

Physics 399 Senior Seminar Course Syllabus
August 11, 2008

Instructor: Dr. Dennis C. Henry Office: Olin 213

Required: Course Pack for PHY-399 Physics Senior Seminar, available in Book Mark. Purchase of this course pack also covers the cost of materials distributed in class and practice exams. Not all problem sets were included in the pack at press time.

Reference: Planning for Graduate Studies in Physics and Related Fields, Second Edition, Dennis C. Henry (AAPT, 2001) Copies were made available last year.

Office Hours: MWF 10:30-11:15 AM, chapel period, and other times by appointment.

Course Description and Objectives

Catalog description: *This course provides a review of principal topics from across the core areas of physics. Students will prepare solutions to problems from the Graduate Record Examination in physics.*

This course was created by the department in 1991 in response to requests from students for assistance in preparing for the GRE physics subject test. Since that time nearly all the full-time and several visiting faculty have taught the course, which has taken various forms, all centered on solving review problems organized by topics. Each instructor distributes sample GRE questions, review problem sets, and administers 50-question practice exams at the beginning and end of the course. Other references and materials, now largely on the web, offer background on the role of the GRE in graduate admissions and strategies for taking the physics GRE.

The faculty understand that not everyone enrolled in PHY-399 plans to take the GRE physics subject test, either this semester or ever. We have tried to tailor the course so that it has value to physics majors, whatever their immediate or long-term plans. We also recognize that not all students will have the same background from previous or concurrent courses. Therefore, independent of their test preparation objectives, the course activities are designed to be beneficial for reviewing familiar physics topics, as well making new connections.

The GRE Physics Subject Test is a test of a student's problem solving performance in a timed, multiple-choice format, where there is no partial credit for "showing all work", and a 25% penalty is assessed for incorrect guesses. This is not an ideal means of assessing the significant skills and understandings that we hope you have developed during your study of physics. The best ways to improve your performance on such test questions are to work lots of problems, build a "physics toolbox" of equations, and practice, practice, practice! As you practice, you will find that recalling the necessary equations and applying the concepts becomes easier. Your "physics toolbox" will take the form of a growing outline of equations and notes as you work problems and review the topics. The toolbox sheets should be organized by topic into two columns: *Equations* on the left and *Context/Applicability* on the right, with the latter indicating when (and maybe when not) to use the equations, along with simple diagrams, brief reminders or other helpful comments. Students will be encouraged to consult with the instructor as they build their toolbox. The assigned problems will present opportunities to discuss the physics of many of these toolbox entries. More general problem solving techniques will also be discussed, including dimensional and dependence analysis, symmetry considerations, approximations, testing of limits, analogies, and other helpful approaches.

(continued on reverse)

Course Policy and Evaluation

1. **Class Meetings:** The class will meet 12:30-1:20 PM MWF through Nov. 7 as listed on the schedule sheet. Students will be expected to have worked all assigned problems and read assigned materials before coming to class.
2. **Attendance:** Regular and on-time attendance at all class meetings is expected. Students will be held responsible for informing themselves of all announcements and assignments made in the classroom, and by occasional e-mail messages. Students must advise the instructor in writing during the first week of class of any scheduled or anticipated athletic, music, or other college activities that will require their absence during the semester. Such written notice does not imply a waiver of course requirements. Any class missed without a valid reason and prior notification will result in zero credit for that day.
3. **Homework and Academic Honesty:** Problem sets and sample questions will be assigned from each GRE subject category. You must come prepared to discuss/present your solutions and methods to the class. Prior collaborations with no more than one student on a given problem are permitted, but must be acknowledged at the outset of any presentations or responses that you make in class. You must be prepared to explain your solution and approach, whether it was correct or not. All students can anticipate being called on in every class on a fair but unpredictable schedule. No problems will be turned in or graded. The rewards of thorough and individual engagement with the review problems will be your growing mastery of the material, enhanced performance on the GRE exam, and a better grade for the course.
4. **Practice Exams:** There will be one 85-minute GRE practice half-exam administered at the beginning of the semester, and another shortly before the November 8 test date. Exams will be graded and the scores reported to each student. Only class averages and score ranges will be shared with the class. Students may reveal their scores with their advisor or others, at their option. The exam scores themselves play no role in calculating final grades.
5. **Evaluation:** The course grade will be based on an average of daily evaluations of preparation, participation, and performance. The lowest evaluation or zero due to absence will be dropped in computing the final course grade. On one occasion (with limited advance notice) a copy of your "Toolbox" outline will be collected and evaluated for thoroughness, accuracy, non-collaboration, and organization. You must take both practice exams to complete the course with a grade of C- or above.
6. **Incompletes:** A grade of Incomplete will only be given when course requirements are not completed due to circumstances beyond the control of the student. [College policy]
7. **Topics Covered:**
 - Introduction and Test Taking Strategies
 - Mechanics
 - Optics and Waves
 - Thermodynamics and Statistical Mechanics
 - Electricity and Magnetism
 - Special Relativity and a bit of General Relativity and Astrophysics
 - Modern Physics
 - Quantum Mechanics
 - Laboratory Methods and Electronics
 - Nuclear, Particle Physics and Condensed Matter Physics
 - Mathematical Methods of Physics