

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. 1 Credit.

In our increasingly complex world, engineers and scientists are called on to assume leadership roles in times of crisis. Responding effectively to events like Deepwater Horizon, Fukushima, COVID-19, the Colonial Pipeline ransomware attack, and Apollo 13 requires individuals with deep technical knowledge to step into roles they may have never envisioned, and lead teams to solutions under great adversity. This course will use case studies of well-known crises to deconstruct the engineering of complex systems and explore aspects of technical leadership. It will encourage students to think about the roles they aspire to, and how best to prepare for them. System engineering and project management skills will be introduced, as will the human side of equation – building and leading great teams. Weekly meetings will be devoted to discussion of crisis case studies, the occasional visitor with technical leadership crisis experience, instruction on the elements of engineering leadership, and working towards a final report.

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

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 exist. 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.

Area: Engineering

EN.501.107. FYS: Superwoman! Women in Science and Technology: Myth, Challenge, and Power. 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.

Area: Engineering

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

In 1952, British mathematician, biologist, cryptographer, and proto-computer 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.

Area: Social and Behavioral Sciences

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 course 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 in this course will put theory to practice, applying the processes and techniques of 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. Working individually and in groups, students will reflect upon their own experiences in relation to the themes of the course, and develop foundational artifacts (resumes and personal statements) that support multiple pathways through and beyond Hopkins.

EN.501.117. FYS: Combatting 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, to discover what makes technical communication successful. Students will explore techniques they can use to combat scientific misinformation as well as 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.

The combination of engineering-design and the Social Sciences and the Humanities is not recent. In this combination, design stops being only a craft as it takes a strategic role for achieving change and innovation. This relationship began with the use of applied ethnographic tools for the development of interaction design (IxD/ UX) in software development: it has since transcended the computer towards the redefinition of social interactions. This course intends to set the theoretical and applied methodologies of cultural anthropology in combination with tangible design strategies. The tools portrayed will focus on making sense of social phenomena in relation with healthcare. AnthroDesign has the potential to provide a more ethical framework as well as relevant tools with which to deal explore developments that involve legal and ethical concerns deeply rooted in sociopolitical issues and human rights. In this journey, we will look through the eyes of an anthropologist and take actions with the hands of the designer.

Area: Social and Behavioral Sciences

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 technical discussion of topics including statistics, data analysis, and experimental design, although no specific prerequisites will be required.

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.

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 of 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 Antarctic Treaty that governs peaceful use expires in 2048. How do artists, writers, and filmmakers visualize and chronicle the vast wilderness for people who will never experience it? 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? Shouldn't such a magical and vulnerable place be off-limits or inviolate, only to be viewed from above?

Area: Engineering

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.”

Area: Engineering

EN.501.127. FYS: Innovation Through Empathic Design. 3 Credits.

How can empathy help us solve complex problems? For the longest time, many thought separating themselves – their emotion and feelings - from their work helped them focus and solve technical problems objectively. But how does that help us solve problems for people? People who are complex in nature and whose thoughts and feelings are not separate, but rather intertwined. In order to design concepts and products that are both innovative and aligned to actual user needs and desires, we need to connect and understand people. In this First-Year Seminar, students will delve into what empathy is and how it can help us design innovative solutions by focusing on understanding people and how they see, understand, and interact with the world. We will explore empathy through a historical lens to understand how it is viewed and defined in a variety of different fields of study. We will also engage in understanding ourselves and how empathy is learned and the tools we can use in order to empathize and understand others.

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.501.130. FYS: The Beauty of Mathematics and its Effectiveness, an Exploration. 3 Credits.

Besides being a self-contained logical discipline, mathematics has incredibly broad application to the world we live in. The meta question is why this is so. We explore modalities of application, seeking beautiful underlying structure in mathematics, in applications, and the ways in which they align. Prerequisite is just high school mathematics and a desire to understand the world.

Area: Engineering, Quantitative and Mathematical Sciences