



# NPRE 100 Orientation to NPRE Fall 2025

## Course Information

1. Course Duration: Full semester (16 weeks)
2. Contact Hours: Thursday, 3:30 – 4:50 PM; one 80-minute lecture-discussion period each week
3. Course Format: In-person
4. Course Location: 1015 Electrical & Computer Engineering Building (ECEB)
5. # Credit Hours: 1 Credit Hours

## Instructor & Course Assistant Information

- **Katy Huff**  
[kdhuff@illinois.edu](mailto:kdhuff@illinois.edu), (217) 300-3132, 111B Talbot Laboratory  
<https://npre.illinois.edu/people/profile/kdhuff>

Katy Huff is an Associate Professor in the Department of Nuclear, Plasma, and Radiological Engineering (NPRE). From May 2021 to May 2024, she took a leave of absence from UIUC to hold multiple positions in the U.S. Department of Energy, including that of Assistant Secretary for Nuclear Energy. Her research is in modeling and simulation of advanced reactors and fuel cycles. She received her PhD in Nuclear Engineering from the University of Wisconsin-Madison (2013) and her undergraduate degree in Physics from the University of Chicago (2008).

- **Becky Meline**  
[bmeline@illinois.edu](mailto:bmeline@illinois.edu), (217) 333-3598, 100A Talbot Laboratory  
<https://npre.illinois.edu/people/profile/bmeline>

Becky Meline is Senior Coordinator of Undergraduate Programs & Academic Advisor for NPRE. She has advised students in NPRE for over twenty years at both the undergraduate and previously graduate level and so is knowledgeable of all NPRE degree programs. She was the recipient of the Office of the Provost's 2020 Campus Award for Excellence in Undergraduate Advising.

- **Kennedy Dempsey**, [kmd9@illinois.edu](mailto:kmd9@illinois.edu), is a junior in NPRE in the Plasma and Fusion Science and Engineering concentration. Over the summer she worked with Prof. Novak's Multiphysics and Multiscale research group on adaptive mesh refinement with neutron transport simulations and is continuing with this research during the school year. She is currently serving as Treasurer for the UIUC American Nuclear Society (ANS) student chapter.
- **Olivia Evans**, [oevans2@illinois.edu](mailto:oevans2@illinois.edu), is a senior in NPRE in the Power, Safety, and Environment concentration. She is an undergraduate researcher under Prof. Novak, working on modeling the Joyo reactor in Monte Carlo. She has also worked with the Corps of Engineers on developing microgrids and will be continuing her work from her summer internship with Constellation Energy, modeling fuel and PCI. Olivia serves as a Co-president for the Women in Nuclear (WIN) student chapter.
- **Adam Rousseau**, [adampr2@illinois.edu](mailto:adampr2@illinois.edu), is a junior in NPRE in the Plasma and Fusion Science and Engineering concentration of NPRE. They spent last summer working on campus in the Synthesis, Plasma, Energy, Conversion (SPEC) Lab, headed by Prof. Sankaran, synthesizing boron nitride using chemical vapor deposition. Adam is also the Outreach Chair in the American Nuclear Society student chapter.
- **Mia Sawkiw**, [msawkiw2@illinois.edu](mailto:msawkiw2@illinois.edu) is a junior in NPRE in the Plasma and Fusion concentration. She is an undergraduate research assistant at the Illinois Plasma Institute (IPI) working with graphene functionalization and plasma analysis under Prof. Qerimi. She serves as the Internal Vice President of the American Nuclear Society student chapter.
- **Aidan Rogers**, [aidanr5@illinois.edu](mailto:aidanr5@illinois.edu), is a sophomore in NPRE in the Power, Safety, and the Environment concentration with a minor in Political Science. He is starting research under Professor Brooks in the Multiphase Thermo-fluid Dynamics Laboratory this semester. He is additionally an active member of the American Nuclear Society (ANS). Last year he was Public Relations chair for an Engineering Open House exhibit, and this year he plans to aid in increasing the chapter's outreach through social media.

Instructor and Course Assistant office hours and locations to be announced in Canvas or by appointment. Students are encouraged to make use of office hours for questions or help with assignments.

## Course Description

**From the Course Catalog: NPRE 100** Orientation to NPRE. 1 credit hours. Introduction to nuclear, plasma, and radiological engineering. Demonstrations and discussion of nuclear phenomena (reactor operation, plasma behavior, and others). Experiments on radioactive decay and radiation shielding with formal laboratory report and a student project.

**Further Description: This course is titled Orientation to NPRE, so...about NPRE:** Nuclear, plasma, and radiological engineering encompasses a broad and diverse but complimentary set of engineering disciplines with a wide variety of applications – in energy production, plasma processing of materials, fusion development, biomedical research and healthcare, and nuclear safeguards and radiation detection. The NPRE curriculum includes three concentrations:

- Power, safety, and the environment
- Plasma and fusion science and engineering
- Radiological, medical and instrumentation applications

**Power, safety, and the environment** focuses on continued safe and reliable nuclear energy production. This relies on multifaceted engineering disciplines for design and analysis of large complex systems. Areas of scholarship and research include: advanced reactor design and safety, reactor physics and thermal-hydraulics, nuclear materials, instrumentation and controls, training and education, fuel design and performance, waste management, reactor accident analysis, risk and reliability, probabilistic risk assessment, human factors, validation and verification, uncertainty analysis, energy and security, and nonproliferation.

**Plasma and fusion science and engineering** focuses on plasma processing for a myriad of applications including semiconductor production and on harnessing the power of nuclear fusion. Areas of scholarship and research include: plasma physics and fusion, plasma material interactions, plasma modeling, plasma code development, atmospheric plasma, extreme ultraviolet lithography and physical vapor deposition, plasma processing of semiconductors, fusion materials, plasma nanosynthesis, plasma sources and processing, and plasma manufacturing.

**Radiological, medical and instrumentation applications** concentration encompasses the intersection of radiation technologies, medicine, and security. This area focuses on developing science and engineering techniques that utilize ionizing radiation for biomedical research and healthcare as well as nuclear safeguards and radiation detection for homeland security. Areas of scholarship and research include: biomedical imaging, radiation detection and measurement, x-ray imaging techniques, image processing, emission tomography (PET and SPECT), spectroscopy, dosimetry, homeland security, nuclear safeguards, nonproliferation, radiation protection during radiation therapy, big data analytics for radiation sensor networks, health physics, advanced thermal neutron detectors, and isotope identification algorithms.

**More about this course:** This course introduces students to the core **N**, the **P**, and the **R** fields of **N**uclear, **P**lasma, and **R**adiological Engineering as well as its interrelated areas of Materials Science and Reliability and Risk. Nuclear phenomena are presented and discussed. Students create an individualized degree plan. Experiments are conducted on one of a) radiation shielding, b) plasma breakdown voltage, c) control room simulation with a written laboratory report. Computer programming is introduced using Python. Engineering design and research practices are introduced. Students present results of their design and research project. Tours of research facilities on campus are taken. Faculty guest presentations are given on current research in the NPRE fields. Guest presentations may be given by Engineering Undergraduate Research, Engineering Career Services, and other Engineering resource units. Ethical practices in Engineering are discussed.

## Learning Outcomes

- Students will develop an individualized plan that will include all requirements to complete the degree within the anticipated graduation term and will include any additional requirements for any certificates, minors, dual degrees, or study abroad experiences that the student may wish to pursue.
- Students will conduct a physical experiment in one of a) radiation shielding, b) plasma breakdown voltage, c) control room simulation and write a technical lab report showing results.
- Students will use the programming language Python to complete a data analysis and plotting activity.
- Students will be introduced to the engineering process by working in small teams to identify a challenge, the math/physics/experiments necessary to address this challenge, the engineering considerations, and finally the challenge solution. They will create a short video which will summarize their challenge background and findings.
- Students will demonstrate the ability to present information clearly, coherently, and in an organized way through a team presentation on a research project using visuals (Power Point, Google Slides, etc.)
- Students will be exposed to the broad and varied research opportunities in NPRE through presentations by advanced students, faculty, and guest speakers.
- Students will keep a journal of their ongoing efforts and experiences in developing themselves as researchers and scholars and for preparing themselves for “what’s next” professionally.

## Prerequisites

None

## Course Materials

### Learning Management System

Course materials, including syllabus, lecture notes or presentations, and assignment prompts will be posted in [Canvas](#)

### Required and Recommended Course Readings

All required and/or recommended Course Readings will be available through Canvas.

## Course Requirements and Policies

### Grading Breakdown

Instructional Activity	Occurrences	Percentage
<b>Assignments:</b>		
Degree plan (individual)	1	15%
Lab Report (individual)	1	20%
PYTHON computer project (individual)	1	20%
Pre-design project video (team)	1	15%
Research project presentation (team)	1	15%
Journal submission (individual)	3	9%
<b>Other:</b>		
Quizzes	6	6%
<b>Total</b>		100%

## Course Components

### Assignments

- Assignments will be introduced in class and details posted in Canvas. You are responsible for reading assignment prompts fully and for asking the instructors and/or course assistants any questions you may have.

- You are expected to produce your own work in individual assignments. You may collaborate with peers, but each student is responsible for writing their own assignment separately.
- Assignments are to be submitted through Canvas unless otherwise noted.
- Assignments are to be submitted by 11:59 PM on due date unless otherwise noted.

## Quizzes

There will be six unannounced, “pop”, quizzes throughout the semester. There are no make-up options.

## Late Assignment Policy

10% for every day late, up to a maximum of 50% reduction. No late assignments will be accepted for credit after last day of instruction, Wednesday, December 10.

## Class Attendance

- The [Student Code](#) states "Regular class attendance is expected of all students at the university."
- Our time together is limited – 80 minutes, 14 classes, and we have a lot to cover.
- In general, across university classes, there is a correlation between regular class attendance and student academic success.

## Absence Policy

- If you know in advance that you will be absent, it is your responsibility to notify the instructor prior to absence. Notification should be no less than one week in advance in order for there to be any accommodation.
- Examples of excused absences include a documented illness, family emergency, required military service or athletic event, or observance of a religious holiday.
- If you are absent, it is your responsibility to review all content covered during the class.
- Please arrive to class on time. Being late means you miss material covered from the start of class. It can also be disruptive to the instructors and your peers.

## Technology Use During Class

Cell phones are to be turned off and put away during class. Use of tablets and laptops is allowed only when required for an in-class assignment and this is explicitly stated by your instructor. At all other times, electronic devices should be silenced and put away. NPRE 100 expects you to be an active participant in class. The tech-free policy is intended to help keep students fully present and undistracted in class and to prevent you from unintentionally distracting your peers.

## Course Schedule/Outline

The Course Schedule/Outline is provided in a separate document. Please refer to it for class dates, activities, misc. notes and assignments with deadlines.

## Additional Course and Campus Policies

### Academic Integrity

Academic dishonesty may result in a failing grade. Every student is expected to review and abide by the Academic Integrity Policy:

<https://studentcode.illinois.edu/article1/part4/1-401/> . Ignorance is not an excuse for any academic dishonesty. It is your responsibility to read this policy to avoid any misunderstanding. Do not hesitate to ask the instructor(s) if you are ever in doubt about what constitutes plagiarism, cheating, or any other breach of academic integrity.

### Students with Disabilities

The University of Illinois Champaign-Urbana, is committed to ensuring that all students, including students with disabilities, do not experience barriers to learning and participating fully in class. Students who have a letter of accommodation from DRES are advised to share that with instructors as soon as possible to ensure accommodation needs can be discussed and met.

To obtain disability-related academic accommodations, disabled students must contact Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES, please visit 1207 S. Oak Street, Champaign, call 217.333.1970, email [disability@illinois.edu](mailto:disability@illinois.edu), or visit the DRES website.

### Family Educational Rights and Privacy Act (FERPA)

See <http://registrar.illinois.edu/ferpa> for more information on Family Educational Rights and Privacy Act (FERPA).

### Mental Health

Significant stress, mood changes, excessive worry, substance/alcohol misuse or interferences in eating or sleep can have an impact on academic performance, social development, and emotional wellbeing. The University of Illinois offers a variety of confidential services including individual and group counseling, crisis intervention, psychiatric services, and specialized screenings which are covered through the Health Service Fee. If you or someone you know experiences any of the above mental health concerns, it is strongly encouraged to contact or visit any of the University's resources provided below. Getting help is a smart and courageous thing to do for yourself and for those who care about you.

- Counseling Center (217) 333-3704
- McKinley Health Center (217) 333-2700
- National Suicide Prevention Lifeline (800) 273-8255
- Rosecrance Crisis Line (217) 359-4141 (available 24/7, 365 days a year)

If you are in immediate danger, call 911.

## Community of Care

As members of the Illinois community, we each have a responsibility to express care and concern for one another. If you come across a classmate whose behavior concerns you, whether in regard to their well-being or yours, we encourage you to refer this behavior to the Connie Frank CARE Center (formerly the Student Assistance Center) in the Office of the Dean of Students. You may do so by calling 217-333-0050 or by submitting an [online referral](#). Based on your report, staff in the Connie Frank CARE Center will reach out to offer support and assistance.

Further, as a Community of Care, we want to support you in your overall wellness. We know that students sometimes face challenges that can impact academic performance (examples include mental health concerns, food insecurity, homelessness, personal emergencies). Should you find that you are managing such a challenge and that it is interfering with your coursework, you are encouraged to contact the [Connie Frank CARE Center](#) (formerly the Student Assistance Center) in the Office of the Dean of Students for support and referrals to campus and/or community resources.

## Disruptive Behavior

Behavior that persistently or grossly interferes with classroom activities is considered disruptive behavior and may be subject to disciplinary action. Such behavior inhibits other students' ability to learn and an instructor's ability to teach. A student responsible for disruptive behavior may be required to leave class pending discussion and resolution of the problem and may be reported to the Office for Student Conflict Resolution (<https://go.illinois.edu/ReportMisconduct>; [conflictresolution@illinois.edu](mailto:conflictresolution@illinois.edu); 333-3680) for disciplinary action.

## Emergency Response Recommendations

Emergency response recommendations and campus building floor plans can be found at the following website: <https://police.illinois.edu/em/run-hide-fight/>. I encourage you to review this website within the first 10 days of class.

## Religious Observances

It is the policy of the University of Illinois Urbana-Champaign to reasonably accommodate its students' religious beliefs, observances, and practices that conflict with a student's class attendance or participation in a scheduled examination or work



requirement, consistent with state and federal law. Students must make requests for accommodation in advance of the conflict to allow time for both consideration of the request and alternate procedures to be prepared. Requests should be directed to the instructor. The Office of the Dean of Students provides an optional resource on its [website](#) to assist students in making such requests.

## **Sexual Misconduct Reporting Obligation**

The University of Illinois is committed to combating sexual misconduct. Faculty and staff members are required to report any instances of sexual misconduct to the University's Title IX Office. In turn, an individual with the Title IX Office will provide information about rights and options, including supportive measures, resources, the campus disciplinary process, and law enforcement options.

A list of the designated University employees who, as counselors, confidential advisors, and medical professionals, do not have this reporting responsibility and can maintain confidentiality, can be found here: [wecare.illinois.edu/resources/students/#confidential](https://wecare.illinois.edu/resources/students/#confidential).

Other information about resources and reporting is available here: [wecare.illinois.edu](https://wecare.illinois.edu).

## **Veterans and Military Students**

As a military-friendly institution, and per federal regulations and Illinois statutes, the University of Illinois Urbana-Champaign has established policies and procedures to accommodate military-connected students. In addition to the support available at the Chez Veterans Center (<https://chezveteranscenter.ahs.illinois.edu/>), members of the National Guard or Reserves and active-duty military personnel with military obligations (e.g., deployments, training, drills) are encouraged to communicate these, in advance whenever possible, to the instructor. The policy for Excused Absences and Departure from the University for U.S. Military or other U.S. National Defense Services can be found at <https://studentcode.illinois.edu/article3/part3/3-313>.