Physics 4150: Plasma Physics

Fall 2010 Course Syllabus

Instructor: Dmitri Uzdensky
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Duane F-835 (Gamow Tower, 8th floor)
303-492-7988

Time: Tuesday, Thursday, 11:00 am - 12:15pm

Place: G2B47 Duane Physics Building

Webpage: www.colorado.edu/physics/phys4150/phys4150_fa10


Office Hours: Wed. 2 – 3:45 pm in Duane F-835 or by appointment

Mid-term Exam: In class, Thursday, October 21

Final Exam: Monday, Dec. 13, 4:30 – 7 pm

Grader: Adam Light (adam.light@colorado.edu)

Course description and outline: Physics 4150 is an introductory plasma physics course covering single particle motion in electromagnetic fields, fluid theory, kinetic theory, wave propagation, equilibrium, and stability, collisions, diffusion, and resistivity. Examples are taken from space, astrophysical, and laboratory plasmas. Many concepts apply directly to accelerator physics and fusion energy science. An overview of thermonuclear fusion energy and Space/Astrophysical applications will be given at the beginning of the course. Plasma physics is a great way to really learn classical physics and get a deep exposure to fluid mechanics since plasma is simply an unusual fluid. More importantly, Physics 4150 will require bringing together knowledge and skills learned in your other courses on classical physics and apply it to a completely different situation. Chen’s textbook is very good and is the classic introductory plasma textbook used everywhere. We will cover most of the first 6 chapters and a little kinetic theory (part of Chapter 7).

Pre-requisites: The formal prerequisites for the course are PHYS 1110--1120, and MATH 2400 or APPM and corequisite is E&M I (PHYS 3310); however, some background in statistical mechanics and thermodynamics (e.g., PHYS 4130), as well as fluid dynamics, is also desirable.
Grades: Your final grade is based on mastering the course material and will be determined by the following weighting: 25% homework, 25% mid-term exam, and 50% final exam.

Exams: There will be one in-class mid-term exam and one final exam. There are no make-up mid-term exams. Excused absences must be fully documented. Notify me immediately if there is a conflict with one of the exams. An un-excused absence from an exam will result in a grade of zero for that exam. If you miss the final exam for any reason, you may receive an incomplete. You are allowed to bring the course textbook to all exams.

Homework: There will be about 12 problem sets. Homework will usually be distributed on Thursdays and will normally be due at 5 pm the next Thursday. Homework may be handed in during class the day it is. Otherwise, it is to be put in my 8th floor CIPS mailbox (take Gamow tower elevator to 8th floor and look straight ahead) by no later than the due date/time (given in the Class Schedule). Individual problems within a given problem set have equal weights. A problem set delayed by up to one week will lose 5% each day. However, no homework will be accepted after the official solution has been distributed (normally, one week after its due date)! Both homework problem sets and solutions will be sent to you by email and will be in the pdf format. You are responsible for any hints/comments/revisions made in class.

You will learn more plasma physics by actually working through problems than by any other way, so try the homework without help or solutions first. Doing the homework is the best practice for the exams and, remember, you won’t have solutions to check or collaborators to discuss problems with during the exam. With all that said, you are encouraged to work collaboratively on homework, since helping others actually helps you learn the material better. Just copying solutions directly from another student, or downloading worked out solutions would obviously constitute cheating; furthermore, this would be a total waste of your time because it would cost you enormously via your exam performance. Comparing problem set answers and getting help from other students and/or during office hours, or during class is completely ok and is even encouraged.

Email: Email communication is important. I will use email for correspondence with the class on questions, clarifications, problem hints, homework solutions, etc. I will use your official university business email address. If this does not work for you please fix it and let me know immediately. You are responsible for any announcements/comments made in class and sent to you by email. If you miss a class, please check with a fellow student to make sure you did not miss any important announcements.

Fine Print

Disability Accommodations: If you qualify for accommodations because of a disability, please submit to me a letter from Disability Services in a timely manner so that your needs be addressed. Disability Services determines accommodations based on documented disabilities. Contact: 303-492-8671, Willard 322, and http://www.Colorado.EDU/disabilityservices . If you have a temporary medical condition or injury, see guidelines at http://www.colorado.edu/disabilityservices/go.cgi?select=temporary.html Disability Services' letters for students with disabilities indicate legally mandated reasonable accommodations. The syllabus statements and answers to Frequently Asked Questions can be found at http://www.colorado.edu/disabilityservices
**Religious Observances:** Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, just let me know. See full details at [http://www.colorado.edu/policies/fac_relig.html](http://www.colorado.edu/policies/fac_relig.html)

**Classroom Behavior Policy:** Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender, gender variance, and nationalities. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records. See policies at [http://www.colorado.edu/policies/classbehavior.html](http://www.colorado.edu/policies/classbehavior.html) and at [http://www.colorado.edu/studentaffairs/judicialaffairs/code.html#student_code](http://www.colorado.edu/studentaffairs/judicialaffairs/code.html#student_code)

**Discrimination and Harassment:** The University of Colorado at Boulder policy on Discrimination and Harassment, the University of Colorado policy on Sexual Harassment and the University of Colorado policy on Amorous Relationships apply to all students, staff and faculty. Any student, staff or faculty member who believes s/he has been the subject of sexual harassment or discrimination or harassment based upon race, color, national origin, sex, age, disability, creed, religion, sexual orientation, or veteran status should contact the Office of Discrimination and Harassment (ODH) at 303-492-2127 or the Office of Judicial Affairs at 303-492-5550.

Information about the ODH, the above referenced policies and the campus resources available to assist individuals regarding discrimination or harassment can be obtained at [http://www.colorado.edu/odh](http://www.colorado.edu/odh)

**Honor Code:** All students of the University of Colorado at Boulder are responsible for knowing and adhering to the academic integrity policy of this institution. Violations of this policy may include: cheating, plagiarism, aid of academic dishonesty, fabrication, lying, bribery, and threatening behavior. All incidents of academic misconduct shall be reported to the Honor Code Council (honor@colorado.edu; 303-735-2273). Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from the faculty member and non-academic sanctions (including but not limited to university probation, suspension, or expulsion). Other information on the Honor Code can be found at [http://www.colorado.edu/policies/honor.html](http://www.colorado.edu/policies/honor.html) and at [http://www.colorado.edu/academics/honorcode/](http://www.colorado.edu/academics/honorcode/)

**Dress Code:** I don’t care what you wear in my class. There is no dress code.