

Andrea Ferrogia
City University of New York
New York City College of Technology

Physics 3100 - Classical Mechanics

Syllabus

The course PHYS 3100 offers a study of classical mechanics from a more advanced perspective than freshman physics, with particular emphasis on Lagrangian and Hamiltonian formalisms. Topics include a review of Newtonian mechanics and the principle of conservation of energy and momentum, as well as the study of calculus of variations, Lagrange's equations, two bodies central force problems, mechanics in non-inertial frames, rigid bodies, Hamiltonian mechanics, collision theory.

- **Topics:** Newton's laws of motion and their application, Lagrangian mechanics, Hamiltonian mechanics.
- **Prerequisites:** An introductory level classical mechanics course and a good knowledge of vectors and multivariate calculus.
- **Suggested Textbooks:**
 - Classical Mechanics (by John R. Taylor, Professor of Physics at The University of Colorado in Boulder), University Science Books (2005), ISBN 1-891389-22-X
 - Classical Dynamics (by David Tong, Professor at Cambridge University), available at <http://www.damtp.cam.ac.uk/user/tong/dynamics/clas.pdf>
- **Exams:** There will be two exams during the semester (30 % of the grade each) and a final exam (40 % of the grade).
- **Exam policy:**
 - i)* All students are expected to appear on time for all exams.
 - ii)* Any student absent from an exam will be given a grade of zero for the exam unless he provides a doctor's note of explanation.

ii) Students will be allowed to prepare and use during the exam a handwritten, one-page letter format formula sheet.

- **Homework:** Homework problems will be assigned during the semester. Homework assignments will not be graded. However, it is extremely important that students solve the homework problems and ask any problem-related question they might have to the instructor.

The table below includes a breakdown of the topics covered in each week of the course and links to the corresponding material in the book by Prof. Taylor (JT book) and in the lectures by Prof. Tong (DT lectures)

Week	Topic	JT book	DT lectures
1	Newton's laws of motion	Ch 1	Ch 1
2	Air drag	Ch 2	-
3	Linear and angular momentum	Ch 2	Ch 1
4	Energy	Ch 4	Ch 1
5	Oscillations	Ch 5	-
6	Calculus of variations	Ch 6	Ch 2
7 and 8	Lagrangian mechanics	Ch 7	Ch 2
9 and 10	Two-body problems	Ch 8	Ch 2
11 and 12	Hamiltonian mechanics	Ch 13	Ch 4
13 and 14	Rigid bodies	Ch 10	Ch 3
15	Review and Final exam		

Additional notes employed in class will be made available online

Accessibility Statement: City Tech is committed to supporting the educational goals of enrolled students with disabilities in the areas of enrollment, academic advisement, tutoring, assistive technologies and testing accommodations. If you have or think you may have a disability, you may be eligible for reasonable accommodations or academic adjustments as provided under applicable federal, state and city laws. You may also request services for temporary conditions or medical issues under certain circumstances. If you have questions about your eligibility or would like to seek accommodation services or academic adjustments, please contact the Center for Student Accessibility at 300 Jay Street, Room L-237, Phone 718-260-5143 or <http://www.citytech.cuny.edu/accessibility/>.

August 22, 2019