NRE 4350 Syllabus

Design Methods & Tools, Section A, 3 Credits]

Fall 2026

Instructor Information

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General Course Information

Description

Introduction to selected methods and nuclear engineering analytic tools (computer codes) with tutorials.

Course Learning Outcomes

- Develop a basic understanding of methods, applications and limitations of selected state-of-the-art tools used in nuclear and radiological engineering design
- Demonstrate ability to apply knowledge of mathematics, science, and engineering to understand methods, applications and limitations of selected state-of-the-art tools
- Develop a basic capability of using selected state-of-the arts tools and problem-solving skills within the context of nuclear engineering design.
- Demonstrate ability to formulate and solve engineering problems, as needed to perform assigned analyses in reactor physics, shielding and reactor design using selected state-of-the art tools/codes.
- Demonstrate ability to effectively present results of their analyses in written reports.

Required Course Materials

SCALE code manual, available free online: https://scale-manual.ornl.gov/

MCNP code manual, available free online: https://mcnp.lanl.gov/manual.html

Grading Policy:

A>90; B>80; C>70; D>60

Description of Graded Components

There will be 7 to 9 assignments spread throughout the semester (approximately every 2 weeks) requiring use of selected analytic tools. Each assignment will typically require preparing model(s) and input(s), running a simulation, extracting and interpreting results, and writing a report. The last assignment is a mini-project. Each assignment (except the mini-project) will contribute up to 15%, and the final assignment will contribute up to 33% toward the total combined score defining the final grade. Points/weight of each assignment will be specified with the assignment. Additionally, there will be several short pass/fail assignments (e.g., obtaining codes from RSICC, test runs with given inputs, and similar) that will have to be completed by the deadline assigned.

Course Policies

Pre-Requisites

NRE 3208 or equivalent, NRE 3112 or equivalent, or, with approval of instructor

Pre- or Co-Requisites

NRE 4214 or equivalent, or NRE 4328 or equivalent; or, with approval of instructor

Communications by email

If you contact me by email, it is mandatory that you use your GT email address.

Attendance and Participation

In class lectures and tutorials, we will discuss topics relevant for assigned projects. Therefore, you are expected to attend and participate, and your attendance will be considered when determining your final grade.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services (404-894-2563) as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Absence and Assignments Due Dates

For any absence, for any reason please inform me in advance, as soon as possible.

Students who will be absent because of participation in approved Institute activities (such as field trips, professional conferences, and athletic events) should obtain approval of such activities from the Student Academic and Financial Affairs Committee of the Academic Senate, and statements of the approved absence may be obtained from the Office of the Registrar. Notify me at least two weeks in advance. Due to tight schedule of the assignments, in most cases it will not be possible to grant any extension; instead, you will get the assignment early to be able to complete it by the regular due date/time.

Late Assignments and Extensions

Submittals of assignments will be due strictly by the date and time announced, in the manner announced with each assignment. If not specified otherwise, assignments should be uploaded to Canvas. In case of any technical issues with upload, it should be emailed to the instructor before the due date/time. Each student can postpone one submittal deadline (except the last assignment) by 72 hours (3 days), notifying the instructor by email at least 24 hours before the submittal deadline. No reason needs to be provided and there will be no penalty in grading if submitted within 72 hours of the original deadline. A longer delay will result in zero points. Any subsequent late submittal will result in zero points. The last assignment (mini-project) will be assigned at least 3 weeks before the due date, and this submittal cannot be extended.

Collaboration, Group Work, and Use of Generative AI

Students are allowed to discuss assignments and issues with using the codes. However, preparation of specific models and inputs, simulations and analyses, preparation of the report, etc., must be independent individual effort of each student. If in doubt, consult with me in advance.

Use of AI for assignments and preparing reports is not allowed.

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review Georgia Tech's Honor Code and the student Code of Conduct.

Any student suspected of cheating or plagiarism on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Student-Faculty Expectations Agreement

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. The Student-Faculty Expectations articulate some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

Student Use of Mobile and Electronic Devices in the Classroom

Use of mobile and electronic devices is not allowed, unless related to class activities, such as during the hands-on computer codes tutorials.

Additional Course Policies

Recording of class activities is not allowed.