

ENGINEERING, SUSTAINABILITY, AND HEALTH (ESH)

ESH 501 | ENGINEERING AND THE HEALTH OF THE PLANET

Units: 3 Repeatability: No

Students will be introduced to MESH and the complex adaptive systems that will be examined over the next few months in relation to engineering, health, and sustainability. They will begin to develop or enhance their critical thinking skills and ability to question assumptions relating to contemporary practices and processes. Students will explore how changes to earth systems, facilitated or exacerbated by technological developments, affect human health, ecosystems, environmental justice and ethics, within political, economic, and social systems. They will develop their sustainability design skills and apply critical lenses to a variety of engineering applications to consider potential negative human and ecosystem health impacts and possible ways to mitigate these. The course will be taught as a series of case studies within a wide range of engineering disciplines and draw where possible on areas specifically connected to the students' own areas of interest and backgrounds.

ESH 502 | HEALTH AND THE BUILT ENVIRONMENT

Units: 3 Repeatability: No

This course will critically examine the complex interplay between engineering, development, and other interventions that impact the environment, and human, animal, and planetary health. Students will employ transdisciplinary and complex systems approaches to better understand how changes to the environment can impact health outcomes, and thereby foster an awareness of the unintended outcomes of their work and the need for greater intentionality in the planning, design, and implementation of their interventions and projects. This course will also cultivate an understanding of the important, but often overlooked, development of social infrastructure in tandem with the development of physical infrastructure for fostering sustainability.

ESH 510 | SUSTAINABLE FOOD

Units: 3 Repeatability: No

Prerequisites: ESH 501 with a minimum grade of C- and ESH 502 with a minimum grade of C-
This course examines the complex and interconnected world of health, politics, economics, ecology, engineering, sustainability, and justice in relation to food systems and food production. We explore the methods and impacts of land use and food production and distribution through a social science and historical lens. An understanding of the complex social factors and unsustainable practices impacting malnutrition, obesity, and non-communicable and communicable diseases will be essential to be able to redress these challenges. Specifically, food insecurity, food deserts, commerciogenic malnutrition, and famine will be critically examined, as will the impact of transnational food monopolies, foreign direct investment, and the World Trade Organization on food cost, accessibility, and safety. Alternative, sustainable, and just practices of food production and distribution that draw on both traditional and contemporary movements will be mined for innovative solutions that promote human, environmental, and planetary health.

ESH 511 | SUSTAINABLE WATER

Units: 3 Repeatability: No

Prerequisites: ESH 501 with a minimum grade of C- and ESH 502 with a minimum grade of C-
This course explores water and its interconnections with environmental sustainability, social equity, health, and economic development. With the understanding of sustainable access to clean water as a fundamental human right, students will re-envision and create a world where water engineering and management support a healthy ecosystem for both people and the planet. We will explore water scarcity, water access, and engineering innovations in water supply, drinking and waste water, efficiency of distribution, as well as the impact of engineering on water quality and ecosystem health. Throughout the course, students will consider the interrelated aspects of engineering and water in relation to health, justice, and sustainability. The course will adopt a case study approach and students will 'virtually' visit multiple contexts and countries in order to explore the real-life implications of access to life-giving water.

ESH 520 | SUSTAINABLE ENERGY

Units: 3 Repeatability: No

Prerequisites: ESH 501 with a minimum grade of C- and ESH 502 with a minimum grade of C-
This survey course introduces students to energy systems, technologies, governance, and policies through the lens of sustainability. Students completing the course will develop a holistic understanding of how these components currently fit together, the justice and security implications that they create, and how they need to evolve as part of the ongoing energy transition. As part of this journey, students will develop skills for analyzing the state and trends of the U.S. and global energy systems, assessing energy production and consumption data, and evaluating options for delivering energy services in a sustainable and equitable manner. In addition, students will apply the material learned throughout the course to a real-life scenario of their choice and will be able to incorporate the results into their MESH project.

ESH 521 | GETTING TO ZERO WASTE

Units: 3 Repeatability: No

Prerequisites: ESH 501 with a minimum grade of C- and ESH 502 with a minimum grade of C-
This course will explore all elements of the global waste problem from recycling and reusing, to reducing consumption and production, and the practicalities of getting to zero waste. We will examine the idea of circular economies and circularity of materials, inspired by nature to reduce our waste to zero. Critique of contemporary and alternative processes will be facilitated by reviewing the interconnected social, political, economic, environmental and technical implications. Case studies will be explored in different parts of the world and framed in new approaches to the ecological paradigm of moving from waste as a problem to 'waste as a resource'.

ESH 530 | TRANSITIONING TO ALTERNATIVES

Units: 3 Repeatability: No

Prerequisites: ESH 501 with a minimum grade of C- and ESH 502 with a minimum grade of C-

The “Just Transition” framework, emerging from the intersection of climate justice and labor movements, supports both the environment and the worker through a set of principles, processes, and practices that are place-based and yet universal. These principles, processes, and practices address the root-causes of climate change by working to transform the imperialist, colonial, and hierarchical relationships among Peoples, with the Earth, and with knowledge production to just, equitable, and regenerative relations through cooperative economies, direct democracy, and public-interest knowledge production. In this course, we shall explore the potential and promise of such a transition. We shall explore how to reduce extraction by reducing consumption, how to reduce waste by producing for need instead of profit, and how to create non-hierarchical organizational structures in cooperative economies. We shall evaluate the roots and limits of existing ‘corporate metrics’ that measure “progress” towards sustainability by learning from the experiences of historically and currently marginalized communities that are first and most affected by climate change. We aim at co-creating ‘metrics’ with the grassroots movements that facilitate the path towards a just transition.

ESH 531 | ENVIRONMENTAL JUSTICE

Units: 3 Repeatability: No

Prerequisites: ESH 501 with a minimum grade of C- and ESH 502 with a minimum grade of C-

This course will examine the interconnection of industrial and infrastructure development and with environmental issues related to community health, social and environmental justice. Evidence is mounting that unprecedented economic growth experienced by human societies has induced a state of crisis for the Earth’s ecological systems. Many of the public goods provided by them – fresh water, clean air, abundant fisheries, nutritious soils, low sea levels, and moderate weather -- are increasingly at risk. The engineering systems which are needed to support human activity require resource materials and energy at unprecedented rates. Extraction and manufacture of these have the greatest impacts on the most vulnerable societies, which have already suffered the historical impacts of colonization. In this course, we will explore specific issues in an applied, place-based framework, focusing on ways of understanding larger challenges as they manifest themselves. We will also ask fundamental questions about environmental justice, exploring how social power dynamics along racial, economic, and cultural lines are pertinent to understanding people’s disproportionate access to clean, safe, and productive environments, on the one hand, and their unequal exposure to environmental harms, on the other. Through the examination of contemporary case studies, students in this course will be able to demonstrate an advanced level of understanding about the social causes and consequences of environmental racism and inequality, as well as the ways that innovation in engineering can alternately perpetuate environmental inequality and alleviate it.

ESH 540 | CAPSTONE PROJECT

Units: 6 Repeatability: No

Prerequisites: ESH 501 with a minimum grade of C- and ESH 502 with a minimum grade of C- and ESH 510 with a minimum grade of C- and ESH 511 with a minimum grade of C- and ESH 520 with a minimum grade of C- and ESH 521 with a minimum grade of C- and ESH 530 with a minimum grade of C- and ESH 531 with a minimum grade of C-

Participants will embark on a practicum or research project in which they critically review current knowledge and practice in one area of interest and either develop a model and feasibility study or a significant change to their own or others’ practice and explore the impact of this change. This project will run throughout the entire program and relate to all courses. They will be supported throughout the process with critical thinking skills, as well as sustainable design tools and methodologies. For professionals, the project could be based on their own work context. For participants who are not engaged in practice, projects can be arranged as internships for other organizations (online or face to face at a location accessible to participants). It is also possible to conduct a research study for an intended audience. The project might include, but is not limited to: a feasibility study for the development of a new interdisciplinary sustainability/health/engineering process within an organization; conducting a feasibility study and design of a locally appropriate interdisciplinary intervention in a specific context; collaboration with a community organization or NGO/ INGO to design a project or training scheme for engineers and healthcare and development professionals in local culture, environmental, health issues, and human rights; design projects that identify and incorporate appropriate solutions for collaboration between environmental scientists, engineers and health and/or development professionals.

ESH 592 | NEW STUDENT ORIENTATION

Units: 0 Repeatability: No

This orientation course introduces students to the University of San Diego and provides important information about the program. It also allows students to get to know each other and their backgrounds before the start of the program. Throughout the orientation, students will learn to successfully navigate through the online learning environment and locate helpful resources. Students will practice completing tasks in the online learning environment as preparation for success in their graduate courses. This orientation course will be available to students as a reference tool throughout the entirety of your program.