Mechanics

Physics 421 Fall 2019

Instructor: Romain Vasseur, Assistant Professor
office: Hasbrouck 405A
email: rvasseur@umass.edu
office hours: Tu 4:30-6:00pm. Or by appointment and email, or visit my office

Lectures: Tu Th 10:00AM - 11:15AM, room: Hasbrouck Laboratory Add room 126

Additional Honors 421 Colloquium: Fridays 5:30PM - 6:20PM
Location: Hasbrouck Lab Add room 106

TA: August Miller
email: augustmiller@umass.edu
Office: LGRT 1129
Office hours: Mo 4:30-6:00pm

Textbook:

- Classical Dynamics of Particles and Systems (5th Edition) Paperback, Author: Jerry B. Marion by Stephen T. Thornton.
- Suggested reading: Mechanics: Volume 1 (Course of Theoretical Physics Series) 3rd Edition by L. D. Landau and E. M. Lifshitz.

Website: https://blogs.umass.edu/rvasseur/teaching/. Problem set solutions will also be made available on Moodle.

Grading:
The course grade will be based 40% on the homework (with the lowest homework grade being dropped), 20%+20% for the two midterm exams, and 20% on the final exam.

(In exceptional cases when midterm and final exam scores are much higher than the homework score, the homework scores will be ignored) .

Problem sets: The problem sets will be “paperless”, and posted online on my website only. I will post the solutions on Moodle.

Exams:
Midterm Exam 1: Thursday 10/24, 10:00AM - 11:15AM in HAS Add 126
Midterm Exam 2: Tuesday 11/19, 10:00AM - 11:15AM in HAS Add 126
Final Exam: Thursday 12/19, 10:30AM - 12:30PM in HAS Add 126

Course description:
Advanced course in undergraduate classical mechanics covering Newtonian dynamics and analytic methods. Topics include conservation laws, oscillatory phenomena including damping and resonance, central force problems and planetary orbits, rigid body mechanics, an introduction to the calculus of variation and the principle of least action, generalized coordinates, with Lagrangian and Hamiltonian dynamics.

Topics:
- Chapter 1: Matrices, vectors and vector calculus
- Chapter 2: Newtonian Mechanics
- Chapter 3: Small Oscillations
- Chapter 4: Central Force motion
- Chapter 5: Dynamics of a system of particles
- Chapter 6: Analytical mechanics: Lagrangian
    - Functionals and variational calculus
    - Action and Euler-Lagrange equations
    - Symmetries and conservation laws
- Chapter 7: Coupled oscillations
- Chapter 8: Analytical mechanics: Hamiltonian dynamics

Academic Honesty Policy Statement

Since the integrity of the academic enterprise of any institution of higher education requires honesty in scholarship and research, academic honesty is required of all students at the University of Massachusetts Amherst.

Academic dishonesty is prohibited in all programs of the University. Academic dishonesty includes but is not limited to: cheating, fabrication, plagiarism, and facilitating dishonesty. Appropriate sanctions may be imposed on any student who has committed an act of academic dishonesty. Instructors should take reasonable steps to address academic misconduct. Any person who has reason to believe that a student has committed academic dishonesty should bring such information to the attention of the appropriate course instructor as soon as possible. Instances of academic dishonesty not related to a specific course should be brought to the attention of the appropriate department Head or Chair. The procedures outlined below are intended to provide an efficient and orderly process by which action may be taken if it appears that academic dishonesty has occurred and by which students may appeal such actions.

Since students are expected to be familiar with this policy and the commonly accepted standards of academic integrity, ignorance of such standards is not normally sufficient evidence of lack of intent. For more information about what constitutes academic dishonesty, please see the Dean of Students' website: http://umass.edu/dean_students/codeofconduct/acadhonesty/

Disability Statement

The University of Massachusetts Amherst is committed to making reasonable, effective and appropriate accommodations to meet the needs of students with disabilities and help create a barrier-free campus. If you are in need of accommodation for a documented disability, register with Disability Services to have an accommodation letter sent to your faculty. It is your responsibility to initiate these services and to communicate with faculty ahead of time to manage accommodations in a timely manner. For more information, consult the Disability Services website at http://www.umass.edu/disability/.