Physics 112 Spring 2018 Final Exam Notes
Final: Tuesday, May 8, 2018, 8–11 a.m., Hugel 103

Help: I will run a help session on Monday, May 7, from 3:00–4:00 pm in Hugel 100.

Topics: The final exam will be cumulative, incorporating topics covered throughout the semester.

Nuclear physics will account for about $\frac{1}{8}$ of the final. Specifically, you should be able to calculate rates of nuclear decay using half-life (or time constant) information, identify products in nuclear reactions, and be able to convert mass differences to energy using $E = (\Delta m)c^2$. You should also be able to apply other physics concepts covered this semester with a nuclear context.

The final will be designed to be completed in a 2-hour time period, but you may take the full 3-hour period if you wish. The final exam will be very similar to individual hour exams in style and format. It will contain a mix of problems of varying degrees of difficulty. Some problems might include qualitative as well as quantitative questions. Some problems may focus on a single topic or chapter, while others may include topics from several different chapters. Consult the syllabus for the specific list of topics.

The following general areas may be covered:

Ch. 15 & 16	Waves
Ch. 17	Wave Optics
Ch. 20	Electric Forces and Fields
Ch. 21	Electric Potential and Potential Energy
Ch. 22 & 23	DC Circuits
Ch. 24	Magnetism
Ch. 25	Induction; Electromagnetic Waves
Ch. 28 & 29	Quantum and Atomic Physics
Ch. 30	Nuclear Physics

Omissions: The following topics originally on the syllabus will not be on the final:

Sections 15:7	Doppler Effect
Ch. 18	Ray Optics
Ch. 19	Optical Instruments
Section 21:6	Electrocardiogram
Section 23:4	Measuring Voltage and Current
Section 23:8	Nervous System
Sections 24:7–8	Torques; Magnetic Materials
Section 28:1	X-rays
Section 28:2	Photoelectric Effect
Section 29:6–9	Multielectron Atoms, Molecules, & Lasers
Section 30:7	Ultimate Building Blocks of Matter

Problems will typically focus on the underlying fundamental physics rather than obscure applications or complex mathematical manipulations.

You will be provided with an equation sheet similar to those from previous hour tests. A copy is available on the course website.

Lab-Inspired Questions:

There may be lab-inspired questions on the final. For example, there may be questions which are similar to physical situations you encountered in lab. There could also be problems in which you are presented with graphical information (similar to what you have encountered in lab) and asked to use the graph to solve a problem.

You will not be responsible for calculating or propagating uncertainties, but I hope that you do find those topics useful in your future endeavors.

Hints: Some questions may apply concepts from several chapters to a single problem.

Review the equation sheet carefully so that you know what the symbols mean and when each equation applies. It is important to understand what the individual symbols mean, but it is also important to understand the broader context for the equations so you know when they do or do not apply, and how to combine them in a particular situation.

Do not attempt to memorize specific examples. Instead, be sure you understand the basic physical principles and the reasoning behind their use.

Start each problem with a general principle or equation. *If you start your solution with a specialized equation that is not on the equation sheet, you may lose substantial credit.* Then, if numerical values are needed, substitute them for the appropriate symbols. This shows that you know what the relevant physics is and what the symbols mean.

If you are unable to obtain a result for some part of a problem and a subsequent part uses that result, use a symbol for the unknown result. For example, write "where a (in $\mathrm{m/s^2}$) is the acceleration from part b."

Work clearly and carefully so that your work can be read and understood.

Avoid round-off errors. Your final answer should normally be within 1% of the correct answer. Keep additional digits in your intermediate calculations.

Check your arithmetic.

Don't panic. You should have plenty of time.

Get a good night's sleep!