

PHYS 7501 – Particles & Nuclei I

Fall 2017 Syllabus

Course webpage: http://inpp.ohio.edu/~meisel/PHYS7501/phys7501_home.html

Instructor: Asst. Prof. Zach Meisel Office: 204 Edwards Accelerator Laboratory

Email: meisel@ohio.edu Office hours: 10:00-11:00am Wednesday, or by appointment

Class location: Clippinger 133 Class times: 2:00-3:20pm, Tuesday & Thursday

Recommended text: “Modern Nuclear Chemistry” by Loveland, Morrissey, & Seaborg

Overview:

The purpose of this course is to provide an overview of key topics in nuclear physics, primarily focusing on nuclear structure and nuclear reactions. Special topics such as nuclear astrophysics, nuclear applications, and experimental methods will also be touched on. No prior knowledge of nuclear physics will be assumed and course content should be accessible to any graduate student in the Physics & Astronomy Department in their 2nd year or beyond.

The course will consist of lectures twice a week, intermixed with in-class group assignments. Additional learning tools will include homework assignments roughly every other week, a mini-review article, and a presentation on the same material as the mini-review. In addition, there will be a midterm exam and a final exam.

A preliminary schedule appears at the end of this syllabus.

Comments on Homework & Group Work:

Students are encouraged to work together on homework assignments outside of class and are required to work together on group assignments during class. However, you must submit your own written and/or programmed solutions to each problem. Copying will not be tolerated and will result in a zero on the assignment and possibly in the course. Doing the work yourself is how you will learn. If you didn't do it, you didn't learn it. In that case, why take the class?

Exceptions for homework deadlines must be pre-arranged. Any in-class group work that is missed must be completed as if it were a homework assignment. Technically, only official university excuses will be accepted for absences, but other exceptions can be made with sufficient advance notice or for special circumstances.

Article & Presentation:

A major component of the course will be a short article (~8-10 pages) and presentation (~10 minutes) on a special topic in nuclear physics. A list of pre-approved topics will be made available. To officially select a particular topic, you must first meet with the instructor to discuss the topic or topics you are interested in. Topics outside of the formal list may be suggested.

Roughly one month after the topic selection deadline, a rough outline for the article will be due. The rough outline should contain a plausible article structure, key citations, and concepts for key figures. Feedback will be provided, so a more comprehensive outline is encouraged.

Roughly one month after the rough outline deadline, the article will be due. Presentations on the same content will take place during class the following week. Plagiarism of any kind will not be tolerated and will result in a zero grade, possibly for the class. See "*Academic Honesty*".

Exams:

There will be a midterm exam and a final exam. The final exam will not be cumulative, strictly speaking; however, it may necessarily draw on information from earlier in the semester which provides the foundation for later course content.

Grading:

The final course grade will be determined using the weights listed below:

- *Group Work:* 5%
- *Homework:* 30%
- *Article:* 15%
- *Presentation:* 10%
- *Midterm Exam:* 20%
- *Final Exam:* 20%

The final letter grade will be determined based on the following scale, though a more lenient scale may ultimately be adopted:

90—100% A; 85—89.9% A-; 80—84.9% B+; 75—79.9% B; 70—74.9% B-; 65—69.9% C+; 60—64.9% C; 55—59.9% C-; 50—54.9% D+; 45—49.9% D; 40—44.9% D-; 0—39.9% F

Attendance:

Come to class! If you have a good reason not to be there, please let me know. Any in-class group assignments which are missed will have to be made-up as a homework assignment.

Academic Honesty:

I trust you will act in an academically honest fashion. If you have any questions about what does or does not constitute academic misconduct, please let me know.

Academic Misconduct is a Code A violation of the Ohio University Code of Student Conduct. If you are found to be involved in academic misconduct regarding this course, you will receive a zero on the pertinent work and possibly for the entire course and/or referral to the Office of Community Standards and Student Responsibility. University Judiciaries may impose additional sanctions. Procedures for judicial actions will be invoked as described in the Student and Faculty Handbooks. This is all a big hassle, so just be honest!

Planned Schedule: (Subject to change. Advance notice will be given as early as possible.)

*Chapters refer to sections of the recommended textbook for the course, "Modern Nuclear Chemistry" by Loveland, Morrissey, & Seaborg. Supplemental/alternative readings are available on the course web page. Some topic discussions will be based far more on the supplemental/alternative readings than the recommended text.

<u>Date</u>	<u>Chapter*</u>	<u>Topic</u>	<u>Due</u>
8/29	1,2	Nuclear Properties	
8/31	1,2,5	Nuclear Phenomenology	
9/5	6	Nuclear Structure	
9/7	6	Nuclear Structure	HW 1
9/12	6	Nuclear Structure	
9/14	3	Radioactive Decay	
9/19	7	α Decay	HW 2
9/21	8	β Decay	
9/26	9	γ Decay	Review Topic
9/28	11	Nucleon Emission/Fission	HW 3
10/3	5,6	Nuclear Models	
10/5	6	Ab Initio Theories	HW 4
10/10	Fall Reading Day, No Class		
10/12	Midterm Exam		
10/17	6	Shell Model	
10/19	6	Shell Model	
10/24	10	Nuclear Reactions	
10/26	10	Scattering	HW 5
10/31	10	Non-resonant Reactions	Review Outline
11/2	10	Resonant Reactions	
11/7	10	Resonant Reactions	HW6
11/9	10	Compound Reactions	
11/14	10	Other Reaction types	
11/16	12	Nuclear Astrophysics	HW 7
11/21	12	Nuclear Astrophysics	
11/23	Thanksgiving Break, No Class		
11/28	14,17,18	Experimental Topics	HW 8
11/30	4,13,14,16	Nuclear Applications	Review Paper
12/5	Final Presentations		
12/7	Final Presentations		
12/12 (12:20-2:20pm)	Final Exam		

PROPOSED MODIFIED SCHEDULE:

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9/5	6	Nuclear Structure	
9/7	6	Nuclear Structure	HW 1
9/12	6	Nuclear Structure	
9/14	3	Radioactive Decay	
9/19 → Fri. 9/15	7	α Decay	HW 2
9/21 → Mon. 9/25	8	β Decay	HW 2
9/26	9	γ Decay	Review Topic
9/28 → Fri. 9/29	11	Nucleon Emission/Fission	HW 3
10/3	5,6	Nucleon-nucleon potential	HW 3
10/5	6	Ab Initio Theories	HW 4
10/10	Fall Reading Day, No Class		
10/12	Midterm Exam		
10/17	6	Shell Model	
10/19	6	Shell Model	
10/24 → Mon. 10/23	10	Nuclear Reactions	
10/26 → Tue. 10/24	10	Scattering	HW 5
10/31	10	Non-resonant Reactions	HW 5 , Review Outline
11/2	10	Resonant Reactions	
11/7	10	Resonant Reactions	HW6
11/9	10	Compound Reactions	
11/14	10	Other Reaction types	
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