EN.501 (EN FIRST YEAR SEMINARS)

Courses

EN.501.101. FYS: For All Practical Purposes: The Unreasonable Effectiveness of Mathematics. 2 Credits.

Mathematics can be experienced as an esoteric, rigorous philosophical system that is a delightfully engaging art form. Yet, somehow, it seems that the most abstract and theoretical mathematical topics find application in practice, to solve real problems in the real world. This course explores the surprising applicability of mathematics throughout history to the present day, highlighting interesting and important ways that mathematical ideas revolutionized how we describe the natural world through physical laws, produced techniques for solving problems in a wide range of human activities, e.g. decision making, medical diagnoses and imaging, sports, finance, gambling, music, and cryptology. The only background needed is high school mathematics and an interest in participating in engaging discussions.

EN.501.105. FYS: Technical Leadership in Times of Crisis. 3 Credits.

Crises, particularly complex technical crises, are a test of leadership, management, preparation, and decision-making skills, often requiring individuals to step into roles they never envisioned. This seminar invites students to consider the actual practice and ethics of engineering, using historical events like Chernobyl, Apollo 13, Ebola, and several air and sea disasters as case studies. Guest speakers, readings, and film viewings will provide material for debate and dialogue around the unique leadership opportunities technological innovation can provide, and the risks that must be managed. Students will make and present a personal career road map as a final project, building on the insights they have gained.

Distribution Area: Engineering

EN.501.106. FYS: Energy and our modern way of life. 1 Credit.

The general well-being of individuals is strongly correlated with the per capita energy consumption of their societies and without cheap and abundant energy our modern way of life could not exists. Meeting our energy needs is a complex undertaking, which we increasingly understand has far reaching consequences. The seminar gives the students an elementary understanding of energy in modern societies, including how it is generated, transported and used. After introductory lectures, the students choose a specific topic within the general area of energy, conduct research in small groups, and produce a report. Weekly meetings are devoted to progress reports, discussions, and information sessions.

Prerequisite(s): Students may only enroll in and complete one First Year Seminar course.

Distribution Area: Engineering

EN.501.107. FYS: Superwoman! Women in Science and Technology: Myth, Challenge, and Powe. 1 Credit.

How can women achieve successful and joyful careers in STEM fields? What barriers or impediments do women encounter? What tools can women use to overcome impediments? This course will explore issues faced by women in leadership through self-assessment, speakers, improvisation, case studies, readings, Ted Talks and other media. We will examine topics including "failure," impostor syndrome, competition, and managing stress while focusing on developing the skills and competencies you will need to create the career you envision. **Prerequisite(s):** Students may only enroll in and complete one First Year Seminar course.

EN.501.108. FYS: Leadership Theory. 3 Credits.

The course will explore the knowledge base and skills necessary to be an effective leader on a college campus. Students will be introduced to the history of Leadership Theory from the "Great Man" theory of born leaders to Transformational Leadership theory of non-positional learned leadership. Transformational Leadership theory postulates that leadership can be learned and enhanced. Students will assess their personal leadership qualities and develop a plan to enhance their leadership potential.

Prerequisite(s): Students may only enroll in and complete one First Year Seminar course.

Writing Intensive

EN.501.109. FYS: Communicating Science. 3 Credits.

The COVID-19 pandemic and the misinformation surrounding it have only reinforced the importance of science communication. On timely issues like global disease outbreaks, climate change, and gene editing, or generalized ones such as individual nutrition and healthcare, the public expects researchers to speak up. But what happens when crucial scientific information is met with a lack of understanding, or even worse, distrust from the public? In this seminar, we will examine scientific communications from multiple genres, including popular scientific magazines, newspaper articles, journal articles, social media posts, podcasts, documentaries, and TED Talks, to discover what makes technical communication successful (or not). Students will explore techniques and strategies they can use to communicate about significant issues in their own personal, academic, and professional lives. Open to all majors; no expertise required.

Prerequisite(s): Students may only enroll in and complete one First Year Seminar course.

Writing Intensive

EN.501.112. FYS: Computing Through The Ages. 3 Credits.

This course takes the student through 2000 year journey of computing and computing hardware architectures from the Salamis Tablet, the Chinese Suanpan, the Incas Yupana, Babbage Analytical engine, personal computers, and smart phones to modern data center computing machinery and the recent explosion in AI. There will be some technical discussion, but the focus of the course is on people, events, society, and culture that shaped the development of computing and computing sciences as we know them today.

EN.501.113. FYS: Turing's Shadow: Uncovering What's Hidden in STEM. 3 Credits.

In 1952, British mathematician, biologist, cryptographer, and protocomputer scientist Alan Turing was prosecuted for "gross indecency," ending his career. While Turing received a posthumous pardon in 2013, his persecution has left a long shadow on the visibility of LGBTQ+ people in science and engineering. What can we uncover about the contributions that LGBTQ+ people past and present have made to STEM? What can we learn about efforts to build greater inclusion for people with diverse genders and sexualities? What queer futures can we imagine? Students will hear from professionals and scholars from a variety of disciplines as we open STEM's closet.

EN.501.114. FYS: Gas Prices, GameStop and Toilet Paper. Innovation and American Enterprise. 3 Credits.

Why is gas so expensive? How did Reddit influence the price of GameStop shares? And where did all of the toilet paper go? This course seeks to provide students with a foundation for understanding modern business and the skills necessary to generate innovative solutions to problems-worth-solving. Course can be counted for the Foundations of American Enterprise requirement for CLE minors.

EN.501.116. FYS: Minding the Gap: Understanding the Design of Habit. 3 Credits.

There is a painful gap between what people want and what they actually do," writes Stanford psychologist B.J. Fogg. What accounts for this gap? Why do we pursue activities that seem to work in opposition to our goals? How can we develop habits and practices that align with our values, identities, and aspirations? Drawing on readings in psychology, economics, neuroscience, artificial intelligence, and philosophy, this seminar will explore these questions and the broader relationship between habits (what we do), values (what we believe), and personal and professional aspiration (who we hope to become). Students will use design thinking and behavior design to their own lives to learn habits, make decisions, and develop plans for their time at Hopkins that are aligned with their values, identities, and aspirations in a manner that supports their mental and physical well-being.

EN.501.117. FYS: Combating Misinformation and Disinformation in Science. 3 Credits.

While the COVID-19 pandemic may have produced an explosion of hoaxes and conspiracy theories unprecedented in modern times, inaccurate public conceptions of science are common across human history. In this seminar, we will examine historical examples to understand how misinformation spreads and identify its consequences for public trust in science. We will also analyze effective scientific communication from multiple genres, including popular scientific magazines, newspaper articles, journal articles, podcasts, and TED Talks, and films to discover what makes scientific communication successful. Students will explore techniques they can use to identify scientific misinformation and communicate about significant issues in their own personal, academic, and professional lives. Open to all majors; no expertise required.

EN.501.119. FYS: Adulting 101: Managing Your Financial Wellness Journey. 3 Credits.

How is your financial wellness and life satisfaction related? Many debate whether money can bring you happiness and others promote ideas such as financial freedom, generational wealth, and FIRE ("Financial Independence, Retire Early"). In this course, we will consider what is required to be "financially well." We will explore the knowledge and skills required to successfully navigate your personal finances, today and into the future, through guest speakers, simulations, activities, and discussion of readings. Open to all majors; the only background needed is an interest in learning more about financial literacy, money management, and personal development.

EN.501.120. FYS: City as Campus: Discovering Entrepreneurship and Leadership in Baltimore. 3 Credits.

This course will provide students with opportunities to learn about Baltimore's exciting entrepreneurship and innovation landscape. Students will begin with the development of a "sense of place" for their new home; learning to understand both Baltimore and Johns Hopkins University through historical and social lenses and making meaning of Baltimore's current challenges, opportunities, and affordances. Students will be introduced to spaces on campus such as the Digital Media Center and FastForward and will visit local sites in Baltimore such as Baltimore's Innovation Works, Betamore, and Accelerate Baltimore. During these experiences, students will be exposed to local leaders to hear about their experiences. Back in the classroom, students will consider leadership qualities that are key to entrepreneurship and innovation and will explore their own leadership skills to understand their strengths and areas for growth. The course will focus on team-based projects and exercises, but students will also prepare short, written reflections which will provide opportunities for them to process their learning and leadership development throughout the course.

EN.501.121. FYS: AnthroDesign for Healthcare. 3 Credits.

Pictures and everything about the course in the following link: https:// bit.ly/45qz9CN Overview: Integrating engineering design, the social sciences, and the humanities is not new. In this context, design ceases to be only a craft and assumes a strategic role in promoting change and innovation. This relationship originated with the use of applied ethnographic tools in software development. The use of interaction design (IxD) and user experience (UX) has since transcended the computer to the reinterpretation of social interactions. This course aims to introduce theoretical and applied methodologies of cultural anthropology and concrete design strategies. The tools portrayed will focus on making sense of social phenomena in relation to healthcare. AnthroDesign has the ability to give a more ethical framework for innovations involving legal and ethical considerations firmly based on sociopolitical issues and human rights. In this journey, we will look through the eyes of an anthropologist and take action with the hands of the designer.

EN.501.122. FYS: Juries to Journals: Elle Woods, Einstein, and the Meaning of Evidence. 3 Credits.

From alternate facts to disinformation to evidence-based medicine, many in modern society argue that progress relies on decisions based on "evidence" to find "truth", although approaches to weighing evidence vary greatly. This course will explore concepts related to the identification and evaluation of evidence, analyzing and contrasting approaches in different fields of study including law, regulatory science, laboratory science, and medical research. Students will learn to apply critical analytical skills when considering evidence presented by others, including "experts", and to appreciate the challenges and pitfalls of making their own "best case". Course work will consist of readings and viewings, small-group presentations, in-class discussions, and very short written submissions. Some material will include a very basic introduction to topics of courtroom procedures, probability & statistics, and experimental design – but no specific prerequisites will be required. This is neither a math class nor a law class!

EN.501.123. FYS: Exploring Computer Science. 1 Credit.

This course provides first-year students with an introduction to the field and department. Faculty will lead weekly small group discussion sections on topics of interest related to the discipline. Upper-year CS majors will serve as peer mentors for each group.

EN.501.124. FYS: Design Cornerstone. 2 Credits.

Discover how multidisciplinary engineering design results in more effective engineering, communication and problem solving with teams. This hands-on, project-based course gives students the ability to understand, contextualize, and analyze engineering designs and systems. By learning and applying the multidisciplinary design process, students will be more prepared to solve complex problems in a variety of engineering disciplines. Lectures focus on teaching a tested, iterative design process as well as techniques to sharpen creative analysis. Guest lectures from all disciplines illustrate different approaches to design thinking. This course will culminate in a cornerstone design project. Distribution Area: Engineering

EN.501.125. FYS: Envisioning Antarctica: Science, Diplomacy, and the Arts. 3 Credits.

This seminar will explore the human experience in Antarctica and the question: What should be the human use of the continent? Students will consider the influence of scientists, diplomats, visual artists, and writers toward building an understanding of the frozen continent, determining its uses, and interpreting its beauty. Was it serendipity or curiosity that led scientists to discover the ozone hole, examine the Dry Valleys for insights into Mars, or see penguins as sentinels of climate change? The west coast of Antarctica is one of the most rapidly warming places on the planet. Why did twelve nations agree to set aside the continent for peace and science when they had interests in land, fish, and minerals? The protocols of the Antarctic Treaty, which governs peaceful use, come up for possible renewal in 2048. How do artists, writers, and filmmakers visualize and chronicle the vast wilderness for people who will never experience it firsthand? Recent accounts focus less on the power of cold in Antarctica and more on the fragility of its ecosystems to warming. What is the future of Antarctica? The first part of the seminar traces historical ties with Antarctica-exploration, territorial claims, scientific discovery. Students will read journals of explorers, watch videos of expeditions, and meet with former diplomats and scientists. The second explores ideas, values, and visions for the future-commons governance versus territoriality, wilderness versus development, conservation versus exploitation, regulated tourism versus unlimited travel. Throughout, artists' and writers' works will animate the discussions. Students will experience a year living and working in Antarctica through an awardwinning documentary. Also, we will examine Antarctica as a laboratory for exploring the habitability of earth and the secrets of space. The final weeks will culminate in student visioning of these various perspectives.

EN.501.126. FYS: Communicating with Other Intelligences - Artificial, Alien, Animal. 3 Credits.

How do other intelligences - be they machine-made, of extraterrestrial provenance, or our nearby animal kin - shape our understanding of language and our modes of communication? This seminar examines the social, economic, and ethical implications of interacting with and learning alongside algorithms, fungi, "digital assistants," octopi, and other "more-than-human beings". We will consider artificial intelligence, machine learning, and human-animal interaction from the perspectives of philosophy, science, and popular culture, including a project that will examine the possibilities and challenges of emerging AI tools like ChatGPT, DALL-E 2, Stable Diffusion, and the phenomenon of "deepfakes." Distribution Area: Engineering

EN.501.127. FYS: Designing a Just Future. 3 Credits.

This seminar explores a deeper understanding of empathy's potential and limitations within the broader context of design justice. Students will be introduced to ongoing debates about "design thinking" and "humancentered design." We will explore how social and technological forces have complicated such concepts and deepened their relevancy for building systems and products that address problems worth solving. Readings such as Sara Hendren's What Can a Body Do?, Sasha Costanza-Chock's Design Justice: Community-Led Practices to Build the World We Need, and Kat Holmes's Mismatch will provide a foundation for critical dialogue on principles of inclusive design, community advocacy, and ethical empathy. Come prototype tools for a more just and humane society.

EN.501.129. FYS: The Climate Game. 3 Credits.

We know the choices consumers make contributes to climate change, that the way we live in cities contributes over a third of all greenhouse gases, and that individual behavior changes can make a positive difference. We also know that children learn to follow rules, to experiment with trial and error, and to generate strategies through playing games. We know that adolescents can learn negative attitudes by playing violent video games. And we know that when adults play games, the activities help maintain mental acuity and reflexes. But what effect does playing games have on adolescents and adults when it comes to learning new Information and changing attitudes toward positive action? Could playing games help resolve behavioral contributions to climate change? This seminar explores the effects of playing games on young and older adults. Moreover, we will determine what factors make a difference - type of stimuli, type of engagement, duration of engagement, type of interaction? And more importantly, we will use the findings to build a card and/or board game about sustainability needs and practices that can make a difference in individual lives for a target adult audience.

EN.501.131. FYS: What Comes Next? Critical Perspectives on Technological Innovation. 3 Credits.

Emerging technologies offer the potential for transformative advancements, including longer and healthier lives, increased efficiency and safety, and enhanced communication and global connectivity. At the same time, technological innovation often outpaces our societies– our legal regulations and policies, social and political frameworks, and cultural norms. New technologies come with new challenges and risks, which require careful attention and scrutiny to prevent new or renewed harms and injustices. In this seminar, we will consider a variety of technological innovations to examine their social, cultural, political, and environmental ramifications. Students will develop their abilities to think critically and ethically about technology through real-world cases and examples, both individually and in groups. Topics will include artificial intelligence and algorithmic culture, digital media, automation, fast fashion, healthcare technology, and more. This seminar requires no previous background or expertise.

EN.501.132. FYS: Water, Health, and the City. 3 Credits.

How does water shape the health of Baltimore and its environs? To answer that, we can expand our idea of "health" to investigate water's influence on individuals, neighborhoods, industries, and the Chesapeake ecosystem at different times and over different scales. We will approach Baltimore's water from an interdisciplinary perspective, with attention to (1) the concepts that scientists, engineers, and humanists have employed to comprehend water's influence on the urban ecosystem, (2) the policies that have shaped water's costs, distribution, and use, and (3) the disasters and injustices that have affected our region's human and nonhuman inhabitants. We'll also assess the role played by our university in Baltimore's water history. We supplement our weekly discussions and individual projects with collaborative mapping, blogging, and field trips to sites in and around Baltimore.

EN.501.133. FYS: Influencers: Contemporary Media and Leadership. 3 Credits.

This seminar examines leadership "on screen," particularly how contemporary media represents advocacy, conflict resolution, team development, and persuasive communication. Discussions of films, television programs, and social media content will analyze the political and cultural norms that shape representations of individual power and leadership ethics. Through a blend of film screenings, discussions, and project-based learning, students will gain a unique perspective on pop culture's evolving views of what it means to influence others. Films under consideration include Barbie, Mending the Line, Hidden Figures, and Apollo 13.

EN.501.134. FYS: The Leadership Challenge. 3 Credits.

This experiential and discussion based course is designed specifically for first year Johns Hopkins University Clark Scholars. In this course, students will engage in discussions with current university leaders (students, faculty and staff) as they learn about the history, services and involvement of Johns Hopkins University as well as the contributions made by Mr. Clark. Students will explore leadership concepts and topics guided by the required text, The Leadership Challenge. The experiential component will enhance classroom content and expose students to the on- and off-campus involvement opportunities available.

EN.501.135. FYS: Breaking Through: Readings and Techniques for Imagining the Future. 3 Credits.

"Wicked problems," are those that elude a singular answer. Though issues like climate change fit this description, many opportunities for innovative responses to such challenges exist. In this seminar, students will engage a range of discourse-from the dystopian fiction of George Saunders and Black Mirror to case studies and the United Nations' goals for sustainable development—to identify and explore "problems worth solving" as testing grounds for novel social, technological, and cultural innovations. Students will then use a variety of tools and techniques introduced in the seminar to analyze their chosen problems and related case studies to imagine what comes next.

EN.501.136. FYS: Math in the Movies. 3 Credits.

What does cinema reveal about the world of mathematics? This seminar examines full-length feature films and their themes relating to mathematical thinking, the use (and misuse) of math, depictions of mathematicians, and insights into the profession. During class, we will discuss films, watch clips, and interpret scenes. Movies under consideration include A Beautiful Mind, The Man Who Knew Infinity, The Imitation Game, Moneyball, Hidden Figures, Good Will Hunting, Proof, and Gifted. No expertise in mathematics (or film) required.

EN.501.137. FYS: A Little Bit of Everything All of the Time: The Uses and Abuses of the Internet. 3 Credits.

As problematic fave Bo Burnham has sung, the internet gives us "a little bit of everything all of the time." But what are the consequences of this unlimited access and ubiquitous connectivity? This seminar will explore how the internet shapes our sense of self, our relationships with other people, and our relationship to the political world. We will pay particular attention to the form, design, and economy of the internet, and how they relate to our own and others' user experience, both historically and today. We will discuss topics like data privacy, targeted algorithms, social media culture, sexting, and political polarization and mobilization. We will ultimately answer the questions, what do we want the internet to do, and what do we want our relationship to it to be? Students will have the opportunity to plan and pitch a new app or platform that enacts their internet ideals.

EN.501.139. FYS: Pushing the Boundaries: Building a Better World Through Science Fiction and Film. 3 Credits.

Stretching as far back as Mary Shelley's pivotal classic, Frankenstein, to Ted Chiang's contemporary masterpiece, Stories of Your Life and Others, science fiction has continually explored and re-imagined the boundaries of what's knowable, what's possible, and what's conceivable. Often derided as a low-brow, trashy genre, science fiction has, nevertheless, played a significant role in inspiring real technological innovation in STEM, fostering more diverse and inclusive social-cultural-technological worlds, and challenging the conventional, normative narratives of their own historical time periods and institutions. In this first-year seminar, we will examine a wide range of classic and contemporary science fiction and film in order to explore how each work attempts to re-imagine, resist, or stretch conventional (or normative) notions of its time, history, place, and modes of social/cultural/ethical engagement. We might look at notions like consciousness, the mind, the body, human, language, time, STEM, race, gender, politics, ecology, or any others that compel our attention. To do this, we will look at both fiction and film in a broad range of hard/soft SF, cyberpunk, dystopian, utopian, and biopunk subgenres. Authors might include Ursula Leguin, William Gibson, N.K. Jemison, Margaret Atwood, Ted Chiang, Jeff Vandermeer, Octavia Butler, Isaac Asimov, Nnedi Okorafor, or others. Films might include from Blade Runner, Dune, Everything Everywhere All At Once, or others. For a small final project, we will also attempt to turn SF's wild, weird, and wonderful lens back on our own time period by exploring the SF potential that exists in our own majors, labs, research, or experiments by drafting our own short story or non-fiction narrative. The seminar will also include a field trip to Baltimore's highly regarded American Visionary Arts Museum and/ or a screening at a local movie theater.

EN.501.141. FYS: From Pavement to Pixels - Navigating Life in Physical and Digital Worlds. 3 Credits.

When you go on the internet, where do you go? To quote the Beatles, do you go "here, there, and everywhere?" Many of us might say that we do, but what exactly do those coordinates tell us about where we are and what it means to be there? In this course, we will explore how different ways of understanding "space" and "place" help us articulate what it means to live in physical and digital worlds simultaneously. We will draw on cultural studies, digital humanities, philosophy, environmental studies, architectural theory, and artificial intelligence perspectives. We will also engage with scholars and professionals from various disciplines and visit local Baltimore institutions. Course texts may include selections from Henri Lefebvre, Sarah Williams Goldhagen, and Max Tegmark, the podcast Endless Thread, and the documentary Jasper Mall. Students will engage with these topics through conversation and writing as well as a collaborative team project.

EN.501.142. FYS: What's in a Game? The Art and Science of Strategy. 3 Credits.

While the verb most associated with the act of engaging in a game is "play," competition is much more than simple "fun." This seminar dives into world of strategy, to demonstrate the complexity and social richness of what one writer has called "a learning system common to all people." To that end, our readings and discussions will focus on the mathematical theories, computation requirements, cognitive processes, and social dynamics that underpin games and strategic competition. As this is an academic course, we will also study games as vehicles for producing knowledge, understanding, and innovation—and consider how "gamification" might inform our own progress as scholars. In addition to drafting and revising a short seminar paper, students will end the semester designing, testing, and presenting a game of their own.

EN.501.143. FYS: Science, Technology, and Medicine in Popular Culture. 3 Credits.

From sci-fi to sport, entertainment shapes our cultural understanding of wellness, illness, and care. What are the affordances and constraints of this messaging? Can pop culture help us imagine a more just future of healthcare? In this seminar, we will explore representations of health, healthcare, and medicine in a variety of pop culture texts, including film, literature, television, and social media. Together, we will critically examine the stories that are told about health and medicine, and trace how they reflect/challenge historical and contemporary politics and concerns. We will discuss topics like contagion, reproductive health, mental health, and fitness, and inquire about the role of medicine in society more broadly. Ultimately, we will answer the questions 1) what is health? 2) what does it mean to be health? and 3) what do we want healthcare to be?

EN.501.144. FYS: What Should "College" Mean?. 3 Credits.

This FYS examines the contemporary role of university education in society, exploring how (and whether) the modern university can continue to achieve its purpose in the face of economic, cultural, and technological change. As part of this exploration, the course will trace the historical development of higher education from antiquity to the modern era. Special attention will be dedicated to the origins of liberal education and the evolution of this concept over time, culminating the decline of liberal education in recent decades. While illuminating how social expectations of higher education have shifted dramatically over the centuries, the seminar will question 1) whether the current status quo in higher education was inevitable and 2) how students, teachers, voters, and other stakeholders might be able to chart a wise course for the university in the 21st century. To participate in this course, students will engage with a broad range of perspectives from inside and outside the academy. Students will read educational research, policy papers, polemics, and even dramatic fiction. They will also engage with multimedia as they confront educational controversies new and old. For their final project, students will design a novel course and present it to their peers. Ultimately, this seminar encourages students to draw their own conclusions about higher education-to discover its purpose, its promise, and its pitfalls for themselves. By doing so, first-year students have a unique opportunity to make the university experience they are embarking on more profound and worthwhile.

EN.501.145. FYS: Explaining AI Through Games. 3 Credits.

This course will look at Artificial Intelligence and the algorithms and technology behind it through the lens of games. We will discuss how popular games such as Wordle, Crossword Puzzles, and Cards Against Humanity offer really detailed insights into the core workings of Al – from how they are trained, to what happens when they are deployed to users in the wild. While we will get into cutting-edge algorithms and engineering advances, no prior technical knowledge or programming skills are required. At the end of the semester, students will be able to understand and debate engineering decisions and principles underlying all of the fundamental technological aspects of Modern AI systems. Students are expected to come to class prepared to discuss assigned readings and there will be a class project to build an AI Bot to play the popular TV show game Wheel of Fortune.

EN.501.149. FYS: Materials, Music, and Megabytes: Interplay, Analysis, and Appreciation. 3 Credits.

The connection between scientific thinking and musical aptitude is amazing and widely known. This first-year seminar will build on this connection to develop a music-based introduction to materials science and its surrounding disciplines, such as solid-state physics, mechanics, electronics, energy, data science, biomaterials, and neuroscience. At the same time, the understanding of how we might appreciate, produce, and preserve music is increased using fundamental principles of science and engineering that are at the heart of modern, ancient, and even extraterrestrial materials. Societal impacts of materials and music will be topics of discussion, as will other topics suggested by student participants. The course content will be drawn from stimulating writings in which science and music are intertwined, and students will be encouraged to share experiences where one of these disciplines could inform the other. No formal background in either science or music is required, though a high school level understanding of physical sciences, and prior basic music instruction or group experience, will be helpful. The course will culminate in a final presentation that can draw from any combination of scientific or mathematical analysis, musical performance, and/or literary narrative. The instructor has undergraduate concentrations in chemistry and music theory, a longstanding materials chemistry and electronics research program, and extensive musical performance experience with multiple instruments and genres that will facilitate in-class demonstrations.

EN.501.150. FYS: Causal Inference: Understanding Cause and Effect. 3 Credits.

How do we know if one thing truly causes another? In this First-Year Seminar, we'll explore the foundations of Causal Inference, the science of identifying and understanding cause-and-effect relationships. Through real-world case studies, hands-on activities, and critical analysis of media, students will learn how to distinguish correlation from causation, design experiments, and evaluate evidence from observational data. Course includes applications from public health, policy, social media and economics. No prior statistical background required.

EN.501.151. FYS: The Infinite Fugue: Self-Reference in Art, Logic, and Music. 3 Credits.

This course invites you to explore Gödel, Escher, Bach—a book unlike any other. Through its playful dialogues and deep ideas, we'll discover how recursion, paradox, and self-reference shape mathematics, music, and art. What happens when a system talks about itself? Can logic prove its own limitations? How do Bach's fugues, Escher's impossible drawings, and Gödel's theorems intertwine? In an era of AI and algorithmic reasoning, understanding what formal reasoning is—and isn't— has never been more important. Through discussion, puzzles, and thought experiments, we'll engage with Hofstadter's exploration of logic, computation, and the nature of thought itself. While we won't cover the entire book, our goal is to dive deeply into its most fascinating ideas—so that by the end, students will be eager to continue the journey on their own. No background in logic or mathematics is required—just curiosity and a willingness to wrestle with complex ideas.

EN.501.152. FYS: Computational Reasoning. 3 Credits.

This seminar is a hands-on survey of the fundamental concepts of computer science, spanning everything from the art of "thinking slowly" to the cutting edge of machine learning and AI alignment. We'll learn to design clear, step-by-step problem-solving strategies, represent them in flowcharts, and see how encoding information in binary enables circuits to perform logic and math. We'll learn how structuring information makes it possible to build data processing machines and we'll learn how those machines recognize patterns, follow instructions, seek goals, keep secrets, see, and learn. You'll complete the seminar with a synoptic view of the conceptual terrain of computer science and a set of critical thinking skills that dovetail with those cultivated in the humanities and social sciences. Class sessions will focus on lively discussions, hands-on exercises, debates, and collaborative problem-solving during our meetings. No prior coding experience is required; although you'll encounter some code, learning to program is not a primary goal of the course and is not part of the assessment.

EN.501.153. FYS: Storage and Information: How Data Defines the World. 3 Credits.

The ability to store and retrieve data differentiates a finite automata that cannot multiply from a universal computer that exhibits artificial intelligence. This course explores the pivotal role of data and information in the computing age: from the 1880s to the present. We will connect the development of storage media, information theory, and metadata to key political, social, technical and economic developments, such as financial exchanges, censuses, war fighting, and the rise of the Internet. The course will take a broader look at storage capabilities and information content in physical and biological systems and forecast the future of data as technologies evolve.

EN.501.154. FYS: The Path to Preeminence: Leading a School of Engineering. 3 Credits.

Never has it been more important to separate fact from fiction about academic institutions. This seminar provides first-year students with an insider's view of higher education through the lens of a highlyranked school of engineering. Discussions and critical readings will demystify university administration for students and help them to better appreciate their place in the vision and mission of the Whiting School. While the course will address some of the foundational philosophical questions driving the past, present, and future of engineering education, the seminar's unique offering is to uncover for students the practical considerations of leading a complex educational organization. Students will investigate aspects such as student and faculty recruitment, tuition, financial aid, industry connections, philanthropy, facilities and operations, program rankings, and budgets. By fostering a comprehensive understanding of these and other topics, the course will prepare students to successfully navigate their next steps in the world of engineering.

EN.501.155. FYS: Defending the Planet: How to Stop an Asteroid. 3 Credits.

This First-Year Seminar course will examine the science, engineering, and human challenges of defending the planet from an incoming asteroid. We will focus on a scenario developed within the most recent Planetary Defense Conference. Some near-earth objects (NEOs) have a high probability of making a close approach to Earth, and in some rare cases, hitting Earth. These NEO impacts can have devastating consequences for Earth and its inhabitants. One of the most notable NEO impacts was from a large asteroid that led to the extinction of the dinosaurs 65 million years ago. Though large NEOs are very rare, impacts from small NEOs pose significant threats to the planet. What should we do when we detect an incoming asteroid? We will discuss the technological options for deflecting or destroying such objects, as well as the societal and policy issues that will arise when such a threat is discovered. Students in the course may come from any background, and will be expected to participate fully in all of the discussions. We will bring in occasional guest speakers from the Applied Physics Laboratory, NASA, government, and industry to focus on specific aspects; students may be expected to join the speakers for lunch.