

# PHYS 620 – Fall 2024

## Classical Mechanics II

### Lecture course outline

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| Lecture hours:       | Mon., Wed., & Fri.: 11:30 AM – 12:25 PM   |
| Lecture room:        | 302 ICE   |
| Web page:            | <a href="http://www.physics.udel.edu/~szalewic/teach/620/">http://www.physics.udel.edu/~szalewic/teach/620/</a>   |
| Instructor:          | Krzysztof Szalewicz, 229 SHL, phone: 831 6579, szalewic@udel.edu  |
| Office hours:        | one hour after class or by appointment  |
| Text:                | <i>Classical Mechanics</i> by John R. Taylor, University Science Books, 2005<br>(Ch. 8-11 and 13-14, optionally fragments of Ch. 15 & 16)   |
| Supplementary texts: | <i>Classical Dynamics</i> by Stephen T. Thornton and Jerry B Marion,<br>Thomson-Brooks/Cole, 5th edition, 2004<br><i>Mechanics</i> by Keith R. Symon, Addison-Wesley, 3rd edition, 1971           |
| Advanced text:       | H. Goldstein, C. Poole, J. Safko <i>Classical Mechanics</i> ,<br>Addison-Wesely, 3rd edition, 2002  |
| Prerequisites:       | PHYS 419 or equivalent (informal)   |
| Exams and quizzes:   | Quizzes (about 15 minutes) every Friday, except for exam weeks<br>Exam 1 (55 minutes) Sep. 27<br>Exam 2 (55 minutes) Oct. 25<br>Exam 3 (55 minutes) Nov. 20<br>Final exam (2 hours) Dec. 13, 2 PM |
| Homework:            | About 10 problems each week. Normally assigned on Friday,<br>tested the next Friday (neither collected nor graded)  |
| Grading:             | Quizzes: 15%<br>Exam 1: 15%<br>Exam 2: 20%<br>Exam 3: 20%<br>Final exam: 30%  |
|                      | Grades will be assigned as follows:<br>A – 0.80 and above, F – below 0.40, each 0.04 is one grade increment.  |

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## PHYS 620 – Outline, continued

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All problems will be graded on the scale 0 to 10.

The first few homeworks and Exam 1 will consist of questions from classical mechanics at the level of PHYS419, chapters 1–7 in Taylor’s text.

The other exams will be from the material covered in this course. Three types of problems can be expected. (a) Problems or questions related directly to the material covered in class (note that derivations and proofs are an essential part of this course and will be required on exams). (b) Problems very similar to actual homework problems (therefore it is critical that you spend time to understand solutions deposited in the library if you have not solved the homework problems perfectly by yourself). (c) Problems related to the material covered, but not necessarily similar to any homework problem.

Exams 1–3 will deal with the course material covered in the weeks preceding a given exam: exam 2 (3) will not repeat subjects contained in exam 1 (1 & 2). The final exam will embrace the whole course with emphasis on subjects not covered by exams 1–3. All exams and quizzes will be closed book. Each exam will contribute to your final grade as the ratio of the number of points earned to the maximum number of points, weighted as listed above. The sum of quizzes will contribute as an analogous ratio multiplied by the weight given above.

There will be a quiz each week (except on exam weeks) with one problem identical or nearly identical to one of the problems on the homework assigned on the previous week (it can be also a part of a problem). The key to doing well in this course is to get near to the maximum scores on quizzes. You have to master only about 10 problems per week. Come to my office hours if you get stuck. After doing the problems, try to redo them in closed-book mode.

Detailed solutions to homework and exam problems will be put on reserve in the physics library. Everybody is strongly advised to compare these solutions with their work.

I will communicate with you by email. Let me know if you are not getting my emails.

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## Lecture Contents

- Review of Newton's Law and basics concepts of Newtonian mechanics
- Review of Lagrange's mechanics
- Hamilton's equations
- Two-body problem
- Noninertial frames
- Rotations of rigid body
- Coupled vibrations
- Collision Theory
- Continuum mechanics (optionally, fragments of Ch. 16)
- Relativity (optionally, fragments of Ch. 15)