PHYS 42: Electricity and Magnetism for Scientists and Engineers (4 units) All sections – Course Syllabus

I. BASICS

I.A Course description

This is a course intended for science and engineering students and will use vectors and calculus to investigate translational and rotational motion, work and energy, conservation of energy and momentum, static equilibrium and universal gravitation. The complete official course outline is available at: https://portal.santarosa.edu/SRWeb/SR_CourseOutlines.aspx?ck=PHYS42

I.B Prerequisites

Completion of PHYS 40 or higher and completion of or current enrollment in MATH 1C.

I.C Class meetings

Section	Lab Lark 2030	Lecture Lark 2004	Final exam Lark 2004
4722	M 3:00 – 6:00	MW 9:00 – 10:30	W 5/20 7:00 – 9:45
4727	W 12:00 – 3:00		
4309	Th 6:00 – 9:00		
4268	M 3:00 – 6:00	MW 10:30 – 12:00	M 5/18 10:00 – 12:45
4289	W 12:00 – 3:00		
6593	Th 6:00 – 9:00		

I.D Instructor

Leon Hsu, 631 Analy Village Bldg. D, lhsu@santarosa.edu, (707) 524 1802 (email is better)

I.E Office hours

T 12:00 – 2:15, Th 2:15 – 4:30, and by appointment

Office hours are times I set aside to help you with whatever you need to perform at your best. If none of these times works for you, contact me and we'll find a time that does.

I.F Course website

We will use the Canvas system for announcements, assignments, course resources, and grades. Please check the website for any questions and for updates.

I.G Course materials

Required (and available from the bookstore):

1. Simple scientific calculator (one that has functions like sin, cos, e^x, etc.).

Recommended

1. University Physics Volume 2, S. J. Ling, J. Sanny, W. Moebs, eds. ISBN: 978-1-947172-21-0. This is an open source textbook freely available on the Canvas website and at https://openstax.org/details/books/university-physics-volume-2. (OS)
2. Physics for Scientists and Engineers with Modern Physics, Technology Update, 9th edition, by Raymond Serway and John Jewett Jr. ISBN: 9781305401969. This is the textbook you likely used in earlier courses in this series. (SJ)

I.H. Student learning outcomes

Upon completion of this course students will be able to:

1. Apply laws of physics to analyze and solve problems related to electromagnetism and circuits.
2. Design and assemble apparati to measure electromagnetic phenomena.
3. Analyze and make meaningful comparisons between experiment and theory.
4. Effectively communicate principles and processes of electromagnetism and circuits.

I.I Important dates

First day of class	Monday January 13
Last day to add without instructor's approval	Sunday January 19
Last day to drop and be eligible for refund	Sunday January 26
Last day to add with instructor's approval	Sunday February 2
Last day to drop without a W	Sunday February 2
Last day to opt for P/NP	N/A (this class may only be taken for a grade)
Last day to drop with a W	Sunday April 19

II. COURSE OVERVIEW

Welcome to PHYS 42! This is the third semester of a four-semester introductory course in physics for students majoring in a physical science or engineering. This class is required because it is a necessary step in the study of your field. This course is designed to prepare you for your chosen field by giving you:

- A useful understanding of the very small number of fundamental principles of physics that underlie the vast diversity of our world.
- Skills necessary for modeling the complex situations that occur in your field by applying the fundamental principles of physics.
- Practice deciding which principles and techniques are applicable to a situation.
- Practice applying quantitative reasoning and mathematical procedures to a situation to predict its outcome.
- Practice communicating technical information in an organized manner.

This course is designed to help you achieve these goals. I will do my best to help you understand the concepts presented at a level that will enable you to apply them to new situations. **For this level of understanding, memorizing concepts or procedures is not sufficient or even useful. We emphasize the application of physics by giving quizzes in which you will face situations for the first time.** The pace of this course should allow you to understand the material in some depth but it does move right along. Don't fall behind.

Learning physics is no different from learning anything else. It requires your active participation and lots of practice. What you get out of a course depends on the productive effort and quality time you put into it. Although there is no one thing that will help everyone, a relatively quick overview of how to study effectively in general can be found at http://www.youtube.com/playlist?list=PL85708E6EA236E3DB.

This course approaches physics from a point of view common in most fields today. Analyzing complex situations is emphasized from the beginning. To make connections clearer, the order of the course will not always match the textbook. As in any science, we will use mathematics as the most concise and precise description of phenomena. We assume that you have a practical knowledge of algebra, geometry,

trigonometry, and calculus. Throughout this course you may meet mathematical techniques that you have not yet had in a mathematics class. Don't worry. We will introduce mathematics as it is needed.

In addition to mathematics, we will require that you always use and communicate a logical and organized process when problem solving. Since physics is about reality, the course will draw on a large amount of knowledge from your personal experiences, biology courses, chemistry courses, math courses, reading, movies, and TV. All of your knowledge is relevant. This course is not, and cannot be, self-contained. It assumes you have a personal set of experiences from which to work.

We will do what we can to facilitate your learning by giving you a few different environments to help you explore your brain's unique neural connections. Each of these learning environments, listed below, is designed to accomplish a different goal. Some will be more natural to you than others but it is important that you participate actively in all of them. Learning means developing skills and thought patterns that are not natural or comfortable for you. Preparing for a professional life requires learning in as many different ways as possible.

II.A Lectures (individual learning in a "large" class):

To make lectures meaningful, you must add your experiences to the material presented. To help you do this, the evening before every lecture, you will be asked to answer a few questions online about the upcoming lecture. Just attending lecture, even if you take good notes, is not a good use of your time. **Lectures are about constantly examining your existing knowledge and anticipating what will happen next. <u>At some point in a lecture you should expect to be lost.</u> At that point in the lecture, your existing knowledge does not fit the structure of physics. This valuable experience tells you where your learning needs to occur.**

To make lectures useful you must read the assigned text material and attempt some of the assigned problems before coming to class. This will allow you to focus on the concepts and procedures necessary for you. Some lecture notes are provided online. Looking at them before the lecture will give you a sense of what is going to happen. However, what is actually presented may deviate from the notes based on class response so the initial posted notes may not always reflect what happens in class. Updated notes will be posted at the end of every week.

During the lecture, follow the basis of the decisions presented and answer any questions that are raised. Take your own notes during the lecture about those items that puzzle you or that you especially want to remember. As soon after the lecture as possible, look at your notes to remind yourself what you did not understand. Get help as soon as possible from other students, the tutors in the tutoring and MESA centers, or the professor when you are confused. Being confused means you are learning, but the confusion needs to be resolved which may take some time. A primary purpose of the lecture is to stimulate you to identify the confusion that you have with the material.

During the lecture, you should always be able to:

- Answer the following questions about the lecture material: Why this material important to me? How is it related to other things I know? How can it be used? How is it related to my questions about the text reading? How is it related to what we did yesterday? If you cannot answer these questions, get help before the next lecture. The answer to these questions will be different for every individual so help entails articulating your motivations, experiences, understanding of physics, and the connections between them.
- Observe and follow the chain of decisions presented to solve problems using the basic principles of

physics. This set of decisions is not unique, so your way of solving the problem might be different.
- Ask questions of the lecturer and your fellow students to make sure the concepts and techniques make sense to you while they are being presented.
- Answer questions to ensure that you follow the concepts and techniques being presented. To facilitate this, there are occasional questions for you to discuss with your neighbors.
- Discuss your thoughts and listen to the thoughts of others sitting around you. Because these brief discussions are an important part of your learning, sit with people who will listen to your ideas, express their own ideas, and engage in discussion that is helpful to you. Change who you sit near in class if the interactions with your neighbors are not helping you.

II.B Laboratories (small group learning in a small class):

Each group's experience will be different and is generated by the needs and interests of its members. Sometimes the laboratory material will precede the lectures and sometimes follow them. When the laboratory precedes the lecture material on that subject, it allows you to determine what you need to clarify from the lecture. When it follows the lecture material, it tests your ability to apply and clarify that material based on real experiences.

To make the laboratory meaningful, before coming to lab, you must read the assigned sections of the textbook, read the assigned problems in the laboratory manual and have an idea of what you will do. In addition, you need to make your best attempt to answer the warm-up questions in the laboratory manual, and arrive at the prediction needed to begin the lab problem. In the lab you will test your physics knowledge and reasoning by comparing your predictions to those of your fellow students and then to reality.

The laboratory allows you to:
- Predict the behavior of objects to determine whether your ideas of physics agree with reality.
- Apply the physics concepts you have learned to real situations.
- Practice using problem-solving techniques with feedback from other students, your instructor, and reality.
- Develop your technical communication skills by discussing physics concepts and laboratory techniques with your group and other groups.
- Develop your technical communication skills by keeping a detailed written record of your work and thoughts in a laboratory journal.
- Develop your formal technical communication skills by writing laboratory reports.
- Improve your ability to work in a collaboration to accomplish a technical goal effectively.
- Improve your leadership skills when working in a technical collaboration.
- Receive coaching to improve your knowledge of physics concepts and problem solving techniques from your fellow students and the instructor.

II.C Discussion sections (small group learning in a small class):

Each group's experience will be different and is generated by the needs and interests of its members. To make the discussion section meaningful, before coming read the assigned sections of the textbook, read the preceding lecture notes, and make your best attempt to solve the assigned problems. In the discussion section you will test your physics knowledge, quantitative reasoning skills, and ability to apply mathematics to physics by combining your ideas with those of your fellow students to arrive at a problem solution.

In this environment you should be able to:

- Practice problem solving techniques with feedback from fellow students.
- Apply physics concepts to new situations with feedback from fellow students.
- Get help from other students in recognizing where your ideas differ from reality.
- Discuss physics concepts and problem solving techniques with your group.
- Improve your ability to work in a collaboration to accomplish a technical goal.
- Improve your leadership skills when working in a technical collaboration.
- Receive coaching to improve your knowledge of physics concepts and problem-solving techniques from your fellow students and instructor.

II.D Office visits (individual or small group learning tailored to individual needs):
To make the visits meaningful, before coming read the assigned sections of the textbook, read the preceding lecture notes, and make your best attempt to solve the assigned problems. Have a specific problem that you have partially solved to illustrate your difficulty. Similar to working with a tutor, the best way to learn is to ask the instructor or tutor to observe your way of solving a specific problem and comment on your reasoning or procedures. It is usually not helpful if the instructor or tutor shows you how they solve the problem.

In this environment, you should be able to:
- Receive coaching to improve your knowledge of physics concepts and problem-solving techniques.

II.E Homework and reading (individual learning):
Attempting the assigned problems before the lectures will allow you to focus on your needs during the lecture. To make homework meaningful, first read the assigned sections of the textbook and review the applicable lecture notes before attempting the problems. Always work assigned problems as if you were taking a quiz without looking back in the textbook, lecture notes, or online answers. Write as much detail as if you were going to be graded on your work.

If you get stuck, stop the problem and read the relevant sections of the text and lecture notes. If this does not help, get help from friends, the tutorial center, or the instructor's office hours. Never look at the answer to a homework problem until you are absolutely sure you have solved it correctly. Once you look at the answer, the problem loses its value for your learning. If you have difficulty with the assigned problems, do other similar problems in the textbook until the solutions flow smoothly. Success within the time limits of the quizzes requires that you practice enough to be able to work through a new problem rapidly.

In this environment, you should be able to:
- Practice solving problems to determine if you can apply the physics concepts learned using the techniques taught in this course. Remember, to be beneficial, practice should use the techniques you will use on the exams.

III. GRADING
The grade for PHYS 42 will be based on 4 midterm quizzes, laboratory, in-class questions, homework, and a final examination. The majority of your grade in this course will be based on your ability to communicate your physics knowledge by solving problems on quizzes, in laboratory reports, and on the final examination.

Problem solutions will be graded based on your written communication of a logical and organized process grounded in the correct assessment of the physics of a situation. All problems must be solved algebraically before numbers are used. Words, pictures, diagrams, phrases, and a logical mathematical development with well-defined quantities are the key elements in this communication. Correct units must be specified.

No credit will be given for disconnected diagrams, isolated equations, or any answer that is not justified by a preceding logical development. In the case of an incorrect solution to a problem, partial credit will be given for the communication of logical and organized solution steps up to the point that the solution departs from a correct analysis of the physics involved. In other words, you will only receive credit if we can determine, from your writing, what you are doing, why you are doing it, and that your reasoning is correct.

III.A Midterm and final exam:
Each of the 4 midterm quizzes will consist of 5 multiple-choice questions and 3 free response problems, to be taken individually during the lecture periods during which they are scheduled. **One of these three may require manipulation of experimental measurements similar to what you have done in the laboratory.** The final exam will consist of 15 multiple-choice questions and 5 free-response problems, without a group part.

No notes or other aids are permitted during any exam. You will be provided with a formula sheet with all the basic equations and conversions. To account for learning throughout the semester and because the final exam is cumulative, a midterm score that is lower than your final exam score will be replaced by your final exam grade.

III.B Laboratory:
Because the laboratory, in which you compare your ideas about physics to what happens in the real world, is crucial to physics, **you must receive a minimum laboratory grade of 55% to receive a passing grade in the course.** The laboratory grade will be based on the demonstration of a well-organized and correct written technical communication of the physics concepts in your laboratory journal and laboratory reports, well thought out answers to the warm-up and prediction questions, a final laboratory exam, and collaborative laboratory skills as evidenced by effective group work. Grading rubrics for the lab reports are posted on the class web page.

Because the lab equipment changes each week, laboratories may only be made up by arrangement with your instructor during that same week.

III.C Peer evaluations:
Because much of the work in the class occurs as a team, part of your grade will be based on how well you contributed to the success of your team. Contributing to your team doesn't necessarily mean knowing the answers. Just as important is listening to others, helping to make sure that everyone understands what is going on, and asking good questions that helps you learn.

III.D In-class activities:
During each class, there will be one or more questions to which you will write and submit responses. The purpose is for you to practice using the concepts, discuss the physics with your friends and neighbors during class, and to give the instructor feedback on how well the class is doing. Because these

questions are on concepts that you are just learning, you will receive full credit for what looks to me like a good faith effort.

III.E Homework:
Homework, including reading quizzes and problems to be solved, can be accessed either through the Canvas website. Some homework will need to be submitted through the website and some turned in on paper at the beginning of class on the date on which it is due.

You are encouraged to work with classmates or to get help with the homework problems as you desire, however, the final write-up of the homework problems turned in on paper should be your own. If homework assignments from more than one student look similar enough that I think it was copied, then neither student will receive credit for that assignment (see course policy on plagiarism).

In addition to the required homework, the Canvas website also lists supplementary problems from the end of each chapter that you will not submit for grading. It is essential that you practice solving problems every day by working out those at the end of the textbook chapter. The number of problems you need to attempt will vary for each person and each topic. It is strongly recommended that you solve at least the problems listed on the class page. **At least one free-response problem per test will be adapted from either the required or supplementary problems.**

III.F Course grade:
The course grade will be determined by combining the grades from the various components of the course in the following way.

Lab reports…….....20%
Pre-labs.....4%
Peer Evaluations.....5%
Homework.....4%
In-class question.....2%
Four midterms (11% each).....44%
Lab final exam.....6%
Final exam.....15%

≥ 85%	A
< 85% and ≥ 70%	B
< 70% and ≥ 55%	C
< 55% and ≥ 40%	D
< 40% OR < 55% on lab grade	F

Example of grade calculation: Consider the set of grades: 90% (Lab reports); 100% (Pre-labs); 100% (Peer evals); 80% (Homework); 100% (In-class questions); 86%, 59%, 74%, 90% (Midterms); 95% (Lab final exam); and 79% (Final). The quizzes with scores of 59% and 74% will be replaced with the 79% earned on the final exam. The total numerical score is then (90)(0.20)+(100)(0.04)+(100)(0.05)+(80)(0.04)+(100)(0.02)+((86+79+79+90)/4)(0.44)+(95)(0.06)+(79)(0.15) = 86.49, yielding a grade of A.

If the scores for the final (79%) and the second quiz (59%) were exchanged, so that the score on the final was the lowest. Then the total numerical score would be (90)(0.20)+(100)(0.04)+(100)(0.05)+(80)(0.04)+(100)(0.02)+((86+79+74+90)/4)(0.44)+(95)(0.06)+(59)(0.15) = 82.94, yielding a grade of B.

To encourage cooperation, grades are not curved in this course. Helping someone else in the class will never hurt your own grade. In fact, it will probably help it. The Canvas site will always display all of

your grades on your individual assignments. The overall grade in Canvas is sometimes calculated in a peculiar way so do not necessarily trust it to be accurate to within more than 2-3%.

III.G What do the grades mean?

A: You communicate a good working knowledge of physics, mathematics, and logic. You occasionally make some minor mistakes but no major physics, logic, or mathematical errors. You can feel confident in applying physics. You should offer physics help to others when necessary. It is always a good idea to have someone go over your physics reasoning before applying it to any situation that has consequences since no one is perfect.

B: You communicate an adequate working knowledge of physics, math, and logic. You make an occasional major physics error and some minor mistakes in physics, logic, or mathematics. You can offer physics advice to others when necessary. Always have someone carefully check your physics and reasoning before applying it to a situation that has consequences.

C: You communicate a familiarity with physics, math, and logic. You can recognize when most of the major concepts apply to a situation. You give a reasonable interpretation of how a problem is related to physics and make a good but sometimes incomplete attempt at constructing a logical solution. You tend to make some major physics errors together with other minor mistakes. You know when to apply your physics knowledge and generally how to go about it but will need to get help before you use physics in any situation that has consequences.

D: You communicate that you have attended the physics class and read the text. However, you often do not interpret problems in a complete manner and often cannot relate a problem to useful physics concepts. You do not communicate that you can construct a logical problem solution. You tend to make many major physics errors, have missing and erroneous concepts, and make other major mistakes in both logic and mathematics. Do not attempt to use physics in any situation that has consequences.

F: It does not seem as though you can apply physics principles to a problem to any significant degree.

IV. Other course policies

IV.A Attendance

Students who do not attend the first class may be dropped from the class. SRJC policy mandates that students who do not attend either of the first two class meetings MUST be dropped immediately after the second meeting. You will also be dropped from the course if you miss more than three (3) laboratory sessions. If you do miss a class you are responsible for all announcements and material covered in your absence. Check the Canvas site to stay up-to-date. Please keep me updated if there is something that is preventing you from attending class!

IV.B Dropping the class

If you decide to discontinue this course, don’t forget to drop it officially to avoid getting no refund, a W symbol, or a grade.

IV.C Late work

All assignments are due at the time specified in the assignment details. Late work may be accepted for reduced credit. If so, the policy will be specified with the assignment.

IV.D Standards of conduct

Students who register in SRJC classes are required to abide by the SRJC Student Conduct Standards. Violation of the Standards is basis for referral to the Vice President of Student Services or dismissal

from class or from the College. The full Code of Conduct can be found at https://student-conduct.santarosa.edu/code-conduct-0. In particular, note that using cellphones, headphones, tablets, and similar electronic devices is not allowed during class except when explicitly allowed by the instructor. In the case of disruptive behavior, I reserve the right to ask you to leave the classroom. In this case, you may lose participation points or be subject to disciplinary action.

IV.E Scholastic dishonesty

Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a SRJC academic record; or fabricating or falsifying data, research procedures, or data analysis. If it is determined that a student has cheated, he or she may be given an "F" or an "NP" for the course.

Although I encourage students to collaborate on the doing of homework and other non-exam assignments, the write-up and work submitted must be each student's own. If the work submitted by two students looks similar enough that I think it was copied, then both students will receive a grade of 0 for that assignment. No collaboration is ever allowed on the individual portion of the class exams. Two useful links are Jennifer Royal's page on avoiding plagiarism (http://srjcstaff.santarosa.edu/~jroyal/research/plagiarism/plagiarism.html) and SRJC's policy on Academic Integrity (http://www.boarddocs.com/ca/santarosa/Board.nsf/goto?open&id=A63TMC78051C).

IV.F Disability accommodations

SRJC is committed to providing a quality education to all students regardless of ability. Determining appropriate disability accommodations is a collaborative process. You as a student must register with Disability Resources and provide documentation of your disability. The course instructor must provide information regarding a course's content, methods, and essential components. The combination of this information will be used by Disability Resources to determine appropriate accommodations for a particular student in a given course. For more information, please reference Disability Resources https://drd.santarosa.edu or 707 528 4278.

IV.G Mental health and stress management

Learning is, by its nature, stressful. A course that is well matched to your needs will push you to achieve goals that are beyond your current capabilities. Sometimes this educational stress can combine with other sources of stress in your life to lead to an unhealthy situation. As a student, you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, difficulty concentrating and/or lack of motivation. Mental health concerns or stressful events may lead to diminished academic performance. SRJC services are available to assist you. Information about the confidential mental health services available on campus is available at the Student Health Services website https://shs.santarosa.edu/mental-health.

IV.H Harassment

SRJC is committed to providing a safe climate for all students, faculty, and staff. All persons shall have equal access to its programs, facilities, and employment without regard to race, color, creed, religion, national origin, sex, age, marital status, disability, public assistance status, veteran status, or sexual orientation. Complaints involving sexual harassment, race discrimination, sex discrimination and discrimination against those with disabilities, should contact the Vice President of Human Resources

Office at (707) 527-4954. Reports of complaints of discrimination that proceed to investigation will be investigated by a person knowledgeable about discrimination matters and the investigation process will include, at a minimum, interviewing the complainant, other relevant witnesses, and gathering pertinent documentation.

IV.I Student complaints

Students who feel their rights as a student have been violated by an instructor or staff member or who have complaints regarding academic matters (including grades and curriculum) should first attempt in good faith to resolve the matter with the source of the complaint. If the student is dissatisfied with the outcome of this meeting, they may take their complaint to the Department Chair or Administrator for further review by a third party. If a resolution is not reached at this level, the student may file a formal grievance with the appropriate Dean/Supervising Administrator. For support and advice on the complaint/grievance process, a student may consult an Ombudsperson in the Student Affairs Office on either the Santa Rosa or Petaluma Campus. For Santa Rosa, call (707) 527-4424; for Petaluma, (707) 778-3637. The official procedure can be found at http://www.boarddocs.com/ca/santarosa/Board.nsf/goto?open&id=A84P3W62AE40.

V. Schedule

Below is the tentative schedule of topics and work for this semester. Changes may be made to this schedule during the semester. Updates will be announced in class and posted to the Canvas website.

Week	Lecture	Lab/Discussion
1 1/13	M: Introduction, electric charge, Coulomb's Law W: Electric fields (OS 5.1-5.4, 5.7; SJ 23.1-23.4, 23.7, 26.6)	Pre-surveys, discussion problem, error analysis review
2 1/20	M: No class. MLK Jr holiday W: E field of charge distributions (OS 5.5-5.6; SJ 23.5-23.6)	Lab 1 (W-Th-M) (M no lab) Electric fields
3 1/27	M: Electric flux, Gauss' law (OS 6.1-6.3; SJ 24.1-24.3) W: Gauss' law, E field in conductors (OS 6.4; SJ 24.4)	Lab 2 (W-Th-M) Electron deflection by E field
4 2/3	M: Electric potential (OS 7.1-7.4; SJ 25.1-25.4) **W: Midterm 1 (OS 5-6; SJ 23-24)**	Lab 2 (W-Th-M) Electron deflection by E field
5 2/10	M: E potential of distributions (OS 7.5-7.6; SJ 25.5-25.8) W: Capacitance (OS 8.1-8.2; SJ 26.1-26.3)	Lab 2 (M only) (W-Th no lab) Electron deflection by E field
6 2/17	M: No class. Washington's Day holiday W: E field energy (OS 8.3-8.5; SJ 26.4-26.7)	Lab 2 (Th only) (M-W no lab)
7 2/24	M: Electric current/Circuits (OS 9.1-9.5; SJ 27.1-27.3, 27.6) W: Kirchoff's rules (OS 10.1-10.3; SJ 28.1-28.3)	Lab 3 DC circuits **Formal lab report 1 due**
8 3/2	M: RC circuits (OS 10.4-10.6; SJ 28.4-28.5) W: Magnetic field (OS 11.1-11.3; SJ 29.1-29.3)	Lab 4 RC circuits
9 3/9	M: **Midterm 2 (OS 7-10, SJ 25-28)** W: Magnetic forces (OS 11.4-11.7; SJ 29.4-29.6)	Lab 4 RC circuits
Spring Break		
10 3/23	M: Biot-Savart law (OS 12.1-12.4; SJ 30.1-30.2) W: Ampere's law (OS 12.5-12.6; SJ 30.3-30.4)	Lab 5 B field of currents
11 3/30	M: Extra day on magnetic fields/forces W: Magnetic flux/B fields in matter (OS 12.7; SJ 30.5-30.6)	Lab 6 Electron deflection by B field
12 4/6	M: Magnetic induction (OS 13.1-13.3; SJ 31.1-31.3) **W: Midterm 3 (OS 11-12, SJ 29-30)**	Lab 6 Electron deflection by B field
13 4/13	M: Application of induction (OS 13.4-13.7; SJ 31.4-31.6) W: B field energy (OS 14.1-14.3; SJ 32.1, 32.3-32.4)	Lab 7 Magnetic induction
14 4/20	M: RLC circuits (OS 14.4-14.6; SJ 32.2, 32.5-32.6) W: Simple AC circuits (OS 15.1-15.2; SJ 33.1-33.4)	Lab 7 Magnetic induction
15 4/27	M: Driven RLC circuits (OS 15.3-15.6; SJ 33.5-33.9) W: Driven RLC circuits w/phasors (OS 15.2-15.3; SJ 33.5)	Lab 8 AC circuits **Formal lab report 2 due**
16 5/4	M: Maxwell's equations (OS 16.1; SJ 34.1-34.2) **W: Midterm 4 (OS 13-15, SJ 31-33)**	Lab 8 AC circuits
17 5/11	M: Plane EM waves (OS 16.2-16.3; SJ 16.1-16.2, 34.3-34.5) W: EM spectrum (OS 16.4-16.5; SJ 34.6-34.7)	Post-survey, lab final exam
18 5/18, 20	**Final exam:** **(4268, 4289, 6593) M 5/18 10:00 – 12:45, Lark 2004** **(4722, 4727, 4309) W 5/20 7:00 – 9:45 am, Lark 2004**	