PHYS 208, sections 519-524, Fall 2017

Instructor Information

Instructor	Dr. Mioduszewski
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Office	CYCL 333
Office hours	T 10:00-11:00am, R 9:00-10:00am, or by appointment

Course Meeting Times and Locations

Lecture	TR 12:45-2:00pm in MPHY 204
Exam 1	M Sep 25 at 7:15pm
Exam 2	M Oct 16 at 7:15pm
Exam 3	M Nov 13 at 7:15pm
Comprehensive Exam	F Dec 01 at 7:15pm

See attached **Lab Schedule** for the section-specific locations/times of the recitations and labs

Course Description and Course Objectives

Electricity & Magnetism for students in science and engineering. This is the second semester of a two-semester sequence in introductory physics. Topics include material covered in chapters 21-32 of the textbook, "University Physics" (see **Text and Required Materials** below).
Knowledge to gain: Understanding of material covered in chapters 21-32 of the textbook, University Physics.
Skills to gain: Ability to work through complex problems.
See attached list of **Learning Objectives**.

Pre-Requisites:

PHYS 218 and MATH 151 or 171.
You must have a working knowledge of plane geometry, trigonometry, and algebra. You will also be expected to have a working knowledge of derivatives and integrals, and be proficient in the use of vectors (addition, subtraction, dot and cross products).
Co-Requisite: MATH 152 or 172.

Text and Required Materials:

The text is "University Physics", 14th ed., Young and Freedman, vol. 2, stocked in the bookstore, or see the web-page for other versions that would suffice. Look for bundled "Modified Mastering Physics" access, or you must purchase access to this site separately. Also you will need to purchase an access code for WebAssign for the labs and FlipItPhysics for the prelectures. Finally, you must have an "iClicker" for the lectures.
You also should have a pocket calculator capable of calculating arithmetic and trigonometric functions for homework.

Pre-Lectures: PHYS 208 lectures follow a "flipped course" model, and as part of that we are using a pre-lecture system hosted on the online FlipItPhysics site. Please enter your UIN for your 'unique identifier' when registering, to ensure that you get credit for your work. You are required to view the prelectures (narrated slides including a few online questions) ahead of the lectures, and the lectures will include quizzes to see if you have gained a basic understanding. The remainder of the lecture can then focus more on problem-solving. The FlipItPhysics site also includes "Checkpoints" following most pre-lectures, which are short quizzes to test for understanding. The course code for this course is: **MioFall17**.

Lectures and Clickers: The iClickers will be used for in-class conceptual testing and polling. To encourage class participation, credit for iClickers will be based in part on participation, as well as additional points based on correct answers. Full participation credit allows for 3 "free drops" (missed classes), to avoid complicated accounting for excused absences. To gain participation credit you must pre-register your device, and answer all of the questions in

class. *Cheating by bringing a friend's clicker is a violation of the Aggie Honor Code, and will result in loss of all clicker points, and possible disciplinary action.*
To register the iClicker, go to http://www.iclicker.com/support/registeryourclicker/, and enter your first and last names (same as on your TAMU ID), then the TAMU UIN, then the "Remote ID" code from the back of your iClicker. (It can also be found on the LCD screen upon powering up the remote.) Technical problems with the clickers will likely need to be addressed to the support people at iclicker.com.

Laboratory: The Lab is a part of this course, not treated as a separate grade. However, the Lab part of the course must be passed separately to pass the course. In order to pass the Lab part of the course, attendance at all Labs is required (with one make-up Lab available). The **Lab Schedule** is on a separate page, and posted on the web-page. The labs, along with pre-lab and post-lab assignments, will be obtained through the online WebAssign package. Note that although we do not have a Lab scheduled each week, you are expected to attend both Recitation and Lab each week for full credit. Missing the lab part will result in zero credit for the recitation quiz of that week.

Exams: We will have 4 common evening exams (3 "midterm" exams and 1 "comprehensive" exam). The common exams are the extra evening sessions included in the course schedule when you registered. These exams start at 7:15 PM. The three midterm exams are expected to last 75 minutes, and the comprehensive exam is expected to last 120 minutes. The dates are listed above in **Course Meeting Times and Locations**. The locations for each exam will be announced in class.
Exams generally consist of problems similar in content and difficulty to the homework. **Formula sheets** will be provided for each exam.

Absences:

If you miss an exam due to an authorized excused absence as outlined in the University Regulations, you should attempt to contact me prior to the exam, but no later than the next class meeting following the missed exam to arrange for a makeup exam. With an official excuse, the missed exam score will likely be replaced by the makeup exam score. Note: Few conditions qualify as an authorized excused absence, so you must avoid missing exams except for extremely serious circumstances.

Identification: You must bring your TAMU student ID with you to all exams for identification purposes.

Course Topics and Schedule:

Week of	Topic
August 28	Chapter 21: Electric Charge and Electric Field
September 04	Chapter 21 and Chapter 22: Gauss' Law
September 11	Chapter 22 and Chapter 23: Electric Potential
September 18	Chapter 23 and Chapter 24: Capacitance and Dielectrics
September 25 September 25	**Exam I (Chapters 21-23)** Chapter 24 and Chapter 25: Currents, Resistance, and Electromotive Force
October 02	Chapter 25 and Chapter 26: DC Circuits
October 09	Chapter 26 and Chapter 27: Magnetic Fields and Magnetic Forces
October 16 October 16	**Exam II (Chapters 24-26)** Chapter 27 and Chapter 28: Sources of Magnetic Field
October 23	Chapter 28 and Chapter 29: Electromagnetic Induction
October 30	Chapter 29 and Chapter 30: Inductance
November 06	Chapter 30 and Chapter 31: Alternating Current
November 13 November 13	**Exam III (Chapters 27-30)**
November 20 *11/22—11/24 Thanksgiving Break*	Chapter 31 and Chapter 32: Electromagnetic Waves
November 27 *December 01*	Chapter 32 and Review **Comprehensive Exam (Chapters 21-32)**
December 04 — 06	Special Topics

Course Grade: The overall course grade is weighted as follows:
Exams (3 Midterms and 1 Comprehensive) 70%
Laboratory 9%
Recitation Participation 5%
Online homework 8%
Prelectures/Checkpoints and in-class (clickers) 8% (5% Prelectures/Checkpoints + 3% clickers)
Total 100%

The exams are graded based on learning objectives (listed below). Each exam tests several different learning objectives and may test the same learning objective more than once. The grading keeps track of every instance in which a learning objective is tested and whether in that particular instance the objective was judged as passed or failed. Learning objectives will likely be tested multiple times across exams.
At the end of the semester achieved objectives are those which were marked as passing **greater than or equal to 60%** of the tested times. **On the comprehensive exam, if a learning objective is marked as passing ≥60% of the times tested, it will count as being achieved regardless of the number of times it was marked failing on the other 3 midterms.** The fraction of achieved objectives at the end of the semester out of the number of tested objectives gives the numerical grade in the "Exams" portion of the table above.

Grading Scale:
A: 90-100
B: 80-89
C: 70-79
D: 60-69
F: <60

Homework and Recitation: Homework assignments are posted online on the Modified Mastering Physics (pearsonmylabandmastering.com) website, and you are responsible for completing and understanding these problems. By the end of the first week you should set up your Modified Mastering Physics account and complete the first homework assignment. When you first register, you must do so via the homework link on the eCampus site for your PHYS 208 course.

You must work the online problems on your own, and keep up with the deadlines. Late submissions **are** accepted, however full credit will not be given. The penalty is –3% per hour past the deadline. To encourage doing the homework (which is necessary to succeed in the course!), the maximum penalty—no matter how late—is –50%. Details about the grading policy for individual homework problems can be found on the online site—for example, in some cases you get several attempts to key in the correct answer, with a 3% penalty for wrong attempts.

Web Pages:
- ecampus.tamu.edu – main course website for this class (will have lecture notes and grades)
- physics208.physics.tamu.edu – common course website for sections using "University Physics" textbook
- pearsonmylabandmastering.com – (Modified) Mastering Physics for homework submission; register through ecampus.tamu.edu!
- www.flipitphysics.com – for pre-lectures and checkpoints
- www.webassign.net/tamu/login.html – for the labs

ADA Policy: 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 believe you have a disability requiring an accommodation, please contact Disability Services, currently located in the Disability Services building at the Student Services at White Creek complex on west campus or call 979-845-1637. For additional information, visit http://disability.tamu.edu.

Honor Code: The Aggie Honor Code states, "An Aggie does not lie, cheat, or steal or tolerate those who do." Further information regarding the Honor Council Rules and Procedures may be found on the web at http://aggiehonor.tamu.edu.

Learning Objectives:

Mathematical Tools to Solve E&M Problems

1. Be able to compute the components of a vector in any given coordinate system
2. Be able to compute addition, scalar, and vector products between vectors
3. Be able to solve for a unknown quantity in a single equation when possible
4. Be able to solve a system of N equations with N unknown variables
5. Be able to translate verbal constraints into mathematical language
6. Be able to translate mathematical results to verbal interpretations
7. Be able to do integrals and take derivatives

Electric Charge and Coulomb's Law

8. Calculate the electric force between charges using Coulomb's Law
9. Calculate the Coulomb force exerted on a charged particle by other charged particles, using Coulomb's Law and Superposition
10. Calculate the electric field produced by a point charge
11. Calculate the electric field due to a collection of point charges and understand the distinction between electric force and electric field
12. Calculate the electric field caused by a continuous distribution of charge
13. Be able to draw and to interpret electric field lines
14. Calculate the force and torque on an electric dipole due to an external electric field, and the potential energy of an electric dipole

Gauss' Law

15. Articulate the concept of electric flux and be able to calculate the electric flux through a surface
16. Formulate how Gauss' Law relates the electric flux through a closed surface to the charge enclosed by the surface
17. Articulate under what conditions Gauss' Law is useful for determining electric field
18. Be able to use Gauss' Law to calculate the electric field due to a symmetric charge distribution
19. Describe the electric field within a conductor and where the charge is located on a charged conductor.

Electric Potential

20. Calculate the electric potential energy of a collection of charges
21. Use conservation of energy to solve a problem with electric forces
22. Articulate the meaning and significance of electric potential
23. Calculate the electric potential that a collection of charges produces at a point in space
24. Calculate the electric potential due to a continuous distribution of charges
25. Be able to use electric potential to calculate electric field
26. Be able to calculate the electric potential from the electric field
27. Be able to draw and to interpret equipotential surfaces

Capacitance and Dielectrics

28. Identify the nature of capacitors and be able to quantify their ability to store charge (i.e. the capacitance)
29. Be able to combine the calculation of fields and potential functions to derive the capacitance of the three soluble systems
30. Analyze capacitors connected in a network (by determining equivalent capacitance for capacitors connected in series or parallel)
31. Calculate the amount of energy stored in a capacitor
32. Articulate how dielectrics make capacitors more effective (and how a dielectric within a charged capacitor becomes polarized)
33. Be able to apply Gauss' Law when dielectrics are present
34. Be able to analyze change of charge, voltage, and energy of the capacitor when dielectric is inserted/removed in the presence/absence of the battery

Current, Resistance, and Electromotive Force

35. Calculate the resistance of a conductor from its dimensions and resistivity
36. Articulate Ohm's Law both in terms of the resistivity of a material (the microscopic form of Ohm's Law) and in terms of the resistance (macroscopic form of Ohm's Law)
37. Articulate the concept of electromotive force (emf) and how emf makes it possible for current to flow in a circuit

38. Identify the symbols used in circuit diagrams
39. Calculate a terminal voltage
40. Calculate energy and power in a circuit

Direct-Current Circuits

41. Analyze circuits with multiple resistors in series or parallel
42. Articulate Kirchhoff's Rules
43. Apply Kirchhoff's rules to analyze circuits
44. Articulate the functionality of ammeters and voltmeters and under what conditions these instruments are "idealized"
45. Analyze R-C Circuits

Magnetic Field and Magnetic Forces

46. Articulate the force exerted by a magnetic field on other moving charges or currents
47. Interpret magnetic field lines and calculate magnetic flux through a surface
48. Calculate the motion of charged particles in magnetic and electric fields, including applications such as a cyclotron, velocity selector, mass spectrometer, and the Hall effect
49. Calculate the magnetic force on a current-carrying wire
50. Calculate the torque on a magnetic dipole and the potential energy of a magnetic dipole in an external magnetic field

Sources of Magnetic Field

51. Calculate the magnetic field due to a point charge with constant velocity
52. Calculate the magnetic field due to a current (using Biot-Savart Law)
53. Calculate the force between two long parallel conductors
54. Apply Ampere's Law to calculate the magnetic field
55. Recognize under what conditions Ampere's Law is useful to determine the magnetic field

Electromagnetic Induction

56. Be able to calculate magnetic flux through a surface
57. Articulate how Faraday's Law relates the induced emf in a loop to the time-derivative of magnetic flux through the loop and be able to apply it to calculate induced emf
58. Apply Lenz's Law to determine the direction of an induced emf
59. Calculate the emf induced in a conductor moving through a magnetic field
60. Calculate the induced electric field generated by a changing magnetic flux
61. Articulate the concept of displacement current and be able to calculate it for a changing electric flux through a surface

Inductance

62. Calculate mutual inductance and induced emf due to mutual inductance
63. Articulate the concept of self inductance and be able to relate the magnetic flux and current to the self inductance
64. Calculate the energy stored in a magnetic field
65. Analyze R-L circuits and describe the time-dependence of the current
66. Analyze L-C circuits and describe the time-dependence of the current
67. Recognize the time-dependence of the current in an L-R-C circuit

Alternating-Current Circuits

68. Analyze an L-R-C series circuit with a sinusoidal emf
69. Understand the origin of resonances in L-R-C circuits (analogous to forced, damped harmonic oscillator)
70. Determine the amount of power flowing into or out of the alternating-current circuit

Electromagnetic Waves

71. Articulate the key properties of electromagnetic waves (wave is transverse, relationship between E and B, speed of wave)
72. Be able to reproduce the wave equation mathematically and articulate the meaning of all quantities in the mathematical formulation of sinusoidal electromagnetic plane wave.
73. Use the Poynting vector to calculate the energy and momentum carried by the electromagnetic wave

PHYSICS 208 LAB SCHEDULE FALL 2017

WEEK		RECITATION / EXPERIMENT
1	Aug 28 - Sept 01	Recitation – Lab (Diagnostic, Pre)
2	Sept 04 – 08	Recitation – Lab 2. E - Fields and Potentials
3	Sept 11 – 15	Recitation – Lab 3. Capacitors
4	Sept 18 – 22	Recitation – Lab 5. Oscilloscope and RC Circuits
5	Sept 25 – 29	Recitation – No lab
6	Oct 02 – 06	Recitation – Lab 1. Electrical Measurements
7	Oct 09 – 13	Recitation – Lab 6. Magnetic Fields
8	Oct 16 – 20	Recitation – No lab
9	Oct 23 – 27	Recitation – Lab 8. Faraday's Law
10	Oct 30 – Nov 03	Recitation – No lab
11	Nov 06 – 10	Recitation – Make up for one missed lab only (Lab 7. LR, LC and RLC Circuits)
12	Nov 13 – 17	Recitation – No lab
13	Nov 20 – 24	Thanksgiving Week (no classes Wed/Thurs/Fri)
14	Nov 27 –Dec 01	Recitation – Lab (Diagnostic, Post)
15	Dec 04	Monday *No recitation, no lab* – Redefined day, Friday classes
	Dec 05	Tuesday *No recitation, no lab* – Redefined day, Thursday classes
	Dec 06	Wednesday *No recitation, no lab* – Redefined day, Wednesday classes

Times for Rec // Lab	Monday	Wednesday	Friday
08:00-09:20 // 09:30-10:50	513 (334//211)	509 (334//211)	512 (334//211)
09:10-10:30 // 10:40-12:00	521 (334//212)		524 (333//212)
10:20-11:40 // 11:50-01:10	501 (334//211)		
11:10-12:30 // 12:40-02:00			
12:40-02:00 // 02:10-03:30	507 (334//211)	504 (334//211)	
12:40-02:00 // 02:10-03:30	522 (333//212)		
01:50-03:10 // 03:20-04:40			
03:00-04:20 // 04:30-05:50	514 (334//211)	520 (334//211)	
04:10-05:30 // 05:40-07:00		523 (333//212)	
05:20-06:40 // 06:50-08:10	502 (334//211)	517 (334//211)	

Times for Rec // Lab	Tuesday	Thursday
08:00-09:20 // 09:30-10:50	503 (334//211)	
09:35-10:55 // 11:05-12:25		510 (334//212)
11:10-12:30 // 12:40-02:00	515 (334//211)	505 (334//211)
12:45-02:05 // 02:15-03:35	508 (334//212)	518 (334//212)
02:20-03:40 // 03:50-05:10	519 (334//211)	
03:55-05:15 // 05:25-06:45	516 (334//212)	506 (334//212)
05:30-06:50 // 07:00-08:20		511 (334//211)

■ Physics 208 lab sections will meet in George Mitchell Physics Building room 333 or 334 for the first hour and a half (recitation), and then go to room 211 or 212 for the remainder of the lab period.
■ No lab manual needed: See Physics 208 WebAssign site for on-line manual.
■ Mr. Ramirez's Physics Lab Updates will be posted in the Physics Department web page http://physics.tamu.edu/academics/labs/ (read information on this site before attending first lab session)
■ Students will be provided with lab safety information and rules. It is imperative that the safety rules be followed by all students in the lab. Disobeying the safety rules can result in expulsion from the lab.