PHYS 2426.001
University Physics II
Electricity and Magnetism
COURSE SYLLABUS: FALL 2015

Instructor: Dr. William Newton
Office Location: Science 236
Class time: MWF 11am-12:50pm, STC 135
Office Hours: M 3-4pm, W 1-2pm, or by appointment
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University Email Address: william.newton@tamuc.edu
Graduate teaching assistant: Nathan Brady
Learning Assistants: Alex Fleming, Austin Smith

Preferred Form of Communication: Email
Communication Response Time: 24 hours

COURSE INFORMATION

Textbook(s) Required:

Access to *MasteringPhysics* online homework system, with *Knight, Physics for Scientists and Engineers, 3rd edition*. You have the option of buying *MasteringPhysics* with etext only (ISBN 9780321753052) or *MasteringPhysics* with etext and traditional textbook (ISBN 9780321844354).

McDermott, Tutorials in Introductory Physics Workbook and Homework package (ISBN 9780130970695). This comprises 2 books – one containing class activities, and one homework.

PHYS 2426 Lab Manual, available at the campus bookstore

Course Description:

Physics 2426 is the second semester of a calculus-based physics sequence. University Physics II introduces electrical and magnetic phenomena in nature, including the concepts of electrical charges, electric and magnetic

fields, the application of Gauss' Law, electric potential, conductors and insulators, currents, basic circuits, and induction.

University Catalogue Description
Second semester of calculus based physics with topics in electricity and magnetism for science, mathematics, and engineering students. Prerequisites: PHYS 2425 with a minimum grade of C, MATH 2413. Additionally, MATH 192 or concurrent enrollment.

Student Learning Outcomes
Students will be able to demonstrate the following skills when analyzing situations involving electrostatic fields and potentials and their sources, currents, voltage, capacitance, power, basic electrical circuits, magnetic fields and their sources, and induction:

1. Students will be able to conduct qualitative analysis which demonstrates physical and mathematical intuition and conceptual understanding.
2. Students will be able to perform quantitative calculations in situations involving electric and magnetic fields, and demonstrate knowledge of the relevant basic units, vector addition, and application of basic calculus.
3. Students will be able to use simple laboratory demonstrations to explain the basic properties of electric and magnetic fields, and electrical circuits.

COURSE REQUIREMENTS

Instructional Methods

This class is being taught in studio mode. Studio mode is a student-centered active learning environment that blends lecture time with lab time. Lecture and/or readings will be used to introduce topics. In our class, the lecture itself will be driven by yourselves as explained below. The majority of class time will be focused on group activities. Activities will include conceptual work, labs, and problem solving. Activities will be completed in groups of 3-4. The instructor will assign groups. Groups will be changed 2-3 times during the semester.

Physics education research has shown that students learn best when actively engaged in class. Studio mode has been implemented at many universities and has been found to have positive impacts on conceptual understanding and problem-solving ability.

Course Redesign and Critical Thinking

I'll just take a moment to explain the reason behind the change to studio mode. Many students who take this course will not pursue advanced physics degrees (although some will) and many of you will not often directly use most of the physics concepts taught in the course in your careers. But what you *will* use is your ability to be able to analyze a problem using multiple methods – qualitatlively, conceptually, quantitatively - to simplify it to its fundamental essence to solve it, then systematically add more complexities until you've solved your original problem. No matter what your eventual career, this is what you will be doing, and is what employers are looking for. Employers consistently rank critical thinking and problem-solving ability near the top of their list of desired traits in valued employees. We have redesigned the course to focus on these universal skills; as a bonus, research has shown that focussing on such skills leads to greater conceptual understanding in physics! In Bloom's taxonomy of cognitive skills, this class focusses the 3 higher-level thinking skills highlighted below.

Bloom's Taxonomy of the Cognitive Domain:

1. **Knowledge** - memorization of facts, words, and symbols
2. **Comprehension** - understanding the meaning of knowledge
3. **Application** - applying concepts to various situations
4. **Analysis** - breaking apart complex ideas
5. **Synthesis** - putting individual ideas together to form a complete explanation
6. **Evaluation** - judging the merits of individual ideas and making decisions

Class sequence

The subject matter is divided up into a sequence of 10 topics, each addressed by 1 chapter in the textbook *Physics for Scientists and Engineers*. We will spend about 4 class periods on each topic, with the first 3 classes generally devoted to conceptual understanding and the 4th class to more quantitative problems. As far as possible, the 4 class periods will proceed according to the following sequence

Class 1: Students are expected to have read the chapter summary and listed 3 concepts from it they think are important, or will pose a conceptual challenge. During the class, groups will explain selected concepts on the whiteboard, and we will discuss them as a class. This will constitute the lecture: given by you, with my role as facilitator and to lead you through to understanding the concepts.

The tutorial pre-test will then be taken.

Class 2: The tutorial in physics will be completed, and the tutorial homework assigned.

Class 3: A lab from the lab manual or a PhET lab will be completed.

Class 4: Tutorial homework will be collected at the start of class, and sometimes a reading quiz given. Students will work in groups to complete problems that emphasize both conceptual and quantitative understanding.

Student Responsibilities

The vast majority of class time will be spent working in groups. Students are expected to participate fully in group-work in their assigned roles.

Students are expected to have completed the reading by the due date (see the end of the syllabus for the due dates for all the reading assignments.) Groups will be called upon at random to explain concepts from the reading, and reading quizzes will occasionally be given which will towards the in-class grade.

GRADING

Item	Percentage of Class Grade
In-class assignments	20%
Tutorial Homeworks	20%
MasteringPhysics (Online) Homework	15%
Midterm exams	30%
Final	20%

Note that this adds up to 105%; the extra 5% is extra credit – it is just not associated with any one activity.

Grading scale:
90 % < A
80 % < B < 89.999 %
70 % < C < 79.999 %
60 % < D < 69.999 %
F < 60%

Assessments

See the course calendar and reading/homework at the end of the syllabus for a complete list of class and exam dates, homework and reading assigned dates and due dates.

Exams: There will be three midterms and a final. Your exam grade will be computed from the average of your *two highest midterm* grades and your final exam grade. In other words, your lowest midterm grade will be dropped. The exams will be weighted equally (15 points each). See the course outline for exam dates. Make-up exams will only be allowed for excused absences. See course policies below for details on excused absences.

MasteringPhysics Homework: about 14 homework assignments will be assigned throughout the semester. Homework will be submitted through the MasteringPhysics online homework system. The due date will be displayed in MasteringPhysics and announced in class. Your lowest MasteringPhysics Homework grade will be dropped. MasteringPhysics homeworks will be due **every Friday.**

Tutorials Homework: 10 homework assignments will be assigned throughout the semester. Homework is due at the beginning of class. Late homework will not be accepted. Your lowest tutorial homework grade will be dropped. Tutorial homeworks will be due **two classes** after they are assigned

In-class assignments: In-class work will sometimes be graded. Assignments will be completed as a group, but your effort will determine your individual score. More information about how in-class work is graded will be provided in a separate document. Your lowest 3 in-class assignment grades will be dropped.

TECHNOLOGY REQUIREMENTS

In order to access the MasteringPhysics online homework system, you will need access to the internet and a web browser.

COURSE AND UNIVERSITY PROCEDURES/POLICIES

Course Specific Procedures

1. Cell phone use is only allowed if used for class activities.

2. **Eating is not allowed**. However, covered drinks are allowed.

3. Attendance will be taken by sign-in sheet and verified by seating chart at the beginning of class.

4. The instructor must be notified by email about any excused absences **no later than 24 hours after the missed class**. Even if you choose to notify the instructor in person, you **must still follow up with email** within 24 hours of the missed class. If you do not follow this policy, you will not be able to make up missed exams or turn in late work except in extreme circumstances. Excused absences include those for illness, school-sponsored events, other emergencies deemed unavoidable by the instructor.

5. You are responsible for obtaining notes and class announcements from missed classes.

6. Excessive absences may result in being dropped from the course.

7. When emailing the instructor, include the **course and section number in the subject line**. Include all relevant information, and write clearly, and double check your email to make sure grammar and spelling are correct (this is good advice beyond college: if you email prospective employers, and include poor spelling and bad grammar, they are unlikely to give you the time of day - get in the habit now, when the stakes are not as high).

9. You are expected to check your email at least once a day for class announcements. Emails will be sent to the email addresses you provided to MyLeo. Notify the instructor if you would prefer to receive emails at a different address.

11. Students should fully participate in class activities.

12. Students are expected to be professional and respectful and take responsibility for their learning. If you find yourself struggling, the instructor, GA and LAs are available to provide extra help outside of class.

Syllabus Change Policy

The syllabus is a guide. Circumstances and events, such as student progress, may make it necessary for the instructor to modify the syllabus during the semester. Any changes made to the syllabus will be announced in advance.

University Specific Procedures

Student Conduct

All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. (See current Student Guidebook*).*

Students should also consult the Rules of Netiquette for more information regarding how to interact with students in an online forum: Netiquette http://www.albion.com/netiquette/corerules.html

ADA Statement

Students with Disabilities

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact:

Office of Student Disability Resources and Services

Texas A&M University-Commerce
Gee Library- Room 132
Phone (903) 886-5150 or (903) 886-5835
Fax (903) 468-8148
Email: Rebecca.Tuerk@tamuc.edu

Website: Office of Student Disability Resources and Services
http://www.tamuc.edu/campusLife/campusServices/studentDisabilityResourcesAndServices/

Nondiscrimination Notice

Texas A&M University-Commerce will comply in the classroom, and in online courses, with all federal and state laws prohibiting discrimination and related retaliation on the basis of race, color, religion, sex, national origin, disability, age, genetic information or veteran status. Further, an environment free from discrimination on the basis of sexual orientation, gender identity, or gender expression will be maintained.

Harassment Policy

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, etc. If you or someone you know

has been harassed or assaulted, you can find the appropriate resources here:

University Title IX Contact: Michele Vieira, 903-886-5025, mailto:TitleIX@tamuc.edu

University resource webpages:
http://www.tamuc.edu/facultyStaffServices/humanResources/title-ix/resources.aspx

http://www.tamuc.edu/campuslife/campusServices/universityPoliceDepartment/crimePrevention/sexualAssault.aspx

University Counseling Center: 903-886-5145,
http://www.tamuc.edu/campusLife/campusServices/counselingCenter/default.aspx

Campus police: mailto:upd@tamuc.edu, call 911 in emergency situations

External resources:

Crisis center of NorthEast Texas: http://www.ccnetx.org
Know you IX: http://knowyourix.org
End rape on campus: http://endrapeoncampus.org
Clery Center for Security on Campus: http://clerycenter.org
Not Alone: https://www.notalone.gov

COURSE OUTLINE / CALENDAR

Schedule is subject to change; any changes will be announced in class ahead of time.

Date	Topic	Activities	Chapter
M Aug 31	Introduction	Pre-tests/how class works	
W Sept 2	Introduction	Syllabus/Group ice-breakers	
F Sept 4	Electric charge and forces	Group lecture	25
M Sept 7	**LABOR DAY**		
W Sept 9	Electric charge and forces	Tutorial: Charge	25
F Sept 11	Electric charge and forces	Lab 01	25
M Sept 14	Electric charge and forces	PhET lab/problem solving	25
W Sept 16	Electric Field and Flux	Group lecture	26

F Sept 18	Electric Field and Flux	Tutorial: Field and flux	26
M Sept 21	Electric Field and Flux	Lab 02	26
W Sept 23	Electric Field and Flux	PhET lab/problem solving	26
F Sept 25	**TEST 1**		
M Sept 28	Gauss' Law	Group lecture	27
W Sept 30	Gauss' Law	Tutorial: Gauss' law	27
F Oct 2	Gauss' Law	PhET Lab	27
M Oct 5	Gauss' Law	Problem solving	27
W Oct 7	Electric Potential	Group lecture	28
F Oct 9	Electric Potential	Tutorial: Electric potential	28
M Oct 12	Electric Potential	PhET lab/problem solving	28
W Oct 14	Capacitance	Group lecture	29
F Oct 16	Capacitance	Tutorial: Capacitance	29
M Oct 19	Capacitance	Lab 03	29
W Oct 21	Capacitance	PhET lab/problem solving	29
F Oct 23	**TEST 2**		
M Oct 26	Current, Resistance, RMF	Group lecture	30
W Oct 28	Current, Resistance, RMF	Tutorial: Model for circuits I & II	30
F Oct 30	Current, Resistance, RMF	Lab 05/06	30
M Nov 2	Current, Resistance, RMF	PhET lab/problem solving	30
W Nov 4	DC Circuits	Group lecture	31
F Nov 6	DC Circuits	Tutorial: RC Circuits	31
M Nov 9	DC Circuits	Lab 04/07	31
W Nov 11	DC Circuits	PhET lab/problem solving	31
F Nov 13	Magnetic fields and forces	Group lecture	32
M Nov 16	Magnetic fields and forces	Tutorial: Magnetic fields	32
W Nov 18	Magnetic fields and forces	Lab 09	32
F Nov 20	Magnetic fields and forces	PhET lab/problem solving	32
M Nov 23	**TEST 3**		
W Nov 25	Sources of magnetic field	Group lecture	33
F Nov 27	**THANKSGIVING**		
M Nov 30	Sources of magnetic field	Tutorial: magnetic interactions	33
W Dec 2	Sources of magnetic field	Lab 10	33
F Dec 4	Sources of magnetic field	PhET lab/problem solving	33
M Dec 7	Induction	Group lecture	34
W Dec 9	Induction	Tutorial: Lenz' law & Faraday's law	34
F Dec 11	Induction	PhET lab/problem solving	34
W Dec 16	**FINAL**		

READING/HOMEWORK SCHEDULE

Date	Rdg: Chapter Summary Due	Rdg: Full Chapter Due	HW: Mastering Physics Set	HW: Mastering Physics Due	HW: Tut Set	HW: Tut Due
M Aug 31						
W Sept 2						
F Sept 4	25		1			
M Sept 7						
W Sept 9					1	
F Sept 11			2	1		
M Sept 14		25				1
W Sept 16	26					
F Sept 18			3	2	2	
M Sept 21						
W Sept 23		26				2
F Sept 25			4	3		
M Sept 28	27					
W Sept 30					3	
F Oct 2			5	4		
M Oct 5		27				3
W Oct 7	28					
F Oct 9			6	5	4	
M Oct 12		28				
W Oct 14	29					4
F Oct 16			7	6	5	
M Oct 19						
W Oct 21		29				5
F Oct 23			8	7		
M Oct 26	30					
W Oct 28					6	
F Oct 30			9	8		
M Nov 2		30				6
W Nov 4	31					
F Nov 6			10	9	7	
M Nov 9						
W Nov 11		31				7
F Nov 13	32		11	10		
M Nov 16					8	
W Nov 18						
F Nov 20		32	12	11		8

M Nov 23						
W Nov 25	33					
F Nov 27			13			
M Nov 30				12	9	
W Dec 2						
F Dec 4		33	14	13		9
M Dec 7	34					
W Dec 9					10	
F Dec 11		34		14		
W Dec 16						10