PHYS-102: Fundamentals of Physics II - Electricity and Magnetism
SYLLABUS
Fall 2020-2021

Drexel Learn (Blackboard Learn)

https://learn.dcollege.net/ultra/courses/_269104_1/cl/outline
Zoom links to synchronous lectures, recitations, and labs are accessed in Drexel Learn

Lecture (Tuesday/Thursday, EDT/EST)

PHYS-102-A - FA 20-21
10:00-10:50

Recitation (Wednesday, EDT/EST)

Section 2	**11:00-12:20**	**DiNardo**
Section 3	**3:30 - 4:50**	**Patel**
Section 4	**5:00 - 6:20**	**Patel**
Section 5	**12:30-1:50**	**Shpiece**
Section 6	**11:00-12:20**	**Shpiece**

Laboratory (Friday. EDT/EST) - ***Note: Specific meeting weeks, see schedule below***

Section 60	**11:00**	**Fugate**
Section 61	**11:00**	**Fugate**
Section 62	**1:00**	**Fugate**
Section 63	**1:00**	**Fugate**

Course Director and Section A Lecturer

Dr. N. John DiNardo (dinardo@drexel.edu)
Virtual Office Hours: Tu 11:30-12:30, Wed 1:00-2:00, or by appointment
Zoom link: https://drexel.zoom.us/j/2158952790

Teaching Assistants

Mr. Mark Fugate (mkf64@drexel.edu)
Virtual Office Hours: TBD or by appointment
Zoom link:

Mr. Shalin Patel (ssp325@drexel.edu)
Virtual Office Hours: Th 3:00-5:00, or by appointment
Zoom link: https://drexel.zoom.us/j/93192232676

Mr. Jacob Shpiece (js4664@drexel.edu)
Virtual Office Hours: Tu 1:00-3:00, or by appointment
Zoom link: https://drexel.zoom.us/j/5993704020

Main course website: **PHYS-102-A - FA 20-21**
https://learn.dcollege.net/ultra/courses/_269104_1/cl/outline

Course Materials

University Physics with Modern Physics 15th ed. H.D. Young & R.A. Freedman with Modified Mastering Physics and Learning Catalytics

Mastering Physics provides access to pre-lecture exercises, textbook-based homework problems, and textbook-based recitation problems

Learning Catalytics is an online response system for polling during lectures

Course Description (Catalog link)

Second of a three-course physics sequence introducing electricity and magnetism to engineering and science majors. Topics include: Electrostatics, Coulomb's law, electric field and flux, and Gauss's law. Electric potential and potential energy and capacitors. Charges in motion, voltage and current measurements. Direct current circuit analysis using Ohm's law and Kirchhoff's rules. Sources of magnetic fields, concepts of magnetic flux and electromagnetic induction.

Updated Course Learning Outcomes

- Students will be able to apply key concepts and physical laws of electricity and magnetism including conservation of charge, Coulomb's law, Gauss's law, electric potential, Kirchhoff's rules, Biot-Savart law, Ampere's law, Faraday's law and Lenz's law
- Students will be able to analyze the dynamics of charged particles in electric and magnetic fields
- Students will be able to identify sources of electric potential and analyze direct current circuits including steady state and time-varying circuits
- Students will develop critical thinking skills combining theoretical and applied concepts in electricity and magnetism through problem solving and performing laboratory experiments

Course Elements

Pre-lecture reading of textbook chapter and **Pre-lecture exercises in Mastering Physics** are due each week. **Pre-lecture** Mastering Physics grades are reduced by 25% per day for late submissions.

Lecture slides (not annotated) are provided before each lecture in Drexel Learn. Synchronous (live) **Lectures** in Zoom present concepts and examples; concepts may be explored and misconceptions identified during lectures using the **Learning Catalytics** student response system. The Learning Catalytics grade is weighted heavily towards participation. A web-enabled device is required. **Lecture** videos and transcriptions are posted on Drexel Learn.

Recitations are conducted synchronously (live) in Zoom to discuss and solve problems to advance the application of physics concepts. Collaborative problem solving and discussion/presentation of one problem from a **Recitation Breakout Worksheet** available on Drexel Learn will be implemented in Zoom Breakout Rooms. Recitation problem solutions are made available at week's end on Drexel Learn.

Homework problems allow student to apply concepts through problem-solving

- Online problems are solved and graded in **Mastering Physics** and are due on Wednesdays (except on Monday after Thanksgiving). Homework grades are reduced by 25% per day for late submissions.
- One **Written Homework Problem** per week will be distributed in Drexel Learn and are due on Wednesdays (except on Monday after Thanksgiving). Solutions will be be submitted by upload to the Drexel Learn Recitation portal for annotation and grading.

Three **Virtual Laboratory Experiments** will be conducted during the term to relate observation to theory. The laboratory document and worksheet will be posted in Drexel Learn and a **Pre-Lab Video** in Drexel Learn will introduce the lab. Watching the **Pre-Lab Video** and attending a **Synchronous Laboratory Meeting in Zoom** are required. A group Laboratory Report will follow an outline provided will be submitted. A single grade will be given to each Lab Group report

Examinations

Three one-hour online **Mid-term Examinations** and a comprehensive two-hour **Final Examination** will be given. A make-up examination may be arranged if special circumstances arise with the permission of the Course Director.

All exams will require consent to follow academic integrity requirements. Exams may have timed sections and be distributed in multiple versions. Note below the expectations for academic integrity. Violations of the Academic Integrity policy will be advanced pursued in accord with that policy.

EXAMINATION SCHEDULE

Exam	Day/Date
1	Monday, 10/19/20 - 7:30am*
2	Monday, 11/2/20 - 7:30am*
3	Monday, 11/16/20 - 7:30am*
Make-up**	To be determined
Final	To be determined

* An alternate time may be arranged only for students in non-EDT/EST time zones

** In special cases, with the permission of the Course Director, a Make-up exam may be given.

Optional online meetings

Optional online discussion, organizational meetings may be held during the term as needed

Students in alternate timezones

Based on a student survey distributed at the outset of the term, considerations will be made for students in time zones outside of EDT/EST where scheduling issues may preclude some synchronous virtual activities.

Office hours

Office hours in Zoom are posted for each course instructor. Other times may be requested by appointment.

Syllabus Note

Changes may be made to the Syllabus over the course of the term. Changes, if any, will be posted on the course web site and noted in Lecture.

COURSE SCHEDULE (see website for scheule with enhanced detail

WEEK	LECTURE TOPICS	Recitation Problems	Prelecture / Homework Problems
1	**Lecture 1: Tu 09/22/20** **Chp 21 - Electric Charge and Electric Field** Course Introduction Introduction - Electricity and Magnetism Mechanics - Force, Torque, Energy Electric Charge; Conductors / Insulators Electric Force: Coulomb's Law Charge Transfer between Materials **Lecture 2: Th 09/24/20** **Chp 21 - Electric Charge and Electric Field** Electric Force from discrete/continuous charge distribution Concept of a Field Electric Field Electric Field Lines	**Wed 9/23/20** **Chp 21** 75 10 23 59 Worksheet 1	**Due: Wed 9/23/20** **Prelecture Chp 21**
2	**Lecture 3: TU 09/29/20** **Chp 21 - Electric Charge and Electric Field** Charged Particle Dynamics in Electric Fields Electric Dipole Charge Density / Charge Distributions **Lecture 4: Th 10/1/20** **Chp 22 – Gauss's Law** Charge Density Induced Charge Electric Flux Gauss's Law	**Wed 9/30/20** **Chp 21** 26 37 38 53 54 74 Worksheet 2	**Due: Wed 9/30/20** **Prelecture Chp 22** **Due: Fri 10/2/20** **Homework** **Chp 21** Tutorial 3 12 35 41 48 58 Written Homework 1
3	**Lecture 5: Tu 10/6/20** **Chp 22 – Gauss's Law** Applications of Gauss's Law Charges on Conductors **Lecture 6: Th 10/8/20** **Chp 23 – Electric Potential** Electric Potential Energy Electric Potential Electric Potential Calculations	**Wed 10/7/20** **Chp 22** 3 17 21 26 31 37 Worksheet 3 **Fri 10/9/20** **Lab 1** Sections 60, 62	**Due: Wed 10/7/20** **Prelecture Chp 23** **Due: Fri 10/9/20** **Homework** **Chp 22** Tutorials 12 19 20 38 56 Written Homework 2

WEEK	LECTURE TOPICS	Recitation Problems	Prelecture / Homework Problems
4	**Lecture 7: Tu 10/13/20** **Chp 23 – Electric Potential** Electric Potential Gradient: Relation between Electric Field and Electric Potential Equipotential Surfaces Applications of Electric Potential Conservation of Energy **Lecture 8: Th 10/15/20** **Chp 24 – Capacitance and Dielectrics** Electric Circuits *Concepts* (Chp 25) Current, Current Density *Concepts* (Chp 25) Electromotive Force *Concepts* (Chp 25) Resistance and Resistors *Concepts* (Chp 25) Capacitance and Capacitors Series/Parallel Configurations Capacitors in Series/Parallel	**Wed 10/14/20** **Chp 23** 8 17 21 39 50 54 Worksheet 4 **Fri 10/16/20** **Lab 1** Sections 61, 63	**Due: Wed 10/14/20** **Prelecture Chp 24** **Due: Fri 10/16/20** **Homework** **Chp 23** Tutorials 6 10 19 22 46 59 Written Homework 3
5	**Lecture 9: Tu 10/20/20** **Chp 24 – Capacitance and Dielectrics** Energy Storage In Capacitors Geometric considerations: Parallel Plate / Spherical / Cylindrical Capacitors Dielectric Materials Molecular Model of Induced Charge **Lecture 10: Th 10/22/20** **Chp 25 – Current, Resistance, and Electromotive Force** Conservation of energy; Conservation of charge Electric Current - Direct / (Alternating) Resistivity / Resistance / Resistors Electromotive Force - Batteries and Power Supplies	**Wed 10/21/20** **Chp 24** 4 5 21 26 33 45 56 Worksheet 5	**Due: Wed 10/21/20** **Prelecture Chp 25** **Due: 10/23/20** **Homework** **Chp 24** Tutorial 11 20 28 29 31 51 Written Homework 4
6	**Lecture 11: Tu 10/27/20** **Chp 25 – Current, Resistance, and Electromotive Force** Single Loop Electric Circuit Analysis Introduction to Kirchhoff's Loop Rule Energy and Power in Electric Circuits Resistors in Series/Parallel Electrical Measuring Instruments **Lecture 12: Th 10/29/20** **Chp 26 – Direct-Current Circuits** Kirchhoff's Rules Analysis of Multi-loop Circuits	**Wed 10/28/20** **Chp 25** 7 18 27 29 42 65 70 72 Worksheet 6 **Fri 10/30/20** **Lab 2** Sections 60, 62	**Due: Wed 10/28/20** **Prelecture Chp 26** **Due: Fri 10/30/20** **Homework** **Chp 25** Exercises 2 19 22 30 31 68 71 Tutorial Written Homework 5

WEEK	LECTURE TOPICS	Recitation Problems	Prelecture / Homework Problems
7	**Lecture 13: Tu 11/3/20** **Chp 26 (4-5) – Direct-Current Circuits** Time-dependent circuits: RC Circuit Power Distribution Systems **Lecture 14: Th 11/5/20** **Chp 27 – Magnetic Field and Magnetic Forces** Magnetism / Magnetic Fields Magnetism Magnetic Fields Magnetic Flux Magnetic Field Lines Motion of Charged Particles in Magnetic Fields	**Wed 11/4/20** **Chp 26** 6 24 32 41 54 57 Worksheet 7 **Fri 11/6/20** **Lab 2** Sections 61, 63	**Due: Wed 11/4/20** **Prelecture Chp 27** **Due: Fri 11/6/20** **Homework** **Chp 26** 7 10 21 23 25 Tutorial 40 Written Homework 6
8	**Lecture 15: Tu 11/10/20** **Chp 27 – Magnetic Field and Magnetic Forces** Applications: Charged Particle motion in Magnetic Fields Magnetic Forces / Torques on Current-carrying Condutcors in Magnetic Fields **Lecture 16: Th 11/12/20** **Chp 28 – Sources of Magnetic Field** Magnetic Field produced by Moving Charges / Current Elements / Current-carrying Conductors Forces between Current-carrying Conductors Torques on Current-carrying Conducting Loops / Motors	**Wed 11/11/20** **Chp 27** 14 18 24 29 37 56 59 Worksheet 8 **Fri 11/13/20** **Lab 3** Sections 60, 62	**Due: Wed 11/11/20** **Prelecture Chp 28** **Due: Fri 11/13/20** **Homework** **Chp 27** Tutorial 5 22 25 33 36 53 60 Written Homework 7
9	**Lecture 17: Tu 11/17/20** **Chp 28 – Sources of Magnetic Field** Ampere's Law Applications of Ampere's Law Magnetic Attraction (Magnetic materials) **Lecture 18: Th 11/19/20** **Chp 29 – Electromagnetic Induction** Electromagnetic Induction Faraday's Law Lenz's Law	**Wed 11/18/20** **Chp 28** 9 21 23 29 35 39 59 60 Worksheet 9 **Fri 11/20/20** **Lab 3** Sections 61, 63	**Due: Wed 11/18/20** **Prelecture Chp 29** **Due: Fri 11/20/20** **Homework** **Chp 28** Tutorial 2 10 24 25 28 34 62 64 Written Homework 8

WEEK	LECTURE TOPICS	Recitation Problems	Homework Problems
10	**Lecture 19: Tu 11/24/20** **Chp 29 – Electromagnetic Induction** Applications of Faraday's Law - Time-varying magnetic Flux Time-varying Magnetic Field Time-varying Geometric Change Time-varying Angular Change Motional EMF Generators Energy considerations	**Holiday**	
11	**Lecture 20: Tu 12/1/20** **Chp 30 – Self-Inductance and Inductors** Self-Inductance Inductor / Coil RL Circuit (RLC Circuit) Mutual Inductance Transformer **Lecture 21: Th 12/3/20** **Review**	**Wed 12/2/20** **Chp 29/30** 14 16 24 28 48 **Chp 29/30** 1 5 21 Worksheet 10	**Due: Mon 11/30/20** **Prelecture Chp 30** **Due: Fri 12/4/20** **Homework** **Chp 29** 31 33 35 47 51 **Chp 30** 2 7 22 Written Homework 10

Grading: The final course grade will be based on the following weights.

Midterm Exams (3)	35%
Mastering Physics: Pre-lecture exercises	5%
Mastering Physics Online Homework	10%
Drexel Learn: Written Homework problem	5%
Lecture response exercises - Learning Catalytics	5%
Recitation participation	5%
Virtual Laboratories (3)	15%
Final Exam	20%
TOTAL	**100%**

Letter Grades

Course numerical grades	**Letter Grade**
> 96 %	A+
90 % and Less than 96%	A
86% and Less than 90%	B+
80% and Less than 86%	B
76% and Less than 80%	C+
70% and Less than 76%	C
65 % and Less than 70%	D+
60 % and Less than 65%	D
Less than 60%	F

The grading scale may be modified slightly towards lower numerical grade thresholds (in students' favor)

Notes

Respect for Diversity
Drexel University from its founding has been committed to diversity and inclusive excellence. As part of its mission, the Office of Equality and Diversity aspires to recognize the value of each person as an individual.

The PHYS 102 instructors recognize the talents and diversity of our students. Students' perspectives benefit the learning process and the entire Drexel University community. We will strive to be sure that materials and activities in this course respect the diverse backgrounds of our students including race, ethnicity, gender, sexuality, disability, age, religion, socioeconomic status, and culture. We believe that each student should be respected by us and by their peers. Please provide the Course Director with any suggestions that can improve the course in any way.

Tutoring
The Physics Help! Center offers free tutoring sessions to Drexel students in introductory physics courses. Find PHYS 102 in the Physics Help! Center calendar.

Additional student resources and academic support can be found at
https://drexel.edu/coas/academics/student-resources-support

Help with technology can be found on the Information Technology website at
https://drexel.edu/it

Disability Services
Students with disabilities requesting accommodations must present a current Accommodation Verification Letter (AVL) to the Course Director before accommodations can be made. AVLs are issued by the Office of Disability Services. The Office of Disability Services can be contacted on www.drexel.edu/oed, by phone at 215-895-1401 or TTY at 215-895-2299. Resources for students with disabilities can be found at the following website.
www.drexel.edu/oed/disabilityResources/students

Health Center and Student Counseling
Health and wellness resources for students can be found at the following websites.
http://drexel.edu/counselingandhealth/student-health-center/overview
http://drexel.edu/counselingandhealth/counseling-center/overview

Academic Integrity
Breaches of academic integrity, for example, cheating or plagiarizing from another student or copying from online sources without reference, are serious infractions of the community standards of Drexel University. Likewise, breaches of computer systems policies serious infractions of the community standards of Drexel University. Refer to the following websites to understand expectations of students and consequences for violating these standards.
Academic Integrity
Student Code of Conduct
Security of Enterprise Systems policy
Security of Information and Networked Systems policy

Violations of the Academic Integrity policy will be advanced pursued in accord with that policy. You must certify your understanding of these policies and certify your intention to follow them in order to access examinations. A sample Academic Honesty Certification Statement is provided below.

Appropriate Use of Course Materials
It is important to recognize that some or all of the course materials provided to you are the intellectual property of Drexel University, the course instructor, or others. Use of this intellectual property is governed by Drexel University policies, including the IT-1 policy found at:

https://drexel.edu/it/about/policies/policies/01-Acceptable-Use/

Briefly, this policy states that **all course materials including recordings** provided by the course instructor may not be copied, reproduced, distributed or re-posted, unless otherwise given prior written approval by the University. Doing so may be considered a breach of this policy and will be investigated and addressed as possible academic dishonesty, among other potential violations. Improper use of such materials may also constitute a violation of the University's Code of Conduct found at:

https://drexel.edu/compliance-privacy-audit/compliance/policies/cpo-1/

and will be investigated as such.

Recording of Class Activities
In general, students and others should not record course interactions and course activities in lecture, lab, studio or recitation. Students who have an approved accommodation from the Office of Disability Resources to record online lectures and discussions for note taking purposes should inform their course instructor(s) of their approved accommodation in advance. The recording of lectures and discussions may only be carried out by the students enrolled in the class who have an approved accommodation from Disability Resources with their instructors' prior knowledge and consent. Students with approved accommodations may be asked to turn off their recorder if confidential or personal information is presented.

If a student has any comments, concerns, or questions about provided class materials and/ or recording, talk to your course instructor first. If this does not resolve the issue, you can also reach out to the Department Head, and use the process described for a grade appeal to move your concern forward. The process described for grade appeals can be found at:

https://drexel.edu/provost/policies/grade-appeals/

Registration and Grading policies
Please note the following policies for adding, dropping, or withdrawing from courses at Drexel University as well as incomplete grades and grade appeals.

Course Add/Drop
Course Withdrawal
Incomplete Grades
Grade Appeals

Course Attendance and Participation
Attendance at and participation in lectures, recitation, and virtual laboratory activities is expected. Attendance at midterm and final examinations is required.

In some instances, a student may be unable to attend a course activity. In such a situation, e-mail and/or discuss the situation with the Course Director (dinardo@drexel.edu) or Lecturer before an expected absence or within one week after an unexpected absence to be granted an excused absence. Students should refer to the Absence from Class policy that includes the University policy on excused absences including absences for religious observances. In this remote teaching and learning environment, we will make every effort to accommodate student absences and make available materials and documents on the course website.

Sample Academic Integrity Certification

As noted in the syllabus, breaches of academic integrity, for example by cheating or plagiarizing, are serious infractions of the community standards of Drexel University. Refer to the following websites to understand expectations of students and consequences for violating these standards.

Academic Integrity
Student Code of Conduct

For this exam, you may use

- A scientific calculator
- The equation Sheet provided on the course website
- Your textbook (online textbook allowed)
- Your notes

It is expected that you WILL
Take the exam yourself logging in with your Drexel userid and password

See: Security of Enterprise Systems policy
See: Security of Information and Networked Systems policy

It is expected that you WILL NOT
Allow anyone to assist you in taking this exam
Share your work with another student or appropriate another student's work
Utilize the internet for problem solutions

By my signature, I certify that I have read, understand, and will adhere to the Drexel University Academic Integrity policy, the Student Code of Conduct, and relevant Drexel Information Technology policies to preserve academic integrity.