



PHYS*3400 Advanced Mechanics F17

Instructor:

Huan Yang, MacN 435D

hyang10@uoguelph.ca

Lectures:

Alexander Bldg, Room 259: Tuesday, Thursday 10:00 am -11:20 am

Final Exam:

December 15th, 08:30 am – 10:30 am

Location TBA

Course Description:

This course covers rotational dynamics, Lagrangian mechanics and Hamiltonian mechanics. Topics include a formal treatment of rotations, rigid-body rotations and Eulers equations, generalized coordinates, least action principles, Poisson brackets, Liouville's theorem, Hamilton-Jacobi theory.

Course Content:

Topics include:

- Review of rotation matrices and their derivatives
- Tensors and the Inertia tensor
- Euler's equation
- Generalized coordinates
- D'Alembert's principle and virtual displacement
- Lagrangian formalism
- Constraint forces
- Calculations of variations
- Least action principle
- Hamiltonian mechanics
- Phase space and Liouville's theorem
- Canonical transformations
- Hamilton-Jacobi theory
- Applications of the action



Textbook:

Lecture notes will be posted on Courselink. In addition, an excellent set of course notes used by [Prof. E. Poisson](#) is available. The text from Mechanics I and II, John R. Taylor “Classical Mechanics” will also be useful.

Additional references:

- Herbert Goldstein, Charles P. Poole, and John L. Safko, *Classical Mechanics (3rd Edition)*(Addison Wesley, 2002; ISBN 0201657023; QA 805.G6)
- Walter Greiner, *Classical Mechanics: Systems of Particles and Hamiltonian Dynamics*,(Springer, 2003; ISBN 0-387-95128-8)
- Walter Greiner, *Classical Mechanics: Point Particles and Relativity Dynamics*,(Springer, 2004; ISBN 0-387-95586-0)
- Harold J W Müller-Kirsten, *Classical Mechanics and Relativity* (World Scientific, 2008; ISBN-10:981-283-252-1)
- Cornelius Lanczos, *The Variational Principles of Mechanics (4th Edition)* (Dover Publications, 1986; ISBN 0486650677; QA 845.L3)
- Keith R. Symon, *Mechanics (3rd Edition)* (Addison-Wesley, 1971; ISBN 0-201-07392-7)

Evaluation:

25% Assignments

25% Midterm: October 19th, 08:30 pm-10:30 pm. Location TBA

50% Final Exam

The assignment for this course will be handed out and submitted in class. No Assignments will be accepted after the posting of the solutions on the course website. Submitted assignment solutions must show calculation details, be legible, and written with a logical flow. Marks on assignments will rapidly trend to zero if not presented well.

(Not) Sharing Solutions With Other Students:

All work submitted for grading in this course must be each individual student’s own work. While students are encouraged to share thoughts and ideas, it is not acceptable to share assignment solutions. The assignments are not group projects. It is important that you do not show your final written solutions to other students.

E-mail Communication

As per university regulations, all students are required to check their university email account regularly: email is the official route of communication between the University and its students.



When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and email contact. [See the undergraduate calendar for information on regulations and procedures for Academic Consideration.](#)

Drop Date

The last date to drop one-semester courses, without academic penalty, is Nov. 3, 2017. [For regulations and procedures for Dropping Courses, see the Undergraduate Calendar.](#)

Copies of out-of-class assignments

Keep paper and/or other reliable back-up copies of all assignments and midterm exam: you may be asked to resubmit work at any time.

Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to identified, ongoing disability or a short-term disability should contact the Centre for Students with Disabilities as soon as possible. For more information, contact CSD at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: <http://www.uoguelph.ca/csd/>

Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting and environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or Careless submission of assignments does not excuse students for responsibility for verifying the academic integrity of their work before submitting it. Student who are in any doubt as to whether an action on their part could be construed as an academic offense should consult with a faculty member or faculty advisor.

[The Academic Misconduct Policy is detailed in the Undergraduate Calendar.](#)



Recording of Materials

Presentations which are made in relation to course work – including lectures –cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer. Materials recorded with permission is restricted to use for that course unless further permission is granted.

Resources

The [Academic Calendars](#) are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.

Course Evaluation Information

The department of Physics requires student assessment of all courses taught by the Department. These assessments provide essential feedback to faculty on their teaching by identifying both strength and possible areas of improvement. In addition, annual student assessment of teaching provides part of the information used by the Department Tenure and Promotion Committee in evaluating the faculty member's contribution in the area of teaching. The Department's teaching evaluation questionnaire invites student response both through numerically quantifiable data, and written student comments. In conformity with University of Guelph Faculty Policy, the Department Tenure and Promotions Committee only considers comments signed by students. Your instructor will see all signed and unsigned comments after final grades are submitted. Written student comments may also be used in support of a nomination for internal and external teaching awards.

NOTE: No information will be passed on to the instructor until after the final grades have been submitted.