**PHYS 505: Classical Mechanics (graduate) – Fall 2015**
**course syllabus**
**Nazarbayev University, School of Science and Technology**
**Department of Physics**

### Location & Contact Info
Instructor: Sergiy Bubin
Lecture Hours: Mon,Wed,Fri 9:00 AM - 9:50 AM in room 8.319
Recitations: Tue 1:30 PM - 2:45 PM in room 6.518
Office Hours: and Mon 2:00 PM - 3:00 PM, Tue 2:50 PM - 3:50 PM in room 7.204 (or by appointment)
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Course Website: http://sergiybubin.org/teaching.html

**Course Description** In this course students learn, at a more advanced level than in the corresponding undergraduate courses, the following topics: the Lagrangian and Hamilton dynamics, variational calculus, and dynamics of particles and rigid bodies. Modern topics such as canonical perturbation theory, invariant mappings, nonlinear dynamics and chaos, and applications to semi-classical quantum theory will also be included as time permits. The course will include three lectures per week accompanied by a recitation.

### Required Textbook
H. Goldstein, C. Poole, and J. Safko, *Classical Mechanics* (3rd Edition)

**Other Useful References** Many other texts exist on classical mechanics at both the graduate and undergraduate levels, some can be found in the library, and can also be very useful in this course. Students are encouraged to explore those. Examples of the graduate and/or advanced undergraduate textbooks are:

- W. Greiner , *Classical Mechanics: Systems of Particles and Hamiltonian Dynamics* (2nd 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*
- L. Hand and J. Finch , *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 will approximately be:

| 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 two midterm tests and one final exam. Homework will be assigned approximately every 2 weeks and will typically be due Wednesday in class, unless otherwise indicated. In addition, short quizzes will be arranged on random dates. The problems in quizzes may resemble those found in the recent homework. The cumulative scores for the letter grades will be computed as follows:

| | |
|---:|:---|
| Homework: | 15% |
| Quizzes: | 5% |
| Midterm 1: | 20% |
| Midterm 2: | 20% |
| Final Exam: | 40% |

An extra credit (up to 2%) may be earned through active participation in recitations and lectures. All work to be considered for a regrade must be submitted no later than one week after it was given back to the students. No late howework assignments will be accepted. There will be no make-up for any of the exams, unless there is a serious and well documented reason for missing it.

**Homework Submission Guidelines** Homework must show suffcient proof that a derivation of the solution was carried out. Any student wishing to have the best possible grades on homework returned must:

- Staple pages together and clearly indicate problem numbers
- Turn in neat and readable homework as points may be deducted otherwise
- Show your work! Solutions or answers turned in without explanation will not receive full credit

Homework submission in paper form is strongly preferred. 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 the homework among themselves, plagiarism is strictly prohibited. No collaboration, notes, books, calculators, or use of mobile phones will be allowed during the tests.

**Communication** Email communication with students is vital for this course. Hence, students are expected 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). Moreover, students are responsible for checking their NU email regularly (daily) as important messages, announcements, homeworks corrections, *etc.* may be sent to the class by email.

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.