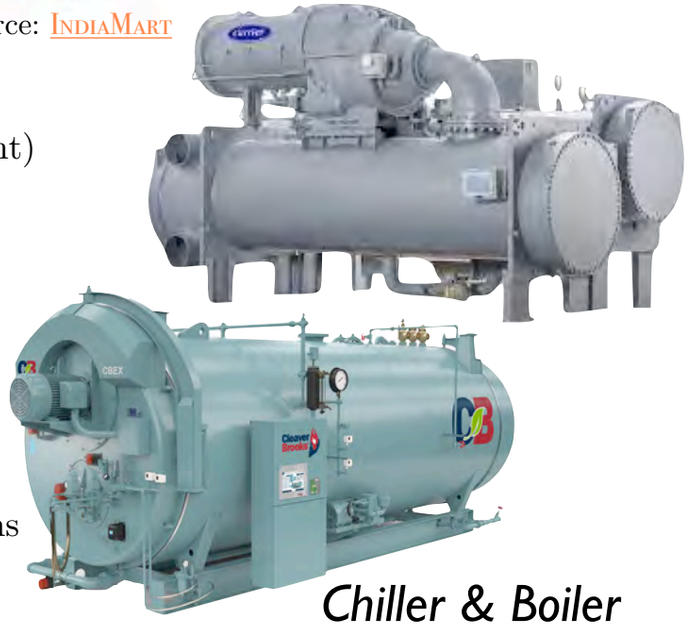
- Intro to Thermal-Fluid Systems (or equivalent)
- Machine Learning, Data Science, or NeuroTech (or equivalent)
- SoftSys

Registration Details

- You are encouraged but not required to take both semesters
- 4 ENGR credits each semester (tentative)
- Counts as an elective for E:Sustainability, E:Robotics, E:Computing, MechE, E:Design
- Counts as a designated alternative for Thermal-Fluid Systems Analysis

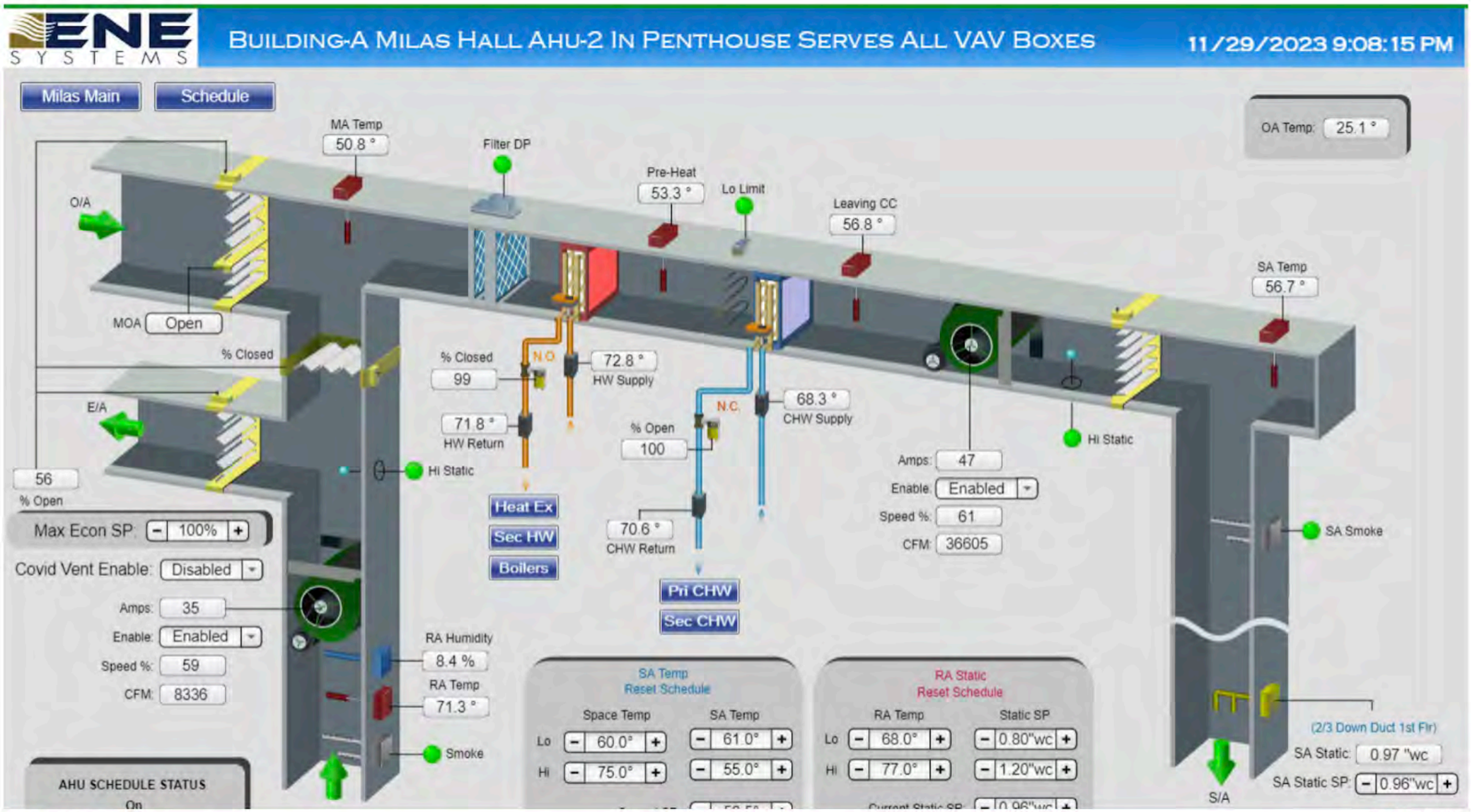
Questions?

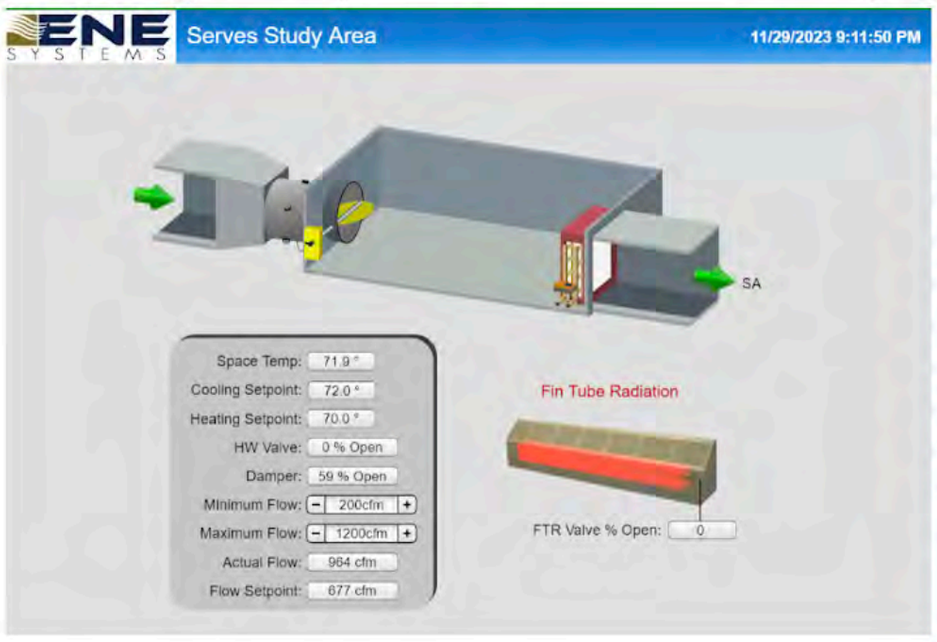
See Prof. Victoria Dean or email vdean@olin.edu



Chiller & Boiler

Live Building Operation Dashboard





Semester: Fall 2024
Credits: 4 ENGR
Level: Intermediate Design Elective
Location: MassArt (and Olin)
Time: Wed 3-8 PM

Thoughtful Objects: Form to Fire

This intermediate design elective explores fabrication through a collaboration with the Fine Arts 3D and Industrial Design departments at MassArt. Students from all three disciplines will work together using the MassArt metal foundry and hot glass shop in combination with CAD modeling and 3D printing as tools for experimentation and production exploring their creative potential. Emphasis is on the development of new processes that combine iterative form development with digital fabrication and studio production techniques. Students will meet at MassArt on Wednesdays from 3:00-8:00 PM. Transportation costs will be covered by the course, and students do not need access to a car to participate, although it helps.

Can be used in E:Design concentrations (not Design Depth).

Introduction to Thermal-Fluid Systems

Alessandra Ferzoco, aferzoco@olin.edu

Catalog Description

This course covers the fundamental principles of thermodynamics, heat transfer, and fluid flow as applied to engineering systems. It provides a foundation in fundamental thermodynamic phenomena, including the first and second laws of thermodynamics for closed systems, thermodynamic properties, and equations of state in ideal gases and incompressible fluids. Topics in heat transfer include conduction, convection, and resistance networks, with an emphasis on thermal modeling. Topics in fluid flow include pipe flow networks, inviscid flows, and basic aerodynamics. Students will predict the behavior of engineered systems, develop tools and skills in measuring system properties, and develop curiosity about thermal-fluid phenomena in everyday life.

Why I love teaching this subject

I love that the subjects covered in this course are simultaneously essential, abstract, and measurable. Energy flows govern climate change and the machines that make it happen. The two quantities that dictate what can happen (energy) and what will happen (entropy) are basically impossible to define. Yet those quantities are measurable, most often using temperature as a proxy, a wonderfully common and also difficult-to-define quantity.

There is an HVAC course running next fall. I think it could be fun to connect intro thermal-fluids to what is happening in that course. Plans for what that looks like is still unfolding, and if you have thoughts about it, please drop a note in the next envelope over or send me an email. Thanks!

Technology, Accessibility, and Design

Paul Ruvolo

Quick Info

Counts as a Design Depth

Lots of guest speakers

> 50% of the course is project-based

Projects cater to all majors

Technology is a double-edged sword. It can empower and it can disable. In TAD, we learn how to bring about a more accessible and inclusive world through two key threads.

- Learning about the social, historical, and political context of disability from an incredible set of guest speakers and readings.
- Partnering with folks from the disabled community to work on the projects that *they* view as most important.

We used ethnographic methods to understand the experience of someone cooking who is blind.

We took a field trip to the Carroll Center for the Blind's woodshop, which is designed to be used non-visually.

We learned about the accessibility of the visual arts for blind folks.

We partnered with Carmen Papaglia (a non-visual artist) to create Loud Cane 2.0

We designed adaptive solutions for Needham elementary students

We worked with Keyona Aviles of Inspired Relief to design an app to foster better mental health for BIPOC folks.

We worked with Charlie Croteau to design an on-road / off-road power wheelchair.

Perkins SCHOOL FOR THE BLIND

We created accessible data visualizations for Perkins Howe Innovation Center, which were featured in TechCrunch and Forbes.

Scan to read an article about TAD!

Mixed Methods Product Evaluation

Sarah Bloomer, Design Professor (and seasoned UX practitioner)

Fall 2024

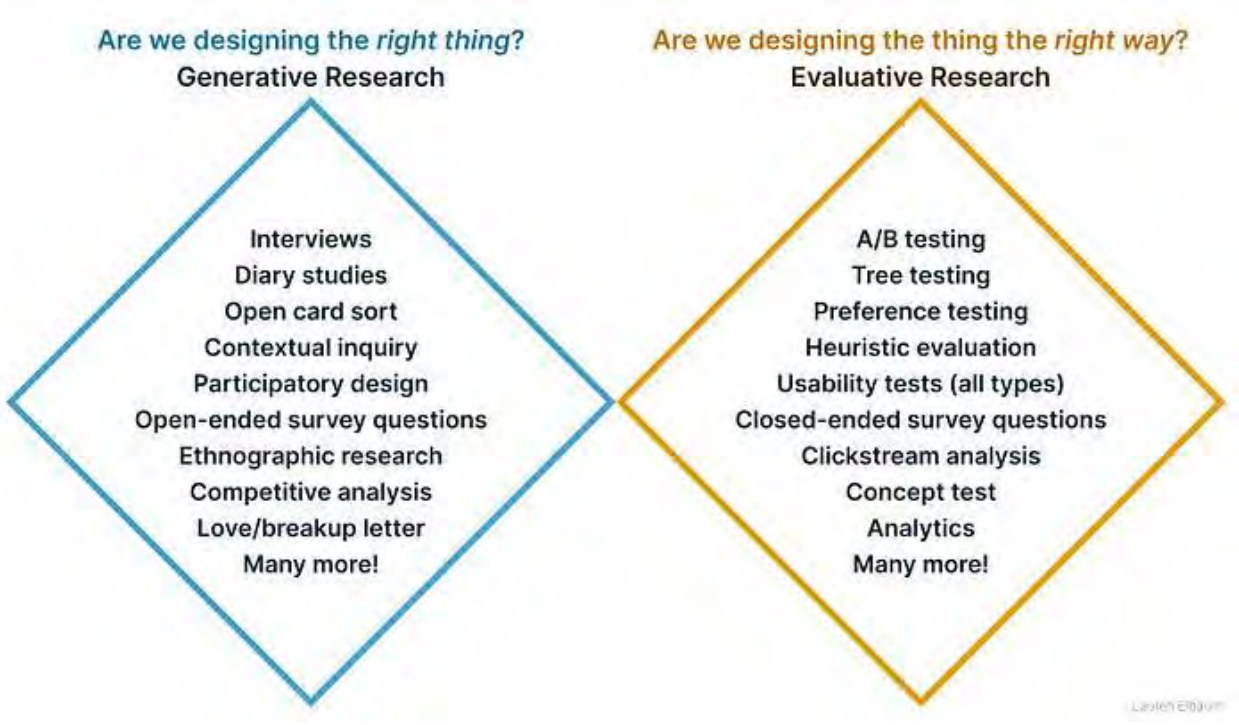
Product Design, User Experience Design, UX Research, Product Strategy, Design Research

For students interested in **product research, product strategy, UX research** or **UX design.** This course provides hands-on experience with qualitative and quantitative methods, and brings in practitioners as speakers. In 2024 projects will be sourced beforehand to make sure we can get enough users to engage in meaningful research.

Overall, students learn:

- Write user research test plans – using both qualitative and quantitative methods
- Implement test plans
- Analyze results and make recommendations
- Communicate those results; practice creating clear communications
- Work with real companies to evaluate their products or services
- Speakers: Industry practitioners and leading UX practitioners

There are two types of UX research: Generative and Evaluative.



Medium: Generative v.s. evaluative UX research methods

Evaluation is fundamental to designing successful products. Targeting existing product, evaluation answers the question: can people use the thing (app, site, product, service etc). Today's product design teams capture both **qualitative** and **quantitative** data are often used together to inform ongoing product design and product strategy.

This course focuses on evaluating existing products to answer questions such as:

- How easy is the product to learn and use?
- Where are the problem areas in the product design?
- Do the features work as expected? Do they work in the context of use?
- Do they work for all target users?
- How might I improve the user experience of an existing product?

ENGR 3299A Special Topics in Design: Design Optimization
Instructor: Jesse Austin-Breneman
Credits: 4 ENGR, **Hours:** 4-0-8
Prerequisite: ENGR 2250 CD

*This course can be used as a **design depth.*** With permission of instructor, it can be used to satisfy the **ME elective** requirement if not used as a design depth course.

Course Description

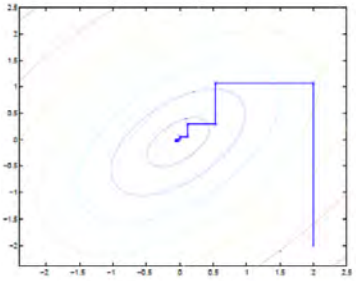
Want to design not just a good system, but the best system? Well then, this course is for you! This course introduces you to the mathematical modeling, optimization theory, and computational methods needed for analytical and simulation-based optimal system design. This will be done in the context of a final project optimizing the design of a system of your choice. Ever wondered what is the best combination of Mario Kart kart attributes or what the powertrain of the most efficient electric vehicle looks like? Turns out you can use the same techniques to answer both questions. Sessions will focus on learning new modeling techniques, such as regressions or kriging, and new optimization algorithms, from gradient descent to particle swarm. We will then apply them to your system to iterate towards an optimal solution.

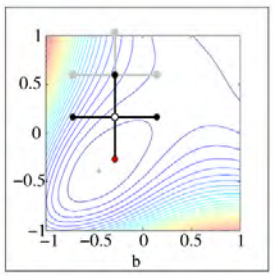
After taking this course you should be able to …

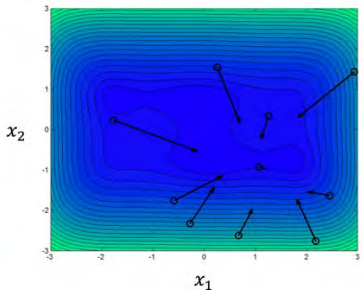
- Formulate design optimization problems from real-world situations
- Develop and apply the appropriate optimization algorithm to solve your formulation
- Articulate and motivate your modeling and optimization choices
- Efficiently iterate on this flyer to get closer to the optimal flyer since this one is clearly sub-optimal

Why you should take this course …

- You want to be able to visualize and understand trade-offs when designing the complex non-linear systems common in actual engineering problems
- You want to make good design decisions, well at least better than a random walk through a really large design space, and you're not sure how
- You've always wondered exactly how does Chat-GPT really works?
- You want to take it to the max and be able to prove it
- You want to be the very best, like no one ever was







Extraordinary Tools in Computing

What is this course about?

In a nutshell, this course is about the **discovery, understanding, and application** of **effective computing tools** for **software engineering**. This means:

- **Discovery**: finding new tools that help you do useful work.
- **Understanding**: learning the mental models or theory behind how these tools work, and how they are effective.
- **Application**: using the tools to achieve important tasks in software engineering.
- **Effective for software engineering**: what tasks are important when designing and developing software.

What should I know about this course?

This course is a **computing elective** for **2 or 4 credits**, depending on course survey data.

To take this course, you need:

- ENGR 2510 (Software Design) or instructor permission
- A Linux setup - probably Ubuntu 24.04. Dual boot/WSL/VM should all be fine.

What will we learn, specifically?

- Bash scripting (hone your command-line skills)
- Automation/continuous integration with GitHub Actions
- Advanced Git usage
- Configuration management and Ansible (set up your machine in a snap)
- Containers and Docker (run lightweight applications in a customizable environment)
- Cloud resources and AWS
- Infrastructure as Code and Terraform (maintainable, automated infrastructure)

How will I be graded?

Grading is likely based on a weighted combination of:

- Readings and quizzes about the material.
- Weekly assignments in learning and using the tools we cover.
- A semester-end project exploring a tool/concept interesting to you.

Is there any more information about this course?

Check out our GitHub from last year: https://github.com/olincollege/xtc-2023-03

Longer-term Software Development

What is this course about?

In short, it's about **learning and practicing** a **process** for developing software that **lasts**. This means **sustainable software** that can continue to be useful even as its requirements, users, or underlying technologies change.

What this means:

- **Learning and practicing**: Learn the concepts and terminology in different parts of the "generally accepted" software engineering process and use it on your project.
- **Process**: Think about how all of these pieces fit together when developing software.
- **Lasts**: Write software that will continue to be useful, even after you rotate off a project and others rotate on.

What should I know about this course?

This course is a **computing elective** for **2 or 4 credits**, depending on course survey data.

To take this course, you need:

- ENGR 2510 (Software Design)
- **Instructor permission - no exceptions (see next point).**
- An **existing software project** to work on in the course. This can be for SCOPE, research, a project team, a club, or a developed personal project.
- A Linux setup - to support development of your project above.

What will we learn, specifically?

- Documentation (types of technical documentation, and what to include in each)
- Requirements (connect real needs and metrics to your software's features)
- Architecture (how software components connect to each other and users)
- API Design (how to sketch out and design software interfaces)
- Code review (look at proposed changes and provide useful feedback to co-workers)
- Testing (define what it means for your software to operate correctly)

How will I be graded?

A weighted average of readings and quizzes, small practice assignments, evidence of applying these practices on your projects, and participation/engagement.

AND ENTREPRENEURSHIP

ENGR 3290 - Olin College – **DESIGN DEPTH**
ENGR 4290 - Olin College – **CAPSTONE**
EPS 4515 - Babson College

Offered: Fall, Spring
Prerequisites: ENGR 2250 for Olin Students; Junior or Senior standing

MISSION

Inspire and educate students to work with people in communities to address challenges endemic to contexts of injustice through design and entrepreneurship.

COURSE DESCRIPTION

This course engages students in community-based, participatory design and action. Teams partner with communities and organizations to achieve positive social and environmental impact with a strong justice framing, working for change in areas like air quality, community development, food processing, global health, and just energy over several semesters.

Guided by an experienced faculty advisor, teams make change through design for impact, social entrepreneurship, community organizing, participatory research, political advocacy and other practices. Teams work using theories of change, assumption testing, power analysis, dissemination of innovation, and ethical norms. Students regularly engage primary parties in inclusive processes, in person and virtually, to observe, strategize, plan, co-design, prototype, test, and implement approaches supported by a significant project budget. There are often opportunities to travel locally, nationally, or internationally to work with partners. Students are exposed to mindsets and dispositions for working with integrity and responsibility in their primary-party contexts through guided exercises, case studies, guest speakers, readings, and reflections. Students learn and apply changemaking practices through project work, and gain essential experience building relationships across difference and developing their own self- and cultural awareness.

LEARNING OBJECTIVES

1. Identify principles and examples of practices that are primary-party-centric, participatory, community-based, and accountable to communities and collaborators.
2. Engage across differences and power imbalances to build trust and productive working relationships with primary parties and collaborators.
3. Reflect on personal and professional obligations and identity development in ways that connect course activities with longer-term life and career goals.
4. Articulate and iterate a theory of change for working for justice in a specific context.
5. Test assumptions that underlie a theory of change in order to help determine how to advance and de-risk a project.
6. Engage in design and strategy development to create or evolve a plan to ensure the sustainability of a project.
7. Take responsibility for and apply a diverse set of practices that foster team health.

AFFORDABLE DESIGN AND ENTREPRENEURSHIP

ADE TRACKS

There are 5 tracks in ADE with a team working in each area. All teams share broader change-making practices, including theory of change, assumption testing, power analysis, dissemination of innovation methods, and ethical norms. And each team has its own particular practices for making change, which are typically a combination of community organizing, public policy advocacy, participatory research, design for impact, and social venturing.

Air Quality — Massachusetts

Reducing the burden of air pollution in near-source communities by building awareness and capacity for agency.

Community Development — Miss, Mass

Creating equitable access to hands-on learning for 9-15 year-olds that build self-confidence, invite creative self-expression, and inspire community action, catalyzing cycles of success to disrupt structural exclusion

Food Processing — Ghana

Creating mini post-harvest processing machines accessible to women to reduce gender inequality, increase local food security, reduce burden, and grow small businesses.

Global Health — Americas

Increasing early access to hearing screening devices to enhance immediate well-being of children and improve their overall life outcomes.

Just Energy — Mass, United States

Enabling community-based renewable energy and supporting energy-related autonomy for Indigenous peoples through Just Transition principles.

Affordable Design and Entrepreneurship

New Track!

Just Energy

Image from Sacred Earth Solar

Level: Design Depth, Engineering Capstone

Advisor: Chhavi Goenka

ADE: Just Energy

Energy from fossil fuels is inherently unjust; it is an extractive model that aggregates benefits to the economically advantaged while externalizing costs (cultural, health, environmental) to the politically disenfranchised. We define "Just Energy" as renewable energy captured and stored through processes that feed and grow the Climate Justice Alliance outcomes: re-localized wealth, democratic governance over community resources and work life; ecological and social well-being for communities; and a caring and sacred world view.

We aspire to create a renewed relationship to energy by design–one that integrates justice and technical considerations to create equitable access while addressing the economic, environmental, and ecological processes involved. We will build relationships with Indigenous communities, co-create the project, and build technologies around renewable energy to address community needs including energy-related autonomy. We will need a range of technical skills, from ME to ECE to Design, to transition to community-based renewable energy.

Robotics Systems Integration (**RoboSys**) Fall 2024

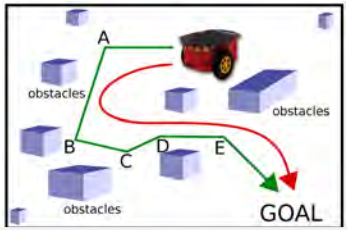
Course Theme:

Robotics for **Sustainable Agriculture**

Learn & apply these in a **real-world context** at a local farm:

Agricultural & Food Systems

Mechatronics (ME+ECE) System Design



Robotics algorithms: Planning, Localization, etc.

AI (computer vision) applications in Ag

- **Field trips** to local farms, AgTech companies
- **Guest lectures** from sustainable Ag experts

- **Prereqs:** FunRobo *OR* CompRobo
- **Serves as**: ECE & ME elective + Core E:Robo


SEED PLANTING
DRONES


SEA TO SKY FARM
SANTA CRUZ, CA


LASERWEEDING
NO CHEMICALS.
NO TILL.
NO WEEDS.
CARBON ROBOTICS

Applied Computational Fluid Dynamics

ENGR3399: Special Topics in Mechanical Engineering

Professor David Barrett

Computational fluid dynamics (CFD) aims to analyze and solve fluid dynamics problems within a variety of practical contexts. In particular, CFD approximately solves the mathematical models in fluid mechanics using numerical solution of the Navier-Stokes equation with computer modeling software.

In this new course you will use CFD modeling software to leverage the computational power of your computer, completing calculations that would otherwise be impossible to do by hand. You will also generate clear visual representations of your solutions to both understand the flow around and to optimize the fluid design of a particular device or vehicle. To ensure that your solutions accurately represent reality, we will start by re-solving classically complete fluid dynamics problems with CFD tools and cross-check both against validated experimental data.

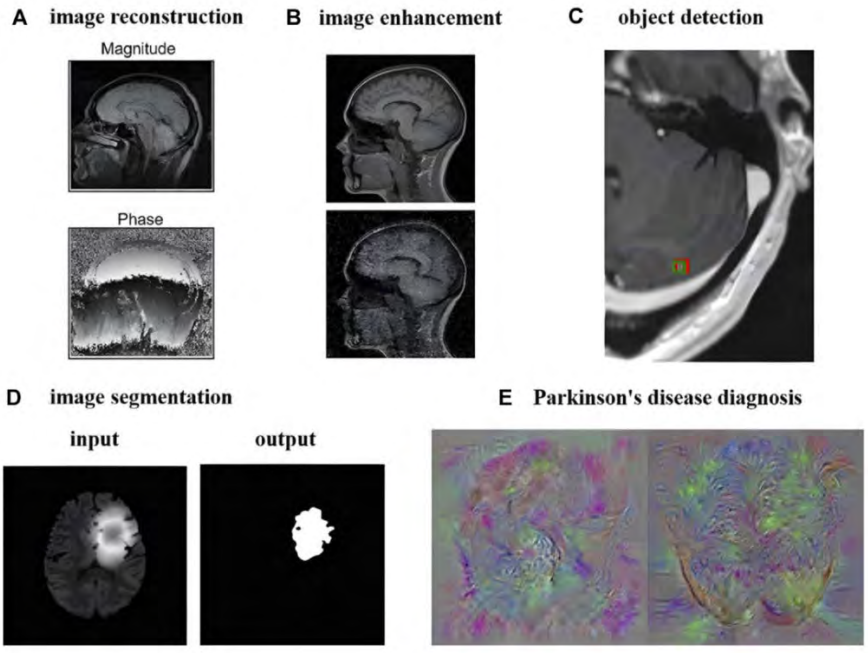
The course will involve one substantial individually chosen CFD final project.

ENGR 3499 Special Topics in ECE: Image Processing, Reconstruction and Analysis
Instructor: Chhavi Goenka
Credits: 4 ENGR **Hours:** 4-0-8
Prerequisite: ENGR 2410 Signals

*This course can be used as a **designated alternative** to the ENGR3415 (DSP)/ENGR 3420 (ADC) requirement for the ECE major.* If taken in addition to DSP or ADC, it may be used as the ECE elective course.

Imaging, imaging algorithms and imaging systems are being used every day to analyze and interact with the world around us, from facial recognition to medical data collection, from search & rescue to surveillance, from autonomous vehicles to assistive devices. In this course, we will learn about the basic concepts of image processing, image reconstruction from incomplete data and image analysis to obtain meaningful information from imaging data. We will also study how and where there is a possibility of biases being introduced into the entire imaging process – from acquisition to interpretation.

The specific topics (as they apply to imaging) that we will cover include but are not limited to sampling, linear transformation, geometric transformation, convolution, change detection, edge detection, quantization, filtering, compression, color spaces, image segmentation, image reconstruction, classification, feature extraction.

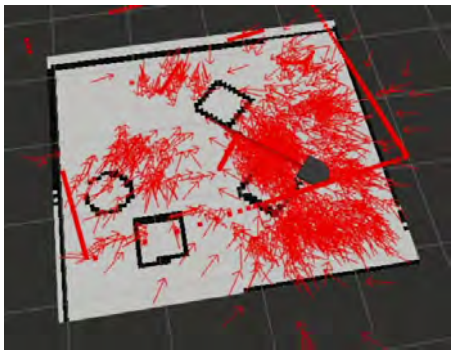


[Image credit: Gao et al 2022 "Application of medical imaging methods and artificial intelligence in tissue engineering and organ-on-a-chip]

A Computational Introduction to Robotics

Victoria Dean and/or Victoria Preston
(with possible special guest Paul Ruvolo)

Learn how math and algorithms can solve complex robotics challenges



ROS OpenCV

Learn how to program robots with industry / academia standard tools

Learn about the challenges and opportunities that robotics advances pose to our world

Make the class yours...

- Machine learning
- Audio localization
- Augmented reality
- Plant-health monitoring with computer vision
- And more...

Scan this for the day 1 slides from last year!

SCOPE: SENIOR CAPSTONE PROGRAM IN ENGINEERING

SCOPE is a unique industry-university collaboration, and the culminating experience of an Olin College student's education.

Over the course of a full academic year, seniors work in multi-disciplinary teams to provide innovative solutions to a company's real-world problems.

Work with a team of differently-trained engineers to look at a problem from a new perspective.

SPONSORSHIP BENEFITS

- Innovative and unexpected solutions to real-world, real-time problems
- Student teams work with you and a faculty advisor
- Strong program structure:
  - project management training
  - reporting and feedback loops
  - access to Olin's state-of-the-art facilities
  - a dedicated, professionally equipped workspace
- Students sign NDAs and sponsors retain IP
- Preferred recruitment opportunities

WHY OLIN?

SCOPE projects are much deeper endeavors than typical senior capstone projects, and are especially relevant for preparing engineering graduates because sponsors scope out projects that really matter to them.

SPONSORSHIP DETAILS

- a sponsorship fee of $60,000
- a liaison who is committed to supporting the student team including a weekly call
- access to background information including organizational perspective and technical expertise

LEARN MORE

Ruth Levine, Director of Strategic Industry Partnerships

Olin College of Engineering

Are you a Junior who is thinking about a start-up?

Consider the
Tech Venture Capstone

Talk to Scott Harris
sharris@olin.edu

Pico will be there!

MECHANICAL ANALYSIS

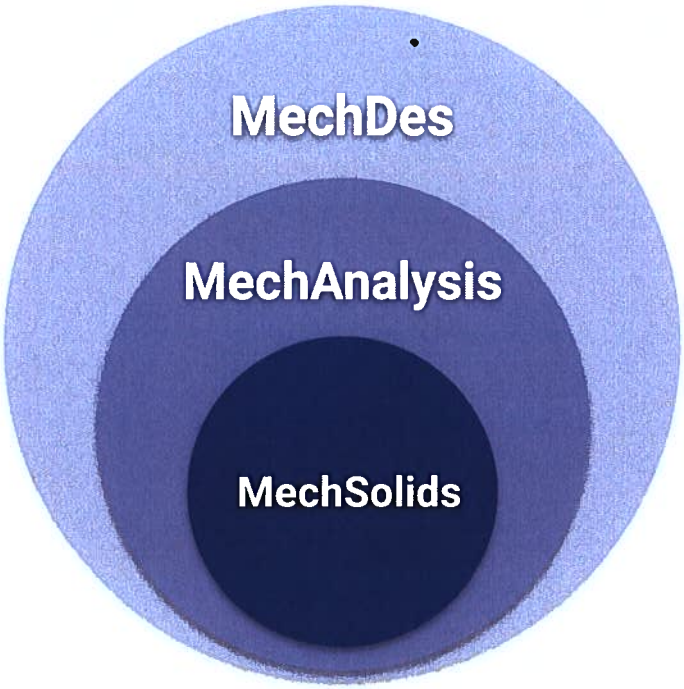
BY:
Rowan - William - Miriam - Ellie

What will you learn?

The **Mech-Analysis** curriculum fits in between what is taught in **Mech-Solids** and **Mech-Des** (although there are no prerequisites to take this class!)

We will cover topics like:

- FBDs
- Stress & Strain
- Beam Bending
- Failure Analysis
- FEA
- Wear & Fatigue
- Bolts, Bearings, Belts, Gears, & Shafts



This is a 2-ENGR-Credit class. There will be 2 lectures per week along with a short weekly problem-set where you will apply the skills you learn in class!

By the end of the class you will…

- Be able to apply **industry-standard** techniques to analyze & evaluate mechanical system performance (**hand calcs**)
- Build your very own **Mech-Analysis Reference Sheet** that you can use as a resource for years to come
- Have a "leg-up" for future **Mech-E courses** at Olin

ASP(I)RIN

ADVANCED SYSTEMS PROGRAMMING IN RUST

Curious about diving into advanced software systems? Heard all the buzz about Rust and wanted to see what the fuss was about? Want to learn how to write safer and more efficient software? Need an E:C/ECE Elective? ASP(i)RIN might just be the class for you!

Prerequisite: ENGR 3525 (Software Systems) or Instructor Permission

Why we think you should take this class

We want to take an approach to a software class that is less common at Olin. Instead of hitting the highlights of a lot of different subjects, we'll take a few systems topics and dive deep into them, comparing and contrasting different theories and methods of tackling these problems presented by different languages and analyzing the trade-offs made between them.

The goal of this approach is instead of broadening the list of topics you are exposed to, we want to strengthen your computational thinking and software architecture skills so that even if you never touch Rust or software systems again, you'll be able to apply the principles from this class to writing safer, more robust programs in any context.

We're also workshopping some cool projects for the class, which include things like a command line tool, a multithreaded server, a custom device driver, and an open-ended final project.

Why Rust?

Rust is a newish programming language that emphasizes both performance and safety - essentially, it lets you write really fast programs and gives you lots of control like C/C++ without exposing you to all the sorts of nasty memory bugs you've probably run into if you've spent any time with these languages.

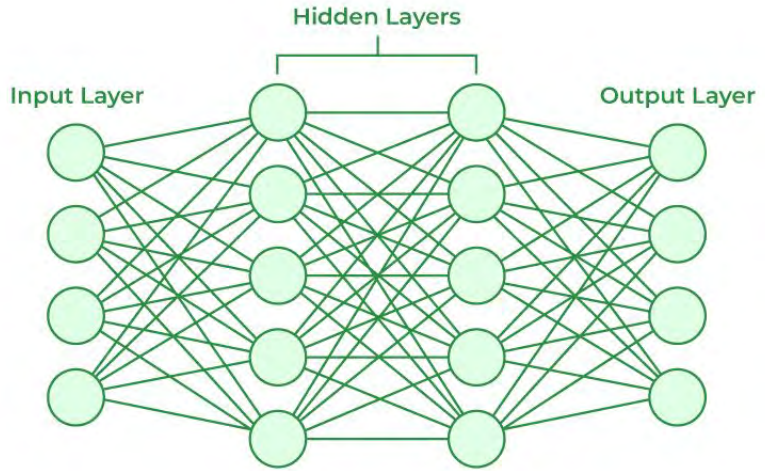
It's also growing quickly in industry use, including at companies like Google, Apple, Discord, and Dropbox, and we think learning the ideas behind how Rust is able to guarantee against certain classes of bugs has made us better programmers and we'd like to pass that on.

Syllabus
tinyurl.com/aspirin-syllabus

Questions? Reach out to Amit KH (akumarhermosillo@olin.edu) or Ayush Chakraborty (achakraborty@olin.edu)!

We are not affiliated with Rust or the Rust Foundation. Some course materials adapted with permission from COMP6991 at UNSW.

Machine Learning! (2 MTH / 2 ENGR)



Considering running an accelerated section for people with ML experience which would include some responsibilities to support others in the course

Code: Python and Pytorch
Prereq: SoftDes or equivalent

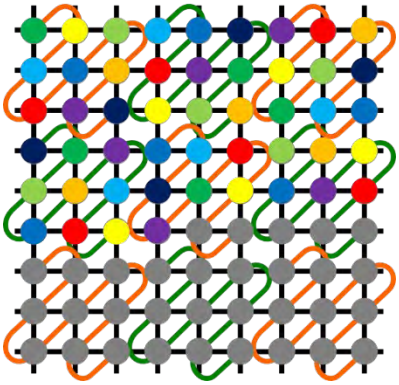
Major pieces:

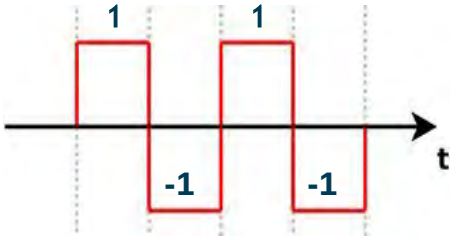
- Math and coding from linear regression to convolutional neural networks
- Fairness, ethics, and responsible AI
- 1 medium sized computer vision project and 1 larger broader project

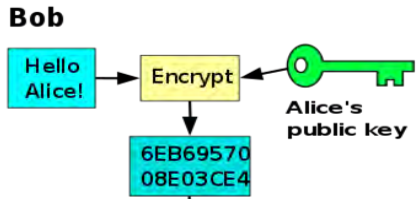
With Sam Michalka (and possibly Paul Ruvolo depending on course fair survey for this and DSA)

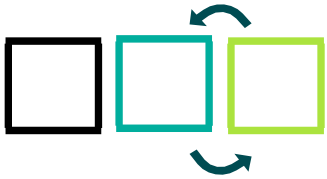
MTH 2110: Discrete Mathematics

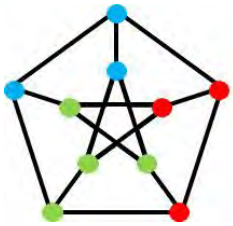
These graphics from prior projects give a glimpse at what Discrete is all about!

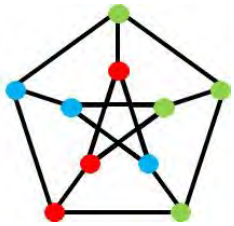












Depending on student demand, there will likely be two sections of Discrete next fall

Discrete Math is required for E:C and ECE majors, and it is one of the advanced math options for E:Robo. Other majors are also welcome and can tailor certain projects to their interests!

This course addresses the following Olin Learning Outcomes, roughly in decreasing order:

- Develop and Apply Knowledge, Skills, Approaches and Methods
- Collaborate Successfully
- Communicate Effectively
- Develop and Apply Creativity
- Design and Implement Processes to Achieve Desired Outcomes

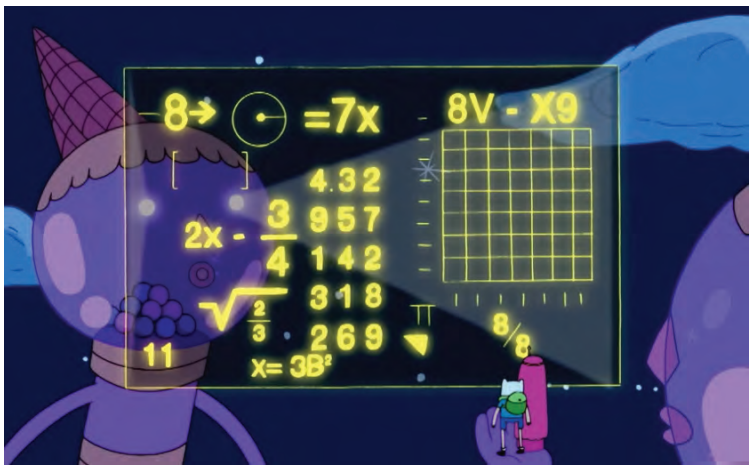
In service of these learning outcomes, we will count a lot of things that are hard to count, use graphs as a way to model everything from social networks to states of games, and apply recursion and induction to a variety of situations. Special topics might include error-control codes, cryptosystems, combinatorial designs, and/or open problems in discrete mathematics.

You'll have a wide variety of deliverables including daily pre-class work (reading and warm-up problems), weekly group assignments, some larger individual assignments, and some group projects. You will get timely feedback on your work with a focus on revisiting concepts to gain creative mastery of the material. Many students report that this is a hard but fun class!

Hypothetical 3110 Version

Depending on student interest and logistics/scheduling issues, Sarah is considering running two levels of Discrete, either at different times or at the same time in the same classrooms. Students who elect the hypothetical new 3000-level course would do most of the same work as the 2000-level course but would trade out some of the more fundamental work for more advanced topics. This might be a logistical and/or scheduling nightmare to the point of being impossible, so it might not happen, but add your name to the sign-up sheet at the Course Fair if you would be interested in a 3000-level version! This does not mean you are signing up – it is a casual expression of interest!

Applied Math for Engineers

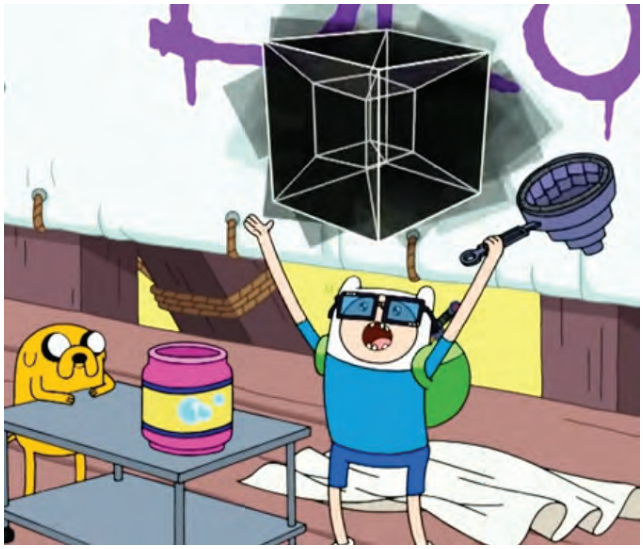


Solve math questions!

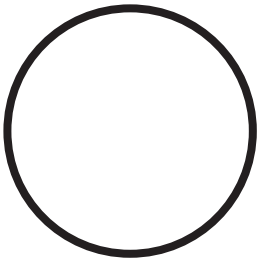
Blow multidimensional bubbles!

Unlock the mysteries of the universe!

This course will combine:
Numerical Methods
PDE's
Linear Algebra
Algorithms
ModSim



$n^2 + 9 + 9$

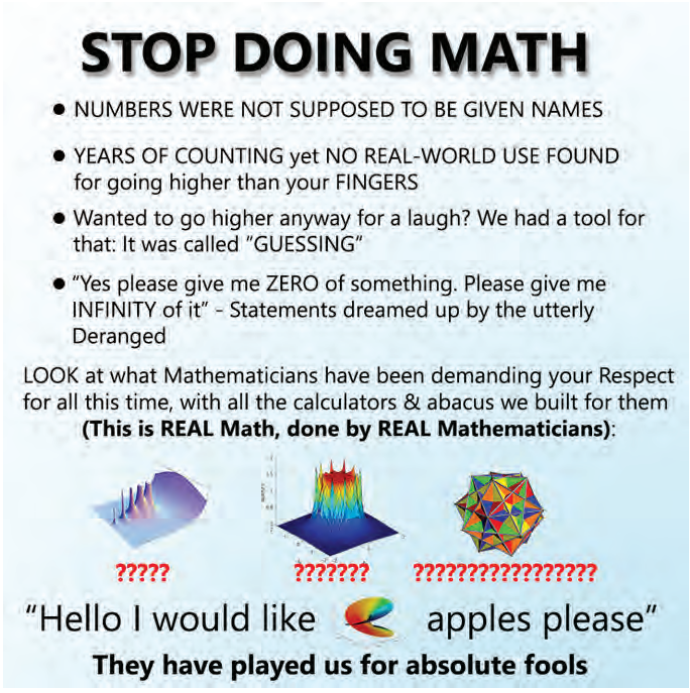


cDonald's Theorem

"It's the language of numbers"
1-A
2-The
3-Hello
4-Please
5-Thank you
6-Goodbye
7-What
8-CLASSIFIED
9-CLASSIFIED

Mathematical
Anti
Telharsic
Harfatum
Septomin

You might even learn how to shoot beams of pure mathematical energy from your forehead!



Play non-mathematicians for fools

MCCI

SCI 1440
Jon Stolk

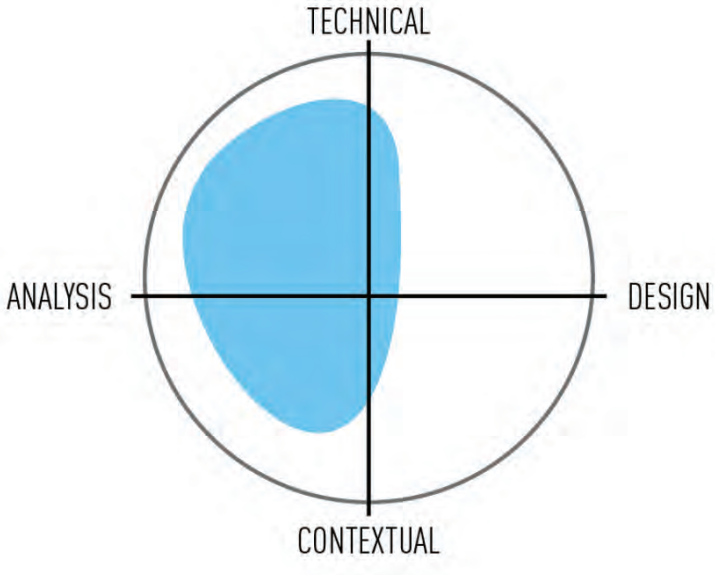
Materials Creation, Consumption, & Impact

SUPS: TRASHING OUR PLANET

ALLOYS: PATHWAYS TO PRODUCTS

DESIGN + MATERIALS + CULTURE/IDENTITY

It's project-based.
It's hands-on, in the lab.
It's systems thinking oriented.
It's sustainability-focused.



MM&E

Metals, Mining, & the Environment

SCI 1420 Jon Stolk

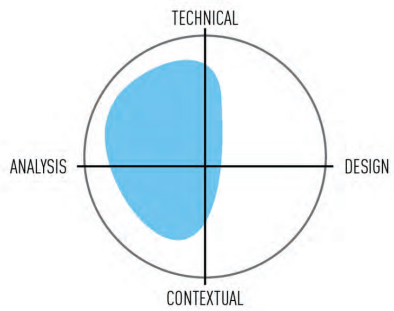
Images: earth.com (left), wikipedia (middle), The Guardian (right)

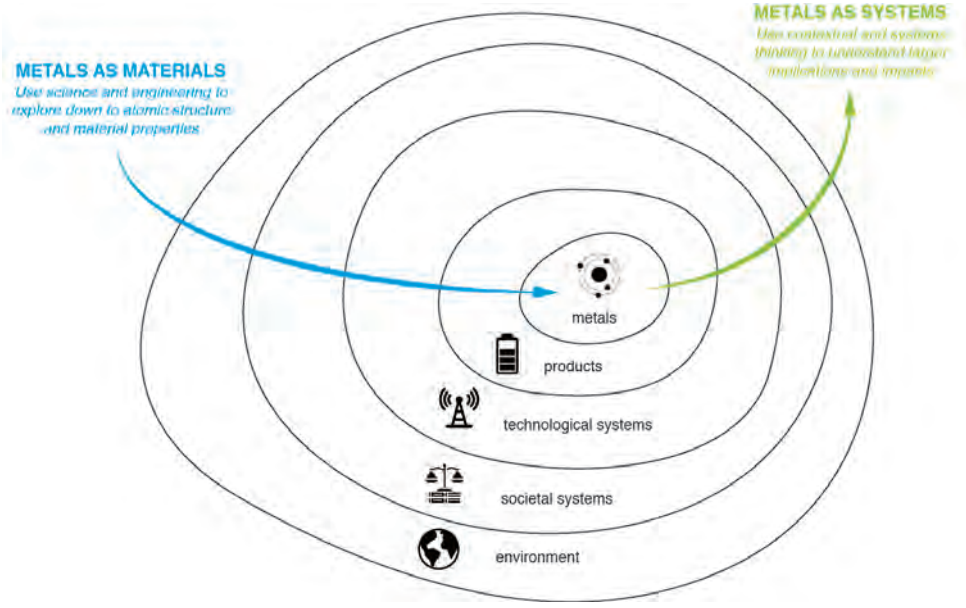
TRASH: E-WASTE & END-OF-LIFE

ALLOY PROCESSING

TREASURE: MINING & CIRCULAR ECONOMIES

It's project-based.
It's hands-on, in the lab.
It's systems thinking oriented.
It's sustainability-focused.





Olin College, Fall 2024
SCI1230: Think Like a Biologist

In this survey course we learn fundamental principles of biology in a journey through the field from the molecular to systems levels. We examine different classes of biological problems and interactions across multiple scales through reading and discussion of primary and secondary literature from the field. We will discuss examples from the environment, microbiology, and current events and technologies and examine the intersection between biology and society. We will gain an understanding of core principles of biology, which will enable us to better understand and develop solutions to complex problems. Projects include examination of biology in the context of systems and exploration of ways in which biology informs interdisciplinary problem solving. Through projects and work in the laboratory students develop a practical and foundational understanding of biological principles and practice.

For Fall 2024, the special project focus will be on Biomanufacturing and Bioprocessing in collaboration with industry partners.

Contact: Jean Huang
jean.huang@olin.edu

BCB

Biomes, Climate Change, and Biodiversity

SCI1270 Fall 2024

with Professor Helen Donis-Keller

Biology is, by definition, the study of life. In this course we will travel from the biosphere to the molecular level as we learn about how life works and the intersections between global warming and the resultant changes to climate that affect all organisms that inhabit planet Earth. Student experience will preference hands-on project-based experiential learning opportunities. Basic principles of genetics, evolution and molecular biology will form a framework from which biodiversity will be studied and biomes understood. This course is for anyone interested in the sustainability of our planet from the perspective of biology. As such the course content is inextricably linked to topics such as environmental justice, agricultural practices, policy development, and human population growth. A new project will be “Darwin, the Galapagos Islands, and Evolution.”

Activities include:

- Learning about REAL SYSTEMS THINKING from life forms
- Gaining a holistic appreciation for planet Earth and its inhabitants
- Learning to cook plant-based meals in labs with Olin’s Chef Sam
- Focusing on sustainability and stewardship of planet Earth
- Learning to grow and cook edible mushrooms
- Fungi and lichen fieldwork identification
- Bio-lab analysis of your own DNA
- Biology lens focused on real-world issues
- Speakers working at the intersection between biology and engineering share what they do.

Credits: 4 SCI, can count as Bio requirement or E: SUST elective

Environment and Health

Professor: Joanne Pratt

This class will explore the impact that our environment has on our health. Through readings, discussions and activities, we will address:

- current issues in environmental science
- human health and disease
- potential impacts of climate change on human health
- global health

In addition, the effect of our environment on mental health and health policies will be addressed.

This is an advanced Biology course, open to anyone who already has biology experience through AP/IB, an Olin foundation course or research. If you have not met those requirements but are highly motivated, please contact Joanne Pratt to obtain permission of the instructor.

Apply to be a ModSim Head CA!

TL;DR: Want to work as a part-time instructor and earn 4 AHS credits? Apply to be a Head CA for ModSim in the Fall 2024 semester. Follow the Hiring Process instructions on the next page.

Longer: This fall the ModSim Faculty will continue a bold experiment: We will train a small team of students to work as "Head CAs" for ModSim. These brave student adventurers will be responsible for co-leading a section in the Fall 2024 offering of ModSim. Head CAs will receive formal training in teaching methods, close mentorship of the ModSim faculty, and 4 AHS credits towards their degree completion.

Head CAs will be selected by a competitive application process. See below for more details on the job and hiring process, and **submit all materials to Zach by March 15th**.

Job Description & Reasons This is Awesome

- Co-Lead a section of ModSim
    - Kick-off each class session and promote a fun classroom dynamic. *This is a unique opportunity you pretty much can't get anywhere else!*
    - Grade student work and give useful, formative feedback. *This will give you a chance to develop even more understanding of the ModSim material; you will get coaching from the ModSim faculty on how to give useful feedback.*
    - Coach first-year students in their learning. *You can contribute to younger students' technical and social development.*
- Develop deep Olin-style teaching experience
    - Get trained in formal teaching methods. *You will complete a workshop on teaching methods, and will work as an apprentice teacher under close mentorship of the ModSim faculty.*
    - Get feedback on your teaching. *Working closely with a ModSim faculty member will give you a chance to get detailed feedback on your teaching approach—this is a unique opportunity for your development.*
- Work for pay + credit?!
    - Earn 4 AHS credits for learning how to teach. Note: *This <u>cannot</u> count towards an AHS concentration, even if you're doing a concentration in education!*
    - In addition to the 4 AHS credits for your pedagogical training, you will get paid for your CA work (i.e., grading, office hours). *This is subject to approval from the College… but we're working to make it happen!*

[See next page for Candidate Requirements and Hiring Process.]

Candidate Requirements

- Must be willing and able to attend all ModSim class sessions in the Fall of 2024.
    - We're moving to a 2x a week pattern (rather than 3x), so ModSim should be easier to attend than prior years.
    - This will depend on your (tentative) course schedule for Fall 2024; you must provide this information in your application letter. Please make sure to note any courses you plan to take in the fall that are a MUST for you (i.e., in order to graduate)!
    - Working as a Head CA will count for 4 AHS credits, so this effectively takes the place of one of your courses.
- Must be willing and able to attend a short training course before the Fall of 2024.
    - This will most likely be during Fall 2024 orientation, so you would get to move in a bit early (TBD).
- Must have worked as an official CA at least once. (Not necessarily for ModSim.)
    - We will do a reference check with your former class supervisor, so make sure to provide the name of at least one professor for whom you've worked as a CA before.
- Must be a committed and reliable teammate.
    - We will ask around for your work history!
- Must be committed to the course mission of ModSim.
    - ModSim is a course about the modeling process, *not* a course on physics, math, or programming. Part of your job will be to articulate this message to students, so you must articulate what ModSim means *to you* in your application letter.

Hiring Process

1. Send an email to Zach (zdelrosario@olin.edu) with (1) a copy of your resume and (2) a short letter describing how you meet all of the Candidate Requirements stated above. This letter should be short: about 1 page, and it can be in bullet-point form if you wish. **Deadline: Friday, March 15th**
2. If you meet the requirements, I will contact you to schedule an interview, to be completed before **March 22nd**.
3. From the interview pool, I will hire ~5 Head CAs. Decisions are contingent on the class schedule, so decisions cannot be made until that is finalized. However, I anticipate making decisions by **early April**.