NRE 2120 Syllabus

[Elements of Nuclear Science and Engineering, Section A, 3 Credits]

[Class Day(s) M/W**, Time** 11:00-12:15 PM**, Location** Boggs Building Room 328**]**

Instructor Information

Instructor	Email	Office Hours & Location
Professor TBD	TBD	Monday 12:15 PM to 1:00 PM in office (Boggs 3-05), or virtual, or by appointment through email
Grader Benjamin Gill	bgill35@gatech.edu	

General Information

Description

Nuclear technologies have positive impact on society through clean electrical production, industrial applications, and medical practice. This course provides understanding of the fundamentals that influence the application of these technologies. This course covers nuclear and radiation engineering fundamentals and applications. Topics include basics of the atom, nuclear cross-sections, interaction rates, radioactive decay, and neutron multiplication. Applications include nuclear power generation, different types of reactors, radiation detection, etc.

Course Goals and Learning Outcomes

Upon successful completion of this course, students should be able to:

1. Summarize multiple applications of nuclear technologies such as power production
2. Explain the theory involved in generating power from nuclear fission
3. Understand the different types of nuclear reactors (e.g., thermal vs fast neutrons, coolant types); Explain the basic systems of a pressurized water reactor (PWR) and a Boling water reactor (BWR) and the safety systems within a nuclear power plant
4. Solve a limited set of real problems encountered in the nuclear engineering field
5. Understand the professional responsibilities and ethics requirements of engineers & scientists, and be able to effectively communicate

Course Requirements & Grading

Assignment	Date	Weight (Percentage, points, etc)
Final Exam	See Course Schedule	20% of total grade
Midterm Exam 1	See Course Schedule	20% of total grade
Midterm Exam 2	See Course Schedule	20% of total grade
Homework	Assigned weekly in class	20% of total grade
Team Project Presentation	Sign up for the time slot	10% of total grade
Student Presentation	Beginning of Every Lecture	10% of total grade

Notes:

1. If less than 60% of homework is submitted (submit 6 or less out of 10), the homework category will be 0.
2. There will be quiz and call for answer in classes. Absence results in a penalty of 5% of the total grade each time. If you do not come to classes consistently (miss quiz or call for answer in class for more than 3 times), your final grade will be 60% of the final grade.

Description of Graded Components

Homework (20%)

Approximately each week will have a homework assignment due. Some focus on problems out of the textbook and some homework problems will be created by the instructor. Homework assignments are due at midnight 11:59 pm on the day they are due. Homework assignments will be posted to Canvas and must be submitted on Canvas as a clear photo or other electronic version, such as a Word document or PDF. Each student must turn in their own unique completion of the assignment.

No late homework will be accepted without an institute-approved absence due to any reason. Late homework will be given 0 score. To give everyone same chance for unforeseen circumstance, one lowest grade of homework will be dropped, and will not be counted in the total grade.

If quiz is given, the grade of quiz will be counted towards homework section.

Individual Presentation (10%)

Each student will give one presentation at the beginning of each lecture (starting in the third week) during the semester. Presentations will be approximately 5 minutes followed by questions asked by the audience (5 minutes most). When it comes to 5 minutes, the instructor will stop the presentation due to time constraint. All presentation topics should relate to nuclear field (except different reactor types as we reserve it for the team project). Students will discuss the topics they are interested in class (see class schedule) to make sure no significant overlaps in the plan, and students should sign up for presentation time slots by the second week of the class. Presentation must be uploaded to Canvas with required naming format by the day prior to the presentation day. Rubrics for presentation is upload to Canvas.

Team Project (10 %)

There will be a team project on different reactor types and their potential user cases. Team project will involve a presentation. The presentation CAN NOT be made by generative AI.

Exam (60 %)

There will be two midterm exams (20% each) and one final exam (20% each). Exam will focus on material covered in class and homework problems. Please note that no sample exam will be provided, but we can arrange an exam review if the whole class agree it is necessary. The exams may include both quantitative and qualitative components. Academic dishonesty on exams will be taken very seriously.

If you don't show up in the exam (without an institute-approved absence), no make-up exam should be expected.

The two midterm exams will be during class time (see course schedule), 11:00-12:15pm.

The final exam will be on December 10 (two hours, detailed time and location TBD).

Bonus Opportunities (≤3%)

Throughout the semester students may be given opportunities to obtain bonus credit for the course. Bonus opportunities include attendance at selected NRE seminars and write a brief summary sending to instructor no later than the day after the seminar. Each completed seminar is 0.5 bonus points. At most 3 bonus points

can be counted to final grade. There is no guarantee that students will receive bonus opportunities. Bonus participation is not required.

Grading Scale

Your final grade will be assigned as a letter grade according to the following scale:

A	90%-100%
B	80-89.9%
C	70-79.9%
D	60-69.9%
F	0-59.9%

Since bonus opportunities are available, please note that there will be no rounding up of grades or grading on a curve.

Absence Penalty

There will be quiz and call for answer in classes. Missed quiz or call for answer results in a penalty of 5% of the total grade each time. If you do not come to classes consistently (miss quiz or call for answer for more than 3 times), your final grade will be 60% of the final grade.

Course Materials

Course Textbook

Masterson R.E. (2017) Nuclear Engineering Fundamentals A Practical Perspective (CRC Press). The free pdf version can be downloaded from Georgia Tech library: https://www.taylorfrancis.com/books/mono/10.1201/9781315156781/nuclear-engineering-fundamentals-robert-masterson after you login in http://library.gatech.edu.

Additional Materials/Resources

Lamarsh J.R. and Baratta A.J. (2001) Introduction to Nuclear Engineering (3rd Edition (Pearson) Other books, reviews, and papers indicated in lecture notes and/or posted on T-square. NOTE: Most lectures use outside sources in addition to (or instead of) the textbook.

Course Website and Other Classroom Management Tools

Canvas will be used as the course website to communicate with the students. Canvas will also be used for student presentation document.

Course Expectations & Guidelines – Please read through

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. For information on Georgia Tech's Academic Honor Code, please visit http://www.catalog.gatech.edu/policies/honor-code/ or http://www.catalog.gatech.edu/rules/18/.

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

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at (404)894-2563 or their website http://disabilityservices.gatech.edu/, and http://disabilityservices.gatech.edu/content/welcome-accommodate as soon as possible, 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.

Attendance and/or Participation

Students are required to actively participate in every scheduled class period, unless they are prevented by an emergency. No phone should be used during class.

Extensions, Late Assignments, & Re-Scheduled/Missed Exams

Late assignments will not be accepted, and missed exams will not be rescheduled without an Institute approved absence (e.g. field trips and athletic events). However, if you have a medical or family emergency, please reach out to the Dean of Students for support and assistance. See http://catalog.gatech.edu/rules/4/ for an articulation of the Institute rules.

"In the event of a medical emergency or an illness that is severe enough to require medical attention, students are responsible for contacting the Office of the Dean of Students as soon as possible to report the medical issue or emergency, providing dated documentation from a medical professional and requesting assistance in notifying their instructors. The medical documentation will be handled confidentially within the Office of the Dean of Students and will inform a decision as to whether communication with instructional faculty is appropriate. It is the expectation of the Institute that instructional faculty will honor a request from the Office of the Dean of Students to excuse a medical emergency or illness and allow make-up of the work missed, including homeworks, quizzes, presentations, examinations, or other class assignments."

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. See http://www.catalog.gatech.edu/rules/22/ for an articulation of some basic expectation 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.

Additional Course Policies

The materials used in this class, including, but not limited to, exams, quizzes, homework assignments, and lectures are copyright protected works. Any unauthorized copying of the class materials is a violation of federal law and may result in disciplinary actions being taken against the student. This includes, among other things, uploading class materials and recording to websites for the purpose of sharing those materials with other current or future students.

The instructor reserves the right to revise, alter, and/or amend this syllabus and attached course schedule as necessary. Students will be notified through canvas or in class of any changes to the syllabus.

Survey

Mid-Semester Course Survey: An anonymous survey will be available in October to provide feedback on the course content and delivery, assessments, and other course features. This is your opportunity to provide feedback on how the course is going so that I can adjust the course if need to.

End of Course Survey: Students are expected to complete the online CIOS course evaluation.

Campus Resources for Students

Academic Advisors (advising.gatech.edu/) in each school help students navigate degree requirements and take advantage of campus resources to ensure their success.

The **Center for Academic Success** (success.gatech.edu/) offers a variety of academic support services to help students succeed academically at Georgia Tech (e.g. tutoring, peer-led study groups, study skills, etc.).

The **Communication Center** (communicationcenter.gatech.edu/) provides support for students with respect to developing competency and excellence in written, oral, visual, electronic, and nonverbal communication.

The **Library** (library.gatech.edu/) provides students with many services besides borrowing privileges including access to technology and technical assistance, online access to many journals and databases, and subject and personalized research assistance.

The **Office of Disability Services** (disabilityservices.gatech.edu/) ensures that students with disabilities have equal access to all programs and activities offered at Georgia Tech. They provide documentation and officially sanctioned requests for accommodation for students

OMED: Educational Services (omed.gatech.edu/) is the unit charged by Georgia Tech with the retention, development, and performance of the complete student learner who is traditionally underrepresented: African American, Hispanic, and Native American. OMED's programming and academic support services are aimed at equipping all students with strategies to navigate the Georgia Tech environment.

The **Division of Student Life** (studentlife.gatech.edu/) – often referred to as the Office of the Dean of Students – offers resources and support for all students in our community.

Counseling Center	counseling.gatech.edu/	404-894-2575
Dean of Students	studentlife.gatech.edu/	404-385-8772
GT Police	police.gatech.edu/	404-894-2500
Stamps Health Services	health.gatech.edu/	404-894-1420

Course Schedule

See associated course schedule.

The instructor reserves the right to modify the syllabus and course schedule. Any modification will be notified to students.