Applied Nuclear Physics RDCH/HPS-701

UNIVERSITY OF NEVADA LAS VEGAS Department of Health Physics and Diagnostic Sciences Fall 2021

Time: Class Location: Instructor: Office Hours:

Note: The instructor reserves the right to change the syllabus as it relates to how the course is administered.

Course Description

Introduction to the fundamental principles of nuclear physics and quantum mechanics, including nuclear physics, radioactive decay, and the interactions of radiation with matter.

Course Prerequisite(s):

Graduate standing in Health Physics, Radiochemistry or Nuclear Engineering

Course Objectives

To provide the students with an understanding of the fundamental principles of modern physics to serve as a foundation for future training in health physics, nuclear engineering, and radiochemistry. Outcomes for HPS/RDCH 701 include:

Understand and apply fundamentals of quantum mechanics & nuclear physics Understand and calculate radioactive decay and activity Understand and predict interactions of radiation with matter Understand and be able to predict outcomes of nuclear reactions

Required Text

Introductory Nuclear Physics, Kenneth Krane. John Wiley & Sons, Inc. 978-3527406067.

1 RDCH/HPS 701 Syllabus

Recommended Text

Nuclides and Isotopes: Chart of the Nuclides. 16th Edition. Knolls Atomic Power Laboratory. 2002. (or see online version at <u>Chart of the Nuclides</u>)

Atoms, Radiation and Radiation Protection, 3rd Edition. James E. Turner. John Wiley & Sons, Inc. 978-3527406067.

Evaluation Methods

Grading for the course will be based on the scheduled exams, final exam, and weekly homework. Tentative grade weights given to each evaluation tool as follows:

Examinations (2) 50%

Final Exam 25%

start of the semester, and the classroom locations are available approximately one month before the end of the semester. See the <u>Final Exam Schedule</u>, https://www.unlv.edu/registrar/calendars.

Identity Verification in Online Courses

All UNLV students must use their Campus-issued ACE ID and password to log in to WebCampus-Canvas.

UNLV students enrolled in online or hybrid courses are expected to read and adhere to the <u>Student Academic Misconduct Policy</u>, https://www.unlv.edu/studentconduct/misconduct/policy, which states that "acting or attempting to act as a substitute for another, or using or attempting to use a substitute, in any academic evaluation or assignment" is a form of academic misconduct. Intentionally sharing ACE login credentials with another person may be considered an attempt to use a substitute, and could result in investigation and sanctions, as outlined in the Student Academic Misconduct Policy.

UNLV students enrolled in online courses are also expected to read and adhere to the <u>Acceptable Use of Computing and Information Technology Resources Policy</u>,

https://guides.library.unlv.edu/appointments/librarian. You can also <u>ask the library staff</u> questions via chat and text message at https://ask.library.unlv.edu/.

Missed Classwork

Any student missing class, quizzes, examinations, or any other class or laboratory work because of observance of religious holidays will be given an opportunity during that semester to make up the missed work. The make-up opportunity will apply to the religious holiday absence only. It is the responsibility of the student to notify the instructor within the first 14 calendar days of the course for Fall and Spring courses (except for modular courses), or within the first 7 calendar days of the course for Summer and modular courses, of their intention to participate in religious holidays which do not fall on state holidays or periods of class recess. For additional information, please visit the Missed Classwork policy, under Registration Policies, on the Academic Policies webpage,

https://catalog.unlv.edu/content.php?catoid=32&navoid=8271&hl=.

In accordance with the policy approved by the Faculty Senate regarding missed class time and assignments, students who represent UNLV in any official extracurricular activity will also have the opportunity to make up assignments, provided that the student submits official written

major Campus events, and announcements. All UNLV students receive a Rebelmail account after they have been admitted to the University. Sending emails within WebCampus-Canvas is also acceptable.

Tutoring and Coaching

The Academic Success Center (ASC), at the Claude I. Howard Building, provides tutoring, academic success coaching, and other academic assistance for all UNLV undergraduate students. For information regarding tutoring subjects, tutoring times, and other ASC programs and services, please visit the <u>ASC website</u>, https://www.unlv.edu/asc, or call 702-895-3177. The ASC is located across from the Student Services Complex (SSC). Academic success coaching is located on the second floor of SSC A, Room 254. Drop-in tutoring is located on the second floor of the Lied Library, and on the second floor of the College of Engineering building (TBE A 207).

UNLV Writing Center

One-on-one or small group assistance with writing is available free of charge to UNLV students at the Writing Center, https://writingcenter.unlv.edu/, located in the Central Desert Complex, Building 3, Room 301 (CDC 3–301). Walk-in consultations are sometimes available, but students with appointments receive priority assistance. Students may make appointments in person or by calling the Center, telephone 702-895-3908. Students are requested to bring to their appointments their Rebel ID Card, a copy of the instructions for their assignment, and two copies of any writing they have completed on their assignment.

Diversity Statement

As an institution of higher learning, UNLV represents a rich diversity of human beings among its faculty, staff, and students, and is committed to aspiring to maintain a Campus environment that values that diversity. Accordingly, the University supports understanding and appreciation of all members of its community, regardless of race, sex, age, color, national origin, ethnicity, creed, religion, disability, sexual orientation, gender, gender identity, marital status, pregnancy, genetic information, veteran status, or political affiliation. Please see University Statements and Compliance, https://www.unlv.edu/about/statements-compliance.

A successful learning experience requires mutual respect and trust between the students and the instructor. Accordingly, the instructor asks that students be willing to listen to one another's points of view, acknowledging that there may be disagreements, keep discussion and comments on topic, and use first person, positive language when expressing their perspectives.

Course Schedule (Tentative)

*** 1 "	Lecture Topics	Corresponding	Notes
Week #		Chapters in the	
		Text (Krane)	
1	Introduction, History of		
	Modern Physics		
2	Angular Momentum,	Chapters 2&3	
	Nuclear Properties/the		
	Deuteron		
3	Nuclear Forces, Nuclear	Chapters 4&5	Labor Day
	Models		
4	Radioactive Decay, Decay	Chapter 6	
	Kinetics		
5	Alpha Decay	Chapter 8	Possible Exam One
6	No Class		Instructor out-of-time
7	Beta Decay, Gamma Decal	Chapters 9&10	
8	Charged Particle	Chapter 7	
	Interactions		
9	Photon Interactions	Chapter 7	
10	Neutron Interactions	Chapters 11&12	
11	Neutron Shielding and		Possible Exam Two
	Applications		
12	Fission and Fusion	Chapters 13&14	
13	Detection, Nuclear		
	Detonation		