

Physics 3151 B – Classical Mechanics Course Outline

1. Course Information

Course Information: Physics 3151A, Classical Mechanics, 2025-2026 Fall Term

3 hours per week, IN PERSON INSTRUCTION.

Prerequisite(s): (Physics 1028A/B or 1301A/B or 1401A/B or 1501A/B) and (Physics 1029A/B or 1302A/B or 1402A/B or 1502A/B), or the former Physics 1020 or 1024 or 1026; Calculus 2303A/B or 2503A/B, Applied Mathematics 2402A or 2270A/B or the former Applied Mathematics 2411 or 2413.

Antirequisite(s): Applied Mathematics 3151A/B.

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

2. Instructor Information

| Instructors | Email | Office | Phone | Office Hours |
|-------------------------|--|--------|-------|--------------|
| Prof. Shahram Abbassi | sabbassi@uwo.ca | | | |
| Ermia Etemadi Boroujeni | eetemad@uwo.ca | | | |
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Students must use their Western (@uwo.ca) email addresses when contacting their instructors. Before contacting the instructors, make sure you have carefully read this document or the course Forum on OWL. Questions that are addressed in this document or in the Forum will not be answered over e-mail.

If the instructor's office hour is not convenient, you can make an appointment for another day/time, or talk to the instructor after class. If you prefer an appointment with a TA, you can contact them through OWL or via email.

3. Course Syllabus, Schedule, and Delivery Mode

This course offers a rigorous and comprehensive introduction to the fundamental principles and applications of Classical Mechanics. Core topics include Newtonian dynamics, conservation laws, non-inertial reference frames, central force motion, rigid body dynamics, variational principles, and the Lagrangian and Hamiltonian formalisms. Additional advanced topics such as coupled oscillations, Noether's theorem will also be introduced. Emphasis is placed on developing a deep understanding of physical concepts and mathematical techniques essential for advanced studies in physics, astrophysics, and engineering.

Learning Outcomes: Students are expected to familiarize themselves with and agree to the learning outcomes listed on the course homepage. Please refer to the OWL Brightspace portal for detailed learning objectives: *Homepage - PHYSICS 3151A 001: CLASSICAL MECHANICS I (brightspace.com)*.

Key Sessional Dates:

- **Classes begin:** September, 2025
 - **Classes end:** December 2025
 - **Final Exam Period:** December 2025 (exact date scheduled by the Registrar)
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4. Course Materials

This course builds on introductory mechanics and equips students with the conceptual and mathematical tools needed to solve more advanced problems. Topics will include the principle of least action, Lagrangian and Hamiltonian dynamics, central force motion, rigid body rotation, non-inertial reference frames, and the analytical treatment of coupled oscillations.

Primary Textbook:

- **S.T. Thornton and J.B. Marion**, *Classical Dynamics of Particles and Systems*, 5th edition (Brooks/Cole).
 - *Note:* Students are required to bring a hard copy of the textbook (or an equivalent classical mechanics text) to all open-book tutorial tests, the midterm, and the final exam.

Recommended Supplementary Texts (for optional reading and deeper exploration):

- *Analytical Mechanics* by **Grant R. Fowles and George L. Cassiday**, 7th edition
- *Analytical Mechanics* by **L.N. Hand and J.D. Finch** (Cambridge University Press)
- *Classical Mechanics* by **H. Goldstein, C. Poole, and J. Safko**, 3rd edition (Addison-Wesley)
- For advanced readers: *Mathematical Methods of Classical Mechanics* by **V.I. Arnold**, 2nd edition (Springer)

Course Platform and Communications:

All course materials, announcements, and updates will be posted on OWL Brightspace:

<https://westernu.brightspace.com/>. Students are expected to check the course site regularly. If syllabus updates become necessary during the term, the revised version will be posted there.

Technical Requirements:

In the event of a disruption to in-person learning (e.g., due to a COVID-19 resurgence), course delivery may transition online. Students should be prepared with:

- A stable internet connection
- A computer with a working microphone and webcam
- Access to Zoom

If students require technical assistance, they may contact the OWL Help page or Western Technology Services at (519) 661-3800 (ext. 83800).

5. Course Assessment

The final course grade will be calculated based on the following components:

- **Midterm Exam – 20%**
A 1 hour 45 minute in-person exam will be held during class time on the first Friday following Reading Week. The midterm will cover all course content presented up to that point.
- **Final Exam – 45%**
A 3-hour in-person exam scheduled by the Registrar. The final exam will be **comprehensive**, covering all material discussed throughout the course.
- **Assignment--20%**
A major assignment will be distributed via OWL Brightspace. It will involve derivations and analytical or numerical work, with a submission deadline more than two weeks after release. Although collaboration is permitted, each student must submit their own independently written and fully justified solution (in PDF format).
- **Tutorial Tests – 15% (Best 5 only)**
A series of short, open-book tutorial tests will be conducted throughout the term during tutorial sessions. Only the **best five** test scores will count toward your final grade.
 - *In-class option:* You may complete the tutorial during the designated session and submit it by the end of class to receive up to **3%**.
 - *Take-home option:* Alternatively, you may take the test home and submit it (PDF scan) via OWL by the same day at 18:00 PM, receiving up to **2%**.

No electronic devices are permitted during in-class tests or exams, except for a **non-programmable calculator**.

In exceptional cases, the Department of Physics and Astronomy may adjust final course grades to align with departmental policy.

6. Student Absences

If you are unable to meet a course requirement due to illness or other serious circumstances, please follow the procedures below.

Assessment's worth less than 10% of the overall course grade:

* **No make-ups will be offered for weekly tutorial tests** as only 5 of total tutorials count towards the final course grade (i.e., this is designed to also make-up for occasional absences). If a student misses more than 5 tutorial tests or on-line quizzes (all of them covered by a medical or other documented excuse requiring academic consideration) then this course component will be reweighted. In this case, the student will provide specific documentation (medical or otherwise) for such absences to the Dean's Office Counselling unit.

* **Assignment.** It is expected that solving this assignment requires 4 days or less, thus the 1 to 2-week timeline accounts for any possible absences or other circumstances. Only in case of long absences that will extend for over 10 of 14 days in the relevant period of the assignment, one of these two options will be offered, at the discretion of the course instructor: either the assignment grade will be reweighted over all of the other course components, or another assignment of similar difficulty will be offered later on to the affected student(s). Either way, the student will provide specific documentation (medical or otherwise) for such long absences to the Dean's Office Counselling unit.

Assessments worth 10% or more of the overall course grade:

* **If a student misses the Midterm** because of medical or other documented circumstances requiring academic consideration, one of these two options will be offered, at discretion of the course instructor: either the midterm grade will be re-weighted to the final exam, or a make-up midterm will be offered at a date to be determined. The same policy applies if a student misses their make-up midterm, or the make-up of the make-up, etc.

For work totaling 10% or more of the final course grade, you must always provide valid medical or supporting documentation to the Academic Counselling Office of your Faculty of Registration as soon as possible. For further information, please consult the University's medical illness policy at

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf.

The Student Medical Certificate is available at

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf.

* **Absences from Final Examination.** If you miss the Final Exam, please contact the Academic Counselling office of your Faculty of Registration as soon as you are able to do so. They will assess your eligibility to write the Special Examination (the name given by the University to a make-up Final Exam). You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation" (e.g., more than 2 exams in 23-hour period, more than 3 exams in a 47-hour period). If a student fails to write a

scheduled Special Examination, the date of the next Special Examination (if granted) normally will be the scheduled date for the final exam the next time this course is offered. The maximum course load for that term will be reduced by the credit of the course(s) for which the final examination has been deferred. See the Academic Calendar for details (under [Special Examinations](#)).

Note

Missed work can *only* be excused through one of the mechanisms above. Being asked not to attend an in-person course requirement due to potential COVID-19 symptoms is **not** sufficient on its own.

7. Accommodation and Accessibility

Religious Accommodation

When a course requirement conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request accommodation for their absence in writing at least two weeks prior to the holiday to the course instructor and/or the Academic Counselling office of their Faculty of Registration. Please consult University's list of recognized religious holidays (updated annually) at

<https://multiculturalcalendar.com/ecal/index.php?s=c-univwo>.

Accommodation Policies

Students with disabilities work with Accessible Education (formerly SSD) providing recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at:

[https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic Accommodation_disabilities.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf),

8. Academic Policies

The website for Registrarial Services is <http://www.registrar.uwo.ca>.

In accordance with policy available at:

https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf,

the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at his/her official university address is attended to in a timely manner.

Tutorial tests, midterms, and final exams in this course are **open-book and open-notes**. However, **no electronic devices** (i.e. no pads, no laptops, no mobile phones, etc.) will be permitted on tutorial tests in classroom, midterms, and final exams **except for a non-programmable pocket calculator**. Mobile phones cannot be used on tutorial tests in classroom, midterms, and exams, not even as watches and/or calculators, and must be turned off during the entire time of tests, midterms and final exams.

Scholastic offences are taken seriously, and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is

subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, and in any other similar circumstances that will require to do so, tests and examinations in this course will be conducted using a remote proctoring service **if and when the course instructor deems it appropriate**. By taking this course, you are consenting to the use of remote proctoring software and acknowledge that you may be required to provide **personal information** (including some biometric data) and the session may be **recorded**. Completion of this course may require you to have a reliable internet connection and a device that meets the technical requirements for these services. More information about this remote proctoring service, including technical requirements, is available on Western's Remote Proctoring website at: <https://remoteproctoring.uwo.ca>.

9. Support Services

Please visit the Science & Basic Medical Sciences Academic Counselling webpage for information on adding/dropping courses, academic considerations for absences, appeals, exam conflicts, and many other academic related matters: <https://www.uwo.ca/sci/counselling/>.

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Accessible Education at (519) 661-2147 if you have any questions regarding accommodations. Learning-skills counsellors at the Student Development Centre (<http://www.sdc.uwo.ca>) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Students who are in emotional and/or mental distress should refer to Mental Health@Western (<http://www.health.uwo.ca/mentalhealth>) for a complete list of options about how to obtain help. Additional student-run support services are offered by the USC, <http://westernusc.ca/services>.