

Physics 462: Atomic, Nuclear, and Particle Physics

Fall Term 2015

149 Jorgensen Hall, 9:30-10:20 M W F

Lecturer: Dan Claes, 258, Ext 2-2783
dclaes@unl.edu

Office Hours: Monday and Friday 1:30-2:30, or by appointment

Textbook:

Introductory Nuclear Physics, Kenneth Krane, John Wiley & Sons (1988).

Chapter 1 provides a very short historical overview, with a review of particularly relevant topics from quantum mechanics covered in Chapter 2. We'll augment that with a little extra background mathematics and plan to finish both chapters by the beginning of next week. Though we'll skip Chapters 4-5 for now, I'll introduce the relevant material as needed along the way, and you should refer to them then. My goal is to get through the applications described in Chapters 13 & 14, and jump to Chapter 19 (so we finish the semester with some exciting astrophysical theories).

Lecture Schedule: A tentative schedule for the entire semester is posted, and will be updated as needed. Bookmark (and refer to often to) our Blackboard site.

Exams:

Four one-hour "midterm" exams are scheduled during regular class periods, plus a two-hour final. No notes or crib sheets will be allowed. A table of all relevant equations and information will be provided *for you* when appropriate.

Exam I	Friday,	Sept. 18	In class
Exam II	Friday,	Oct. 16	In class
Exam III	Monday,	Nov. 09	In class
Exam IV	Friday,	Dec. 04	In class
Final Exam	Tuesday,	Dec. 15	10am – noon

Homework:

All homework must be delivered to me, my office or mailbox by 3pm on the assigned due date. *Late work* will be corrected, but have no grades recorded. If you feel you have a legitimate excuse for late work, I must hear it **before** the work is due.

Grading: Grades will be determined from an 800 point total as follows:

Hour exams (4 x 100)	400
Homework Problems	200
Final Exam	200

PHYS 462: Nuclear Physics**Tentative Schedule****9:30-10:20****MWF****Week 1**

Lecture 1	Monday,	Aug 24, 2015	History
Lecture 2	Wednesday,	Aug 26, 2015	Fourier Series
Lecture 3	Friday,	Aug 28, 2015	Comments on Fourier Transforms, Conclude History

Week 2

Lecture 4	Monday,	Aug 31, 2015	Angular Momentum & Spin
Lecture 5	Wednesday,	Sept 02, 2015	Cross Sections
Lecture 6	Friday,	Sept 04, 2015	Nuclear Size & Density

Week 3

Labor Day	Monday,	Sept 07, 2015	No Class
Lecture 7	Wednesday,	Sept 09, 2015	Nuclear Binding Energy
Lecture 8	Friday,	Sept 11, 2015	Perturbation Theory

Week 4

Lecture 9	Monday,	Sept 14, 2015	Perturbation Theory
Lecture 10	Wednesday,	Sept 16, 2015	Decays
Lecture ---	Friday,	Sept 18, 2015	EXAM 1

Week 5

Lecture 11	Monday,	Sept 21, 2015	Resonances and Decay Chains
Lecture 12	Wednesday,	Sept 23, 2015	Radioactive Dating Techniques
Lecture 13	Friday,	Sept 25, 2015	Radioactivity

Week 6

Lecture 14	Monday,	Sept 28, 2015	Radiation Through Matter
Lecture 15	Wednesday,	Sept 30, 2015	Radiation Through Matter
Lecture 16	Friday,	Oct 02, 2015	Detectors

Week 7

Lecture 17	Monday,	Oct 05, 2015	Detectors, <i>Begin</i> Counting Statistics
Lecture 18	Wednesday,	Oct 07, 2015	Counting Statistics
Lecture 19	Friday,	Oct 09, 2015	Propagating errors, Alpha Decays

Week 8

Lecture 20	Monday,	Oct 12, 2015	Alpha Decays
Lecture 21	Wednesday,	Oct 14, 2015	Alpha Decays
Lecture --	Friday,	Oct 16, 2015	EXAM 2

Week 9

Lecture --	Monday,	Oct 19, 2015	NO CLASS : Fall break
Lecture 22	Wednesday,	Oct 21, 2015	Beta Decays
Lecture 23	Friday,	Oct 23, 2015	Beta Decays

Week 10

Lecture 24 Monday, Oct 26, 2015 Beta Decays
Lecture 25 Wednesday, Oct 28, 2015 Gamma Decays
Lecture 26 Friday, Oct 30, 2015 Gamma Decays

Week 11

Lecture 27 Monday, Nov 02, 2015 Gamma Decays
Lecture 28 Wednesday, Nov 04, 2015 Mossbauer Effect
Lecture 29 Friday, Nov 06, 2015 Nuclear Reactions

Week 12

Lecture --- Monday, Nov 09, 2015 **EXAM 3**
Lecture 30 Wednesday, Nov 11, 2015 Nuclear Reactions/Cross Sections
Lecture 31 Friday, Nov 13, 2015 Nuclear Fission

Week 13

Lecture 32 Monday, Nov 16, 2015 Nuclear Fission
Lecture 33 Wednesday, Nov 18, 2015 Fission Reactors
Lecture 34 Friday, Nov 20, 2015 Nuclear Fission Explosives

Week 14

Lecture 35 Monday, Nov 23, 2015 Nuclear Fusion
Thanksgiving Break Wed, Nov 25-Fri, Nov 27

Week 15

Lecture 36 Monday, Nov 30, 2015 Stellar Fusion
Lecture 37 Wednesday, Dec 02, 2015 Fusion Reactors
Lecture --- Friday, Dec 04, 2015 **EXAM 4**

Week 16

Lecture 37 Monday, Dec 07, 2015 Nucleosynthesis
Lecture 38 Wednesday, Dec 09, 2015 Fundamental Particles
Lecture 39 Friday, Dec 11, 2015 Wrap-up/Review

FINAL EXAM: 10:00-noon Tuesday Dec. 15 JH 149