

# PHYS 273 H – Fundamentals of Physics II: Electromagnetism Spring 2018

**Instructor:** George Coutrakon

Class meeting room: Faraday Hall Room 129 (in lower lever of Faraday Hall)

Instructor's office: Faraday Hall Room 218

Office hours: Tuesday and Thursday, 4:00 to 5:00pm or by appointment

Email: [gcoutrakon@niu.edu](mailto:gcoutrakon@niu.edu)

**Text:** Giancoli, "*Physics for Scientists and Engineers*", Vol. 2, 4<sup>th</sup> edition

**Homework Website:** [www.masteringphysics.com](http://www.masteringphysics.com) by Pearson.

## Web sites:

There are two websites for this class. General course information is available on Black Board web site <http://www.webcourses.niu.edu>. The class is also using an on-line homework system provided by Pearson education called "Mastering Physics". You can access this web page through <http://www.masteringphysics.com/>. In order to use the mastering physics page you need to either purchase an access code (about \$66) or use the free access code that came with your textbook. You can also purchase the access code and an electronic copy of the textbook for about \$110. If you purchased the book for a previous class such as 253 your code should still be valid. Once you have an access code for Mastering Physics, you need to enroll in this class with the course code COUTRAK273H. The name of the course in MP is Physics 273H Spring 2017.

**Course description:** PHYS 273H is the second semester of calculus-based general physics covering physical laws governing electrostatics, electrodynamics, circuits, magnetostatics, and Maxwell's equations. This includes concepts of electric charge, electric fields, magnetic fields, inductance, and both direct current and alternating current circuits. There is one three-hour laboratory a week.

**Prerequisites:** Phys 253, and Calculus I.

## Course objectives:

By the end of the course, students will be able to

1. Analyze and solve problems or situations involving fundamental physics principles in the areas of electricity, magnetism, electromagnetism, and circuits.
2. Use appropriate mathematical techniques and concepts to obtain quantitative solutions.

3. Describe, calculate, and visualize an electric field and calculate the force in it. [SEP]
4. Describe, calculate, and visualize a magnetic field and calculate the force in it. [SEP]
5. Describe and understand basic electronic elements such as resistor, capacitor, and inductors. [SEP]
6. Use Maxwell's equations and understand their implications. [SEP]

**Expectations:**

Students are expected to attend both the lecture portion of the course, Tuesdays and Thursdays, 9:30-10:45 am in Faraday Hall 129 and their assigned lab section. All assignments need to be completed and turned in on time. Significant additional resources and help outside of class are available and as college students it is your responsibility to seek out these resources if you are having difficulty in the course. For example, there is a physics help room (Faraday Hall 251), myself and your lab TA. Cell phones and all other electronic devices must be silenced during class.

Course information will be disseminated through the Blackboard site (<http://webcourses.niu.edu>).

**Attendance:**

Students are expected to attend all class meetings. If there are any extenuating circumstances, arrangements need to be made in advance of the absence with the instructor (for the lecture sessions) or the TA (for the lab section). Many studies have shown that the single biggest predictor of success in college is attending classes!

**Assignments and Grading:**

Your grade will be determined from a combination of homework, labs, tests, and final exam. There will be approximately one homework assignment and one lab report per week. These assignments and the due dates will be announced in class and will be posted on blackboard. Each lab will have an associated assignment which is due at the beginning of the next week's lab session. There will be three in-class exams during the semester. Finally, there is a comprehensive final exam.

Your final grade for the course will be made up of 25% for the lab portion and 75% for the lecture portion. The lecture portion of your grade will be composed of homework (50%), midterm exams (10% each) 20% for the final exam.

The grading scale (A,B,C,D, and E) will be based on your Weighted Total score in Black Board. I will convert the Weighted Total to letter grades based on the distribution of scores. There will be a small boost (or reduction) in the weighted total score at the end of the semester *after* the grading curve is set. 85% attendance or better will add a small boost, 75% or less will give a small reduction. This is designed to boost your score to next highest grade if you are close to the next highest grade and your attendance is better than 85%.

IMPORTANT NOTE: YOU MUST PASS THE LABS TO PASS THE COURSE. THAT IS, YOUR CUMULATIVE SCORE ON THE LABS MUST EXCEED 60% OR YOU WILL RECEIVE A FAILING GRADE FOR THE COURSE.

2<sup>nd</sup> Important Note: You must average 60% on the four exams to receive a B- or better for the course. All exams will be multiple choice with mostly quantitative calculations.

**Late assignment policy:** Lab reports may be turned in up to 1 week late with a 20% grade penalty, but HW assignments will NOT be accepted late in Mastering Physics. Periodically, I will transfer the point scores from MP to BB.

Course Schedule: Note: may 8 and May 10 are for review before Final Exam

	Tuesday		Thursday	
January	16	Ch. 21 Coulomb's Law, unit of charge, conductors and insulators	18	electric fields for charge distributions
	23	Ch. 22 Gauss's Law	25	Calculating electric fields from charges
	30	Ch. 23 Electric potential	Feb. 1	Work problems
February	6	Ch.24 Capacitors, dielectrics and energy storage	8	Test 1
	13	Ch. 24 , continued	15	Work problems
	20	Ch.25, Electric currents in wire circuits, Ohm's Law $V=IR$	22	Electric power, AC vs. DC
	27	Ch. 26 DC Circuits, EMF, Kirchoff's Law, RC circuits	Mar.1	Ammeter and voltmeter
March	6	Ch 27-Magnetic fields, $F=(I \times B)l$	8	Test 2
SpringBreak	13	HW assignments for Ch. 27	15	(no classes all week)
	20	Ch. 27 Torque on a current loop, electric motors	22	Cathode rays and electrons, Hall Effect
	27	Ch. 28 Ampere's Law and Biot Savart Law	29	Solenoids, toroids and electromagnets

April	3	Ch.29 Faraday's Law, Lens Law	5	Electric generators, transformers and power
	10	Test 3	12	Ch. 30 Inductors
	17	Ch. 30 – LRC circuits (DC)	19	
	24	Ch. 32 – Maxwell's Eqs.	26	Electro-magnetic waves
May	1	Poynting Vector and radiation pressure	3	Radio waves:production and detection

**Accessibility:** If you need an accommodation for this class, please contact the Disability Resource Center as soon as possible. The DRC coordinates accommodations for students with disabilities. It is located on the 4th floor of the Health Services Building, and can be reached at 815-753-1303 (V) or [drc@niu.edu](mailto:drc@niu.edu).

Also, please contact me privately as soon as possible so we can discuss your accommodations. The sooner you let us know your needs, the sooner we can assist you in achieving your learning goals in this course.

**Academic Integrity:** As detailed in the current NIU undergraduate catalog: *Good academic work must be based on honesty. The attempt of any student to present as his or her own work that which he or she has not produced is regarded by the faculty and administration as a serious offense. Students are considered to have cheated if they copy the work of another during an examination or turn in a paper or an assignment written, in whole or in part, by someone else. Students are responsible for plagiarism, intentional or not, if they copy material from books, magazines, or other sources without identifying and acknowledging those sources or if they paraphrase ideas from such sources without acknowledging them. Students responsible for, or assisting others in, either cheating or plagiarism on an assignment, quiz, or examination may receive a grade of F for the course involved and may be suspended or dismissed from the university.*

*A faculty member has original jurisdiction over any instances of*

*academic misconduct that occur in a course which the faculty member is teaching. The student shall be given the opportunity to resolve the matter in meetings with the faculty member and the department chair. If the facts of the incident are not disputed by the student, the faculty member may elect to resolve the matter at that level by levying a sanction no greater than an F for that course. The faculty member shall notify the student in writing whenever such action is taken, and the **Office of Community Standards and Student Conduct** shall receive a copy of the Academic Misconduct Incident Report indicating final disposition of the case, which will be placed in the student's judicial file. In all matters where the charge of academic misconduct is disputed by the student or if the faculty member feels a sanction greater than an F in the course is appropriate (such as repeated offenses or flagrant violations), the faculty member shall refer the matter to the Office of Community Standards and Student Conduct making use of the Academic Misconduct Incident Report. Additional sanctions greater than an F in a course can be levied only through the University Judicial System. With regards to finding the student either responsible or not responsible for his or her action, the ruling of the Judicial Hearing Board shall be binding. In cases where there is either a finding of responsibility or an admission of responsibility by the student, any recommendations by the hearing board regarding the course grade are non-binding on the instructor, who remains solely responsible for assigning a course grade, consistent with the policies set forth in the course syllabus.*