Earth System Science - ESSI

Courses

ESSI 7150 SCIENCE COMMUNICATION (3) LEC. 3. This course will provide opportunities for STEM graduate students to practice communicating science to multiple audiences. Students will gain skills by communicating with both stakeholders and the public and presenting information, exploring public opinion on socio-political topics such as climate change, resilience, and adaptation planning, and learning about appropriate framing and messaging techniques for target audiences. Guest speakers, reading discussions, practical tips, communication rubrics, and presentations to refine communication skills will be emphasized.

ESSI 7200 STEM STUDIO (2) LEC. 2. This course will provide opportunities for interdisciplinary STEM graduate students to learn about structured decision-making and the coproduction of science, which aims to undertake science that is actionable and useful to targeted stakeholder groups. Students will gain skills by communicating with stakeholders and develop a proposal to conduct research with a stakeholder group of their choice. Ideally, students would then implement their research in the follow-on Internship course (ESSI 7920) offered by the ESSI Program/NRT project. Guest speakers, reading discussions, written communication, workshops, and meetings with stakeholders will be included in the course. This course aims to: (i) expose students working on climate adaptation (from natural, social, or humanities sciences) to ideas of interdisciplinary climate knowledge, co-production, and structured decision-making; (ii) help students reflect on and relate these ideas to their own research - how their own climate research could connect with other disciplines and meet the decision needs of stakeholders; (iii) support participants in designing a climate adaptation research project for review by their peers and future implementation with their chosen stakeholder group.

ESSI 7300 SOCIAL-ECOLOGICAL-ENGINEERED SYSTEMS (3) LEC. 3. This course explores foundational scholarship on the Social-Ecological Systems (SES) approach to understanding complex environmental problems with emphasis on the role of engineering in human interactions with natural systems. Students are expected to apply SES concepts and theories to analyses in their own areas of research.

ESSI 7420 NATURAL HAZARDS RISK AND DISASTER RESILIENCE (3) LEC. 3. The purpose of this course is to present students with an approach to understanding adverse natural hazard impacts and disasters grounded in the analysis of disaster risk, vulnerability, and resilience. The course will use a multidisciplinary perspective to examine factors and conditions that put people differentially at risk before, during, and following a disaster event. The course will also introduce students to the metrics, methodologies, and tools necessary for both quantitative and qualitative resilience assessments and benchmarking methods. Specific topics that are an integral part of the resilience concept will include: climate-related hazard risk assessment; disaster resilience assessment covering ecological, social, economic, infrastructural, and institutional components; community capital; hazard mitigation and planning for fostering resilient communities; social vulnerability, and recovery. The course materials, lectures, and assignments will reflect the emerging emphasis on resilience to climate-induced natural hazards and disasters.

ESSI 7920 CLIMATE INTERNSHIP (1) INT. 1. This course will provide graduate Trainees with an opportunity to gain knowledge and skills from a planned work experience in the area of resilience to climate-related natural hazards and disasters. In addition to meeting core learning objectives, jointly developed learning outcomes that are specific to each Trainee will be selected and evaluated by a faculty internship advisor, a stakeholder sponsor, and the Trainee. It is expected that the internship will afford Trainees the opportunity to: 1) explore career paths related to climate resilience outside of academia, 2) conduct research to solve real-world problems, and 3) to understand the research needs of stakeholders. The experience will also give students the opportunity to build professional networks.

ESSI 8000 EARTH SYSTEM SCIENCE AND GLOBAL CHANGE (3) LEC. 3. The course explores the Earth system as a whole, with an emphasis on the interrelationships between geological, biological, climatological, and human systems on regional and global scales.

ESSI 8040 URBAN CLIMATOLOGY (3) SEM. 3. This seminar will explore past, current, and emerging textbooks and literature to introduce (1) the fundamental concepts of the urban-climate system, (2) observational and modeling strategies for studying the urban-climate system, and (3) the context for how the urban-climate system feedbacks fit into the climate change discussion. Students will be graded based on class participation, examinations, a small group project, and an individual project.

ESSI 8100 EARTH SYSTEM OBSERVATIONS AND ANALYSIS (3) LEC. 2. LAB. 2. Pr. GSEI 1200 and GSEI 2070. Course reviews recent advances in earth system observations and provides students opportunity to develop holistic understanding of key parameters and processes of the earth system including biosphere, atmosphere, and oceans processes using observations.

ESSI 8200 EARTH SYSTEM SCIENCE SEMINAR (1) SEM. 1. SU. Students deliver oral presentations based upon their research and provide constructive criticism of their peers' presentations. Topics of presentations may include student’s dissertation research areas or critical examination of current research problems in Earth system science.

ESSI 8990 RESEARCH AND DISSERTATION (1-6) DSR. Theoretical and practical aspects of designing dissertation research in the interdisciplinary Earth System Science program. The course is designed to assist students through the proposal and dissertation writing and presentation processes and to prepare for the dissertation defense. Course may be repeated for a maximum of 15 credit hours.