



**PHYS 222 Classical Mechanics II (Spring 2019)**  
**Course Syllabus**  
**Department of Physics, School of Science and Technology**  
**Nazarbayev University**

**Location & Contact Info**

Instructor: Sergiy Bubin

Lecture Hours: Tue, Thu 10:30am - 11:45am in room 7.317

Recitations: Tue 12:00pm - 1:15pm in room 7.317

Office Hours: Thu 12:30pm - 1:30pm & 5:30pm - 6:30pm in room 7E.333, or by appointment

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Course Website: <http://sergiybubin.org/teaching.html>

**Course Description** This course aims to cover the following topics: the Lagrangian, Hamilton, and Hamilton-Jacobi dynamics, canonical transformations, variational calculus and the least action principle, dynamics of particles and rigid bodies, Green's functions, oscillations and normal coordinates. The relativistic dynamics, fluid dynamics, nonlinear dynamics and chaos may be considered as time permits. The course will include two lectures per week accompanied by a recitation.

**Main Textbook**

S. Thornton and J. Marion, *Classical Dynamics of Particles and Systems* (5th Edition)

**Other Useful References** Many other texts exist on classical mechanics at the introductory (undergraduate) level, some can be found in the library, and can also be very useful in this course. Students are encouraged to explore those. Examples are:

- D. Kleppner and R. Kolenkow, *An Introduction to Mechanics*
- D. Morin, *Introduction to Classical Mechanics*
- J. Taylor, *Classical Mechanics*
- W. Greiner, *Classical Mechanics: Systems of Particles and Hamiltonian Dynamics* (2nd Edition)
- L. Hand and J. Finch, *Analytical Mechanics*

Those who seek an in-depth description at a more technical level may try to supplement their reading with advanced texts, such as:

- H. Goldstein, C. Poole, and J. Safko, *Classical Mechanics* (3rd Edition)
- L. Landau and E. Lifshitz, *Mechanics* (3rd Edition)
- A. Fetter and J. Walecka, *Theoretical Mechanics of Particles and Continua*
- A. Fasano and S. Marmi, *Analytical Mechanics*

**Grading Policy** The course will be graded based on the cumulative score. The minimum cumulative percentages necessary for obtaining the following letter grades are:

Letter grade	A	A-	B+	B	B-	C+	C	C-	D+	D	F
Min. %	95.0	90.0	85.0	80.0	75.0	70.0	65.0	60.0	55.0	50.0	<50.0

There will be three midterm and one final exam. Homework will be assigned every 1-2 weeks. In addition, several short quizzes will be given on random dates without any advance notice. The problems in quizzes may be related to the material in recent lectures or resemble the problems in recent homeworks. The final letter grade for the course will be based on the following contributions:

Homework	10%
Quizzes	10%
Midterm 1	20%*
Midterm 2	20%*
Midterm 3	20%*
Final Exam	40%

\*Only two midterm scores out of three will be counted.

An extra credit (up to 2%) may be earned through active participation in recitations and lectures. Any homework/quiz/exam requested to be regraded must be brought no later than one week after it was given back to the students. Also, this instructor reserves the right to regrade the entire homework/quiz/exam as grading mistakes happen in both directions. Hence, there is a theoretical possibility that a student may get a lower total score after his/her work is regraded.

Some partial credit will be given for those homework/quiz/exam problems where a student demonstrates relevant knowledge of physical concepts and makes mistakes in, say, algebraic manipulations. However, student should not expect that they will automatically get some partial credit for “effort” by simply writing a bunch of irrelevant expressions or copying basic equations out of a textbook or formula sheet.

No late homework assignments will be accepted. There will be no make-up for any of the midterm exams. However, the lowest midterm score will be dropped. This gives students a theoretical possibility to miss one of the midterms without damaging their final grade. It is expected that students will use this possibility responsibly and only when it is indeed necessary.

**Homework/Exam Submission Guidelines** In order to ensure unbiased evaluation of students’ performance all homeworks, quizzes, and exams should be submitted in the following format:

- Solutions are written on standard white paper of size A4 (blank white paper will be provided for exams and quizzes)
- Do not write your name on the front page! Use your Student ID # instead.

Homeworks and exams must show sufficient proof that a derivation of the solution was carried out and the answers are not just copied from somewhere or guessed. Solutions or answers turned in without explanation will receive no credit. Any student wishing to have the best possible grade on a homework must:

- Staple pages together and clearly indicate problem numbers
- Turn in neat and readable work as points may be deducted otherwise

Homeworks are normally expected to be submitted in the paper form. However, electronic submissions via email (e.g. a pdf file of scanned pages) are acceptable for those students who are away or must miss a class when the homework is due.

**Academic Integrity** Students are expected to follow Nazarbayev University student code of conduct, which can be found at <http://registrar.nu.edu.kz/policies-and-procedures>, and adhere to the principles of truth and academic honesty. Students who infringe upon the code of conduct will be subject to sanction. While students are strongly encouraged to discuss between themselves the conceptual points in the homework problems, in the end they should submit their own unique work. Any form of plagiarism is strictly prohibited! Also, please note that no collaboration, notes,

books, calculators, or use of mobile phones will be allowed during the exams.

**Communication** Email communication with students is important for this course. Students are encouraged to use email for quick correspondence regarding lecture material, homework problems, and anything else that does not require long explanations (for which office hours exist). It is students' responsibility to check their NU email regularly as important announcements, homeworks corrections, *etc.* may be sent.

Homework assignments, solutions to homework assignments, exam solutions, and other relevant materials (including this syllabus) will be made available in the electronic form on the course website. Neither homework assignments nor solutions will be handed out to students in paper form in classroom.