Prelims Review Course Outline

Luc Peterson* and Erik Granstedt†
3PL, S216-B, aka "The Party Office," x2693

OVERVIEW & FORMAT

Welcome to the Plasma Physics Prelim Exam Study Group. We are Luc and Erik, two second-year students @ 3PL. Our job is to help you guys prepare for the Physics Department Prelim Exam, scheduled for early January 2008. To do so, we will hold these review sessions, twice a week until the end of classes. Each session will consist of student-run presentations of homework problems (that's from you guys) and a mini-lecture (from us) on the upcoming assignment. The list of topics, and schedule are listed below. We will assign usually around 3 problems per session for you guys to do, plus point you to other references for additional reading on the topic. Yay Physics.

REFERENCES

Besides the packet of past exams, we will sometimes point you to the "Red and Blue Books," collections of qualifying exam questions from other universities. These books are especially useful for their worked-out solutions. Many older graduate students have copies that they will probably lend to you. Also, they are available commercially.

- "A Guide to Physics Problems, Part 1," Cahn et al, 1994, ISBN-10: 0306446790
- "A Guide to Physics Problems, Part 2," Cahn et al, 1997, ISBN-10: 030645291X

Another source is one that is as useful as you make it, the PlasmaWiki. It is a website where anyone can upload and view solutions to Prelim Packet problems.

- `http://www.plasmagicians.com/`

DISCLAIMER: This site is on a computer run by Abe Fetterman. It often goes down, so you should bug him if you're having technical problems. Also, the solutions are not necessarily correct. As anyone can post stuff, many are downright wrong. Use them at your own risk. And, if you find a problem that's wrong or missing, **add the correct solution yourself**. It's the only way to improve this resource.

GRADES

There are no grades. This isn't an official class and we can't make you do the homework. But, keep in mind that **this is for your benefit**. If you don't do the work, you won't learn the material. If you don't present your solutions, you won't learn the material as well. The way things generally work is we have one volunteer per problem, but it's important not to have the same people teaching all of the time. So step up about once every week and present a solution. It's the best way to learn and a good skill to know for Generals (*shudder*).

SCHEDULE

- Mondays: 4:45-6:15, 3PL, Graduate Study Room, Furth Library
- Thursdays: 3:15-4:45, McDonnell Hall, Outside Fine Hall Library

Homework assigned will be presented the next session.

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* `jpeterso@pppl.gov`
† `erikg@pppl.gov`

Schedule

Date	Lecture Topic	Homework & Additional References
9/24	General Lecture: Math Review, References, Q/A, Topic Preferences, Lagrangian Formalism, Small Oscillations, Normal Modes	**HW: 5/04 CM2, 1/99 CM 2, 5/01 CM1** Ref: 1/01 CM1, 1/03 CM2, 5/02 CM2, Red Book 1.34, 5/98 CM2, 1/02 CM1
9/27	Electrostatics, Dielectrics, Maxwell Equations, Images	**HW: 5/99 EM3, 5/97 EM1, 5/00 EM2 (b bonus)** Also: 1/02 EM3, 5/05 EM1, 1/03 EM2, Red Book Problems:3.1–3.17, Griffiths 7.39, 7.41, Jackson 4.7, 4.9
10/1	Basic Thermo/Ideal Gas	TBA
10/4	Schrodinger Equation, Boundary Conditions, 1-D Scattering	
10/8	Rotating Coordinate Systems, Rigid Bodies	
10/11	Magnetostatics	
10/15	Partition Functions/Entropy	
10/18	Quantum Angular Momentum, Spin, Spin Addition	
10/22	Hamiltonians, Constants of Motion, Orbits, Central Forces	
10/25	Inductance, Faraday Problems	
10/29	**Fall Break**	
11/1	**Fall Break**	
11/5	Free Energies, Chem Potential	
11/8	TI Perturbation Theory, Variational Methods	
11/12	**APS DPP Meeting**	
11/15	**APS DPP Meeting**	
11/19	Classical Mech Random Topics: Fluid Mech, etc.	
11/22	Thanksgiving	
11/26	Waves, Plasma(!?)	
11/29	Multiple Particles, Symmetry, Boson/Fermi Philosophy	
12/3	Bose/Fermi Stats, Boltzmann Radiation	
12/6	Relativistic EM, Radiation, Gauges	**HW: 5/00 EM2**
12/10	Debye Theory of Solids, Ising Model	
12/13	Quantum Scattering, TD Perturbation Theory, Born Approx	
12/17	Phase Transformations, Mixtures	