

Course Outline
Phys 430-001, Classical Mechanics
Fall 2018

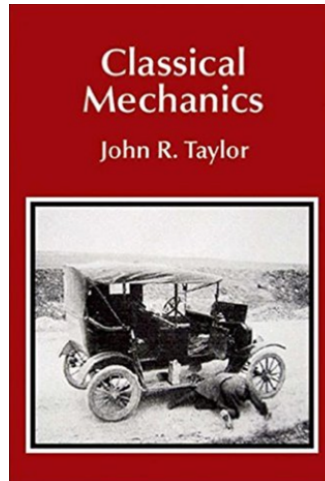
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Lecture: Monday & Thursday, 4:00 PM – 5:25 PM, ECEC 115

Office Hour: M & R, 1:00 PM – 2:00 PM, other times by appointment

Course Website: www.physics.rutgers.edu/~piatek/class/Phys430/F18/Syllabus.pdf

Textbook: *Classical Mechanics*, John R. Taylor, ISBN-10: 189138922X; ISBN-13: 978-1891389221



Lecture Quizzes: Starting on September 13, a lecture quiz will be given by the end of every Thursday class. The quiz will contain 1 – 5 problems depending on the level of difficulty. The quiz will be graded and discussed in the following lecture. The quizzes will be “open textbook” but “closed notes.”

Midterm: There will be a midterm exam on Thursday, October 25, covering chapters 1 – 6. The exam will contain five open-ended problems.

Homework: No formal homework will be assigned; however, the syllabus lists suggested practice problems that a student should attempt to solve. Problems for the lecture quizzes, midterm, and final may be (but do not have to be) selected from the suggested problems.

Grading:

Lecture quizzes 40%

Midterm 30%

Final 30%

Cutoffs for letter grades:

85% – A

80% – B+

70% – B

65% – C+

50% – C

40% – D

Below 40% – F

Students with disabilities:

If you need accommodations due to a disability please contact Chantonette Lyles, Associate Director of Disability Support Services, Fenster Hall Room 260 to discuss your specific needs. A Letter of Accommodation Eligibility from the Disability Support Services office authorizing your accommodations will be required.

Honor Code and Etiquette:

NJIT has a zero-tolerance policy for cheating of any kind and for student behavior that disrupts learning by others. Violations will be reported to the Dean of Students. The penalties range from a minimum of failure in the course plus disciplinary probation up to expulsion from NJIT. Avoid situations where your own behavior could be misinterpreted as dishonorable. **Students are required to agree to the NJIT Honor Code on each exam, assignment, quiz, etc. for the course.**

Turn off all cellular phones, wireless devices, computers, and messaging devices of all kinds during classes and exams. Please do not eat, drink, or create noise in class that interferes with the work of other students or instructors. Creating noise or otherwise interfering with the work of the class will not be tolerated.

Class Calendar

| Lecture | Topic | Reading Material | Suggested Problems |
|-----------------|--|---------------------|---|
| 1. R, 9/6 | Mass, force, Newton's Laws | Ch. 1, 1.1 – 1.5 | Ch. 1: 2, 5,10,18, 23,30 |
| 2. M, 9/10 | Newton's II Law in Cartesian and Polar coordinates. | Ch. 1, 1.6 – 1.7 | Ch. 1: 35,36,39,40,41,44,46,48,49 |
| 3. R, 9/13 | Linear air resistance | Ch. 2, 2.1 – 2.3 | Ch. 2: 1,2,5,7,8,11,12,13,15,16,18,21 |
| 4. M, 9/17 | Quadratic air resistance, complex exponentials, and motion in E and B fields | Ch. 2, 2.4 – 2.7 | Ch. 2:23,24,27,28,38,40,41,45,47,53 |
| 5. R, 9/20 | Rockets, angular momentum | Ch.3, 3.1 – 3.4 | Ch.3: 1,2,3,8,10,11,13,15,21,22 |
| 6. M, 9/24 | Center of mass, angular momentum | Ch. 3, 3.4 – 3.5 | Ch. 3: 25,27,29,31,32,34,35 |
| 7. R, 9/27 | Kinetic and potential energy | Ch. 4, 4.1 – 4.2 | Ch. 4: 2,3,4,5,7,8,9 |
| 8. M, 10/1 | Force and potential energy | Ch. 4, 4.3 – 4.6 | Ch. 4: 11,13,15,20,21,23,24,26,28 |
| 9. R, 10/4 | Curvilinear systems, central forces | Ch. 4., 4.7 – 4.8 | Ch. 4: 30,31,32,34,36,41,42 |
| 10. M, 10/8 | Energy of interaction | Ch. 4., 4.9 – 4.10 | Ch. 4: 46,47,52,53 |
| 11. R, 10/11 | Oscillations | Ch. 5, 5.1 – 5.2 | Ch. 5: 1,2,4,6,8,10,13 |
| 12. M, 10/15 | 2D oscillator | Ch. 5, 5.3 – 5.4 | Ch. 5: 14,16,17,18,19,21,23,27,28,30 |
| 13. R, 10/18 | Driven oscillations and resonance | Ch. 5, 5.5 – 5.6 | Ch. 5: 33,35,40,42,43,44,45 |
| 14. M, 10/22 | Calculus of variations | Ch. 6, 6.1 – 6.4 | Ch. 6: 1,3,4,7,9,11,13,17,23,25 |
| 15. R, 10/25 | Midterm | | |
| 16. M, 10/29 | Lagrange equations | Ch. 7., 7.1 – 7.2 | Ch. 7: 1,2,3,4,6,8 |
| 17. R, 11/1 | Lagrange equations with constraints | Ch. 7, 7.3 – 7.4 | Ch. 7: 9,10,11 |
| 18. M, 11/5 | Examples of Lagrange equations | Ch. 7, 7.5 – 7.7 | Ch. 7: 14,15,16,18,20,21,23 |
| 19. R, 11/8 | Examples of Lagrange equations | Ch. 7, 7.5 – 7.7 | Ch. 7: 27,29,31,34,35,36,37,40,41 |
| 20. M, 11/12 | Two-body, central force problem | Ch. 8, 8.1 – 8.5 | Ch. 8: 1,3,6,7,8,10,13 |
| 21. R, 11/15 | Kepler orbits | Ch. 8, 8.6 – 8.8 | Ch. 8: 15,16,20,22,23,28,29,31,34 |
| 22. M, 11/19 | Non-inertial frames | Ch. 9, 9.1 – 9.4 | Ch. 9: 2,3,4,6 |
| 23. T(R), 11/20 | Rotating frames | Ch. 9, 9.5 – 9.9 | Ch.9:9,10,11,13,14,16,18,19,20,26,28,29 |
| 24. M, 11/26 | Rotation about a fixed axis | Ch. 10, 10.1 – 10.2 | Ch. 10: 2,3,5,8,9,10,12,15,18 |
| 25. R, 11/29 | Inertia tensor and principal axis | Ch. 10, 10.3 – 10.6 | Ch. 10: 20,22,25,27,28,,29,34,35,36,37 |
| 26. M, 12/3 | Euler's equations | Ch. 10, 10.7 – 10.8 | Ch. 10: 40,42,43,44,45,47 |
| 27. R, 12/7 | Coupled oscillators | Ch. 11, 11.1 – 11.3 | Ch. 11: 1,2,3,,4,5,12 |
| 28. M, 12/10 | Lagrangian approach | Ch. 11, 11.4 – 11.7 | Ch. 11: 14,15,18,19,24,26,29,31 |