NRE/MP 6756 - RADIATION PHYSICS
Fall Semester, 2026

Instructor: Dr. C-K Chris Wang, Boggs, Room 3-86, Tel.: (404) 894-3727, E-mail: chris.wang@nre.gatech.edu

Course TA: TBD

Objectives: To acquaint graduate students in nuclear/radiological engineering and medical physics with the modern theories of nuclear structures, decays, nuclear reactions, and the concept of cross sections of neutron, photon, and charged-particle interactions with atoms and nuclei.

Credit hours: 3

Lectures: TR 9:30 – 10:45 AM, ASE 110. Video recordings of all lectures will be available on the Canvas course website for both on-campus and distance learning (DL) students. All students are strongly encouraged to attend lectures in person to get the most out of the course. The live ZOOM link is posted to the DL students on the course canvas page under the media gallery tab at the top of that page.

Class website: All materials for the class (announcements, schedule/changes, lecture notes, homework assignments, etc.) will be distributed electronically via course canvas page: https://Canvas.gatech.edu/. Students are responsible for checking the course canvas page regularly for homework assignments and announcements.

Office Hours: By appointment

Textbook: C-K Chris Wang, Atoms, Nuclei, and Interactions of Ionizing Radiation with Matter, 1st edition, 2017, ISBN 978-1-5165-1439-7 (pbk). The book is published and distributed by Cognella Academic Publishing, and is available for purchase via the link below: https://store.cognella.com/80904-1C-NI-011

References: Kenneth S. Krane, Introductory Nuclear Physics, John Wiley & Sons, Inc., 1988, ISBN 0471-80553-X.

Stanley G. Prussin, Nuclear Physics for Applications, WILEY-VCH Verlag GmbH & Co. KGaA, 2007, ISBN: 978-3-527-40700-2.

Homework Assignments: Eight homework assignments will be issued, with only the top six scores counting toward your final grade. Each assignment is due 10 days after its release date, and solutions will be posted after the due date.

Grading policy: Final grade of the student will be determined by the weighted average of six homework assignments, two midterm exams, and the final exam according to the weight distribution below:

Homework (6)	20% (3.33% each)
Midterm exams (2)	50% (25% each)
Final exam	30%
Weighted average	100%

The final letter grade will be assigned according to the weighted average as:
$90\% \le A$; $80 \le B \le 89\%$; $70 \le C \le 79\%$; $60 \le D \le 69\%$; $F < 60\%$
Should the mean score of the class happen to be less than 80%, the grades will be curved. In the curve calculation, "M" stands for the mean score of the class and SD is the standard deviation of the class.
$M + SD \le A$; $M \le B < M + SD$; $M - SD \le C < M$; $M - 2*SD \le D < M - SD$; $F < M - 2*SD$

Exam requirements for DL students: DL students must arrange for exam proctoring through the DL Office. The students must take their exams within two business days following the scheduled date for on-campus students.

Lecture/Exam Schedule

Week No.	Date	Lecture Topics	Reading
1	8/25	Basic concepts and definitions (First day of class)	Ch.1: Secs. 1.1-1.3
	8/27	Continue	Ch.1: Secs. 1.4-1.7
2	9/1	Continue	Ch.1: Secs. 1.8-1.9
	9/3	Structure of atoms and characteristic x-rays	Ch.2: Secs. 2.1-2.6
3	9/8	Basic concepts of quantum mechanics	Ch.3: Secs. 3.1-3.4
	9/10	Continue	Ch.3: Secs. 3.5-3.7
4	9/15	Continue	Ch.3: Secs. 3.8-3.9
	9/17	Continue	Ch.3: Secs. 3.10-3.11
5	9/22	Properties and structure of atomic nuclei	Ch.4: Secs. 4.1-4.4
	9/24	**Exam #1**	
6	9/29	Properties and structure of atomic nuclei	Ch.4: Secs. 4.5-4.10
	10/1	Unstable nuclei, radioactivity, radioactive decay modes	Ch.5: Secs. 5.1-5.3
7	**10/6**	**Recess (Fall break)**	
	10/8	Radioactive decay schemes, radioactive decay and buildup	Ch.5: Secs. 5.4-5.5
8	10/13	Theory of Alpha decay	Ch.6: Sec. 6.1
	10/15	Theory of beta decay and electron capture	Ch.6: Sec. 6.2
9	10/20	Theory of gamma decay and internal conversion	Ch.6: Sec. 6.3
	10/22	Theory of spontaneous fission	Ch.6: Sec. 6.4
10	10/27	Nuclear reactions and kinematics	Ch.7: Secs. 7.1-7.3
	10/29	Neutron-induced fissions	Ch.7: Secs. 7.4-7.5
11	**11/3**	**Exam #2**	
	11/5	Interaction of neutron with matter	Ch.8: Secs. 8.1-8.3
12	11/10	Interaction of neutron with matter	Ch.8: Secs. 8.4-8.5
	11/12	Continue	Ch.8: Secs. 8.6-8.8
13	11/17	Interaction of charged particles with matter	Ch.9: Sec. 9.1
	11/19	Continue	Ch.9: Sec. 9.2
14	11/24	Continue	Ch.9: Sec. 9. 3-9.5
	11/26	**Holiday**	
15	12/1	Interaction of gamma photons with matter	Ch.10: Secs. 10.1-10.2
	12/3	Interaction of gamma photons with matter	Ch.10: Secs. 10.3-10.4
16	12/8	Continue & course review (Last day of class)	Ch.10: Secs. 10.5-10.6

Final exam: TBD