Nuclear, Plasma, and Radiological Engineering

NPRE 498  **Special Topics**  credit: 1 to 4 hours.

Subject offerings of new and developing areas of knowledge in nuclear, plasma, and radiological engineering intended to augment the existing curriculum. See Class Schedule or departmental course information for topics and prerequisites. 1 to 4 undergraduate hours. 1 to 4 graduate hours. May be repeated in the same or separate terms if topics vary.

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<th>CRN</th>
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<tr>
<td>59909</td>
<td>Lecture-Discussion</td>
<td>A4</td>
<td>ARRANGED -</td>
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<td>Roy, W</td>
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Credit Hours: 4 hours
Spent Nuc Fuel Storage Bedrock
Spent Nuclear Fuel Storage in Bedrock. Course will include five meeting hours on Campus in Spring with discussion comparing U.S. and Swedish approaches to management of nuclear reactor fuel discharges. Enrollment in course requires attendance at one week of lectures and one week of field work in Stockholm, Sweden at the Royal Institute of Technology June 8 - 20. Lectures and field work in Sweden will be on geologic storage in Precambrian bedrock. Topics include petrology and mineralogy, plate tectonics, metamorphism, quaternary geology, hydro geology in soil, hydrogeology in fractured bedrock, hydrogeochemistry, planning and policy, and mapping. Prerequisites: a relevant course in geology, nuclear waste management, or civil engineering, or upper division standing in science or engineering. Contact instructor for full course description. Students registered in the course will be required to submit an application to International Programs in Engineering to attend the study abroad component.

| 67572 | Lecture-Discussion | PRA | 10:00 AM - 11:50 AM | MW   | 100H - Talbot Laboratory | Mohaghegh, Z |

Credit Hours: 3 hours
Advanced Risk Analysis
Restricted to Undergrad - Urbana-Champaign.
This course offers a comprehensive and in-depth review of advanced methods for Probabilistic Risk Analysis (PRA). Topics include: fundamental theories of risk modeling, risk scenario development, model uncertainty, parameter uncertainty, uncertainty propagation (e.g. Method of Moment, Monte Carlo), Bayesian updating, data analysis, hardware reliability, human error modeling, risk importance ranking, precursor analysis, expert elicitation and aggregation, and next generation PRA methods and tools. Risk analysis software will be used for homework and class projects. While the examples will primarily focus on the nuclear power domain, the course will also cover current advancements in risk analysis of other complex systems (e.g. space, aviation, oil and gas). Prerequisites: NPRE 461 Probabilistic Risk Assessment or Instructor Approval.

| 67049 | Lecture-Discussion | SD1 | 11:00 AM - 12:20 PM | TR   | 104 - Talbot Laboratory | Abbaszadeh, S |

Credit Hours: 3 hours
Sensor/Imag Design/Innovation
Restricted to Undergrad - Urbana-Champaign.
This course is a project-based course that starts with photon detection technologies, advanced semiconductor and scintillator devices, as well as a discussion of general aspects of creativity and innovation in engineering and medicine. The lectures cover fundamental detection concepts in a variety of modern scientific and commercial instruments and devices and discuss technological progress that makes them more ubiquitous. We take a deep dive into characteristics of photodetectors and how to select them for specific applications. Example of application such as LIDAR and TOF-PET will be covered. Students will visit Carle Foundation Hospital and will be exposed to examples of unmet needs and are expected to identify and evaluate opportunities to address the need. We continue the lectures with discussion of data scavenging and how to utilize more information from the available data, and student project presentations and peer evaluation.