

UNIVERSITY OF CALGARY
PHYSICS & ASTRONOMY
COURSE OUTLINE

1. Course: **PHYS 561, Stable and Radioactive Isotope Fundamentals**

Lecture Sections:

L01: TuTh, 15:30-16:45, SS 008

Ann-Lise Norman, SB133, ph: 403-220-8313, alnorman@ucalgary.ca, Office Hours: TR 9:30-11

This course will provide an overview of nuclear physics with an emphasis on isotope formation, stable and radioactive isotope fractionation and the application of radioactive and stable isotope techniques. The purpose of the course is to give an overview of fundamental physical processes governing the abundance of isotopes.

PHYS 561 Blackboard

PHAS office is located at SB 605, 403-220-5385

2. **PREREQUISITES:** Permission of the Instructor is required

3. **GRADING:** The University policy on grading and related matters is described sections F.1 and F.2 of the online University Calendar. In determining the overall grade in the winter term of the course the following weights will be used:

Midterm Exams (2 x 25%)	50 %
Assignments	30 %
Independent Study Project and Presentation	20 %

There will be no final examination. Instead, two mid-term exams will be held.

The course grade is calculated by using the weights indicated above and then converted into a letter grade. As a guide to determining standing, these letter grade equivalences will apply:

A+	95 to 100	B	74 to 77	C-	55 to 59
A	88 to 94	B-	69 to 73	D+	50 to 54
A-	83 to 87	C+	65 to 68	D	45 to 49
B+	78 to 83	C	60 to 64	F	0 to 44

If, for some reason, the distribution of grades determined using the aforementioned conversion chart appears to be abnormal the instructors reserve the right to change the grade conversion chart **at the instructor's discretion**, if the instructor feels it is necessary to more fairly represent student achievement.

Students must comply with the University regulations concerning Intellectual Honesty, Plagiarism, etc., which are published in the University Calendar.

4. **Missed Components of Term Work.** The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar in section 3.6: <http://www.ucalgary.ca/pubs/calendar/current/sc-3-6.html>. It is the student's responsibility to familiarize himself/herself with these regulations. See also <http://www.ucalgary.ca/pubs/calendar/current/e-3.html>.

5. **Note that student research will require time outside of class.** Coordination for outside class work is expected to be performed by students with the Isotope Laboratory Manager (Steve Taylor, taylor@phas.ucalgary.ca) and Technicians (Jesusa Pontoy and Nenita Lozano) and is not scheduled.

REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME-ACTIVITY. If you have a clash with this out-of-class-time-activity, please inform your instructor as soon as possible so that alternative arrangements may be made for you.

6. **TEXTBOOK:** *no textbook required*

7. **EXAMINATION POLICY:** No aids/phones/computers/personal data assistants/or other electronic devices will be

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allowed during in class examinations with the exception of calculators. Tests will be closed book. Students should also read the Calendar, Section G, on Examinations: <http://www.ucalgary.ca/pubs/calendar/current/g.html>.

8. There are no additional course fees associated with this course.
9. In this course, the quality of the student's writing in examinations and reports will be a factor in the evaluation of those reports. See also <http://www.ucalgary.ca/pubs/calendar/current/e-2.html>.
10. Students in the course are expected to participate as researchers in their course work. See also <http://www.ucalgary.ca/pubs/calendar/current/e-5.html>.

Department _____
Date Jan 2013

Approval  _____

Associate Dean's Approval for
out of regular class-time activity: _____
Date: _____

11. OTHER IMPORTANT INFORMATION FOR STUDENTS:

- (a) **ACADEMIC MISCONDUCT** (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under K. Student Misconduct (<http://www.ucalgary.ca/pubs/calendar/current/k.html>) to inform yourself of definitions, processes and penalties
- (b) **ASSEMBLY POINTS** in case of emergency during class time. Be sure to **FAMILIARIZE YOURSELF** with the information at <http://www.ucalgary.ca/emergencyplan/assemblypoints>.
- (c) **ACADEMIC ACCOMMODATION POLICY.** Students with documentable disabilities are referred to the following links:
Calendar entry on students with disabilities: <http://www.ucalgary.ca/pubs/calendar/current/b-1.html>
Disability Resource Centre: <http://www.ucalgary.ca/drc/>
- (d) **SAFEWALK:** Campus Security will escort individuals day or night (<http://www.ucalgary.ca/security/safewalk/>). Call 220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.
- (e) **FREEDOM OF INFORMATION AND PRIVACY:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPPA). As one consequence, **students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page.** For more information see also <http://www.ucalgary.ca/secretariat/privacy>.
- (f) **STUDENT UNION INFORMATION:** VP Academic Phone: 220-3911 Email: suvpaca@ucalgary.ca.
SU Faculty Rep. Phone: 220-3913 Email: sciencerep@su.ucalgary.ca Website <http://www.su.ucalgary.ca/home/contact.html>.
Student Ombudsman: <http://www.su.ucalgary.ca/services/student-services/student-rights.html>
- (i) **INTERNET and ELECTRONIC COMMUNICATION DEVICE Information.** You can assume that in all classes that you attend, **your cell phone should be turned off.** Also, communication with other individuals, via laptop computers, Blackberries or other devices connectable to the Internet is not allowed in class time unless specifically permitted by the instructor. If you violate this policy you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.

Physics 561 Draft Lecture Outline

W2013

Instructor: A.L. Norman

TR 15:30 - 16:45

1. Jan 08 - Course Introduction Outline, Expectations, Marking Structure, Exams, Projects
2. Jan 11 – Nuclear Structure & Properties of the atom, Nuclear Force, Chart of nuclides
3. Jan 18 – Binding Energy, Semi-Empirical Mass Formula,
4. Jan 15 - Nuclear Models
5. Jan 17 – Radioactivity history, types,
6. Jan 22 - decay chains, exposure
7. Jan 24 – Radioactivity equilibrium, disequilibrium,
8. Jan 29 - interaction with matter, dose, exposure
9. Jan 31 – Applications in Radioactive research
10. Feb 5 – Nuclear Reactors and Technology
11. Feb 7 - Nucleosynthesis I – Guest Lecture
12. Feb 11 - Midterm Exam

READING WEEK FEB 17-24

13. Feb 26 - Nucleosynthesis II – Guest Lecture
14. Feb 28 – Mass Spectrometry and Vacuum Technology
15. Mar 5 – Data Correction
16. Mar 7 – Isotope Fractionation & Spectroscopy
17. Mar 12 – Rotational, Vibrational & Translational Energy
18. Mar 14 – Partition Function Ratios, Equilibrium Fractionation
19. Mar 19 – Equilibrium Fractionation and the Teller Redlich Theorem
20. Mar 21 – Fractionation & Temperature Dependence
21. Mar 26 – Kinetic Isotope Fractionation
22. Mar 28 – Systems approaching Equilibrium
23. Apr 2 – Examples of Isotope Fractionation I
24. Apr 4 – Examples of Isotope Fractionation II
25. Apr 9 – Student Presentations / 2nd Midterm
26. Apr 11 – Student Presentation