

PHYS 273 Syllabus

Spring Semester 2015

Course: Fundamental of Physics II: Electromagnetism

Section: 0002

Meeting Time: M-W, 3:30 PM – 4:45 PM

Location: [Davis Hall](#) 116 ([click here](#) for NIU interactive map)

Instructor: Juan A. Colón Santana, Ph.D.

Office: 223 [Faraday Hall](#) (or FR 223)

Office hours: Mondays from 2:00 PM- 3:00 PM (or by appointment)

Phone: XXX-XXX-XXXX (will be provided soon)

Email: jcolon@niu.edu

This syllabus is a guide and every attempt is made to provide an accurate overview of the course. However, circumstances and events may make it necessary for the instructor to modify the syllabus during the semester and may depend, in part, on the progress, needs, and experiences of the students. Changes to the syllabus will be made with advance notice.

Course Description:

Physics laws governing electricity and magnetism using calculus. Primarily for majors in the physical and mathematical sciences and engineering. One three-hour laboratory a week. Not available for credit to students with credit in PHYS 211, PHYS 251, or PHYS 251A.

The general content of the course comprise topics on Electricity, Magnetism, Electromagnetism and AC Circuits. See course content section for a detailed list of topics.

Course Prerequisites:

PHYS 250A or PHYS 253. CRQ: MATH 230.

Learning Outcomes

By the end of the course the 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.
- 4) Describe, calculate and visualize a magnetic field and calculate the force in it.
- 5) Describe and understand basic electronic elements such as resistor, capacitor and coils.
- 6) Use Maxwell's equations and understand their implications.

Instructional Methods

This course is taught using a variety of instructional methods including lectures, in class and online discussions, demonstrations, simulations and small group discussions.

Textbooks and Course Materials:

- 1) Physics for Scientists and Engineers with Modern Physics: 4th Edition, Douglas C. Giancoli Volume II (Chapters 21-40) or the full version of the book.
- 2) Automated response system (“Clickers”)
- 3) Active Mastering Physics Account. If you have not register yet, click on the link below to create an account. The course ID is“MPCOLON59023”.
<http://www.pearsonmylabandmastering.com/northamerica/masteringphysics/students/get-registered/index.html>
- 4) Additional materials posted on Blackboard.
NIU Blackboard Link: <https://webcourses.niu.edu/webapps/portal/frameset.jsp>

Student Responsibilities

The students in this course are expected to:

- 1) Engage in active participation in every class .
- 2) Complete weekly homework assignments.
- 3) Discuss with fellow students specific physics problems and/or situations during the lecture as instructed.
- 4) Participate in the online discussions on Blackboard.
- 5) Complete course homework.
- 6) Take required examinations.
- 7) Behave in a responsible and adequate manner at all times.

Resources

There are several resources that students can take advantage of:

- 1) Recitations – this is a weekly hour (time will vary) devoted for problem solving or for answering questions that students may have. The recitation time will take place at the laboratory section, immediately after the experiments are completed (yes... expect to be in laboratory the whole time).
- 2) Tutoring hours – there are several teaching assistants assigned to offer free tutoring hours each week in the tutoring room (Room 251 in Faraday Hall). They can help you with questions and doubts regarding the material. Please, keep in mind that tutors are not required to solve a problem for you, their responsibilities are to guide you in reaching a solution on your own.
- 3) Tutoring Center – the College of Engineering & Engineering Technology provides free tutoring. While this is a resource for all engineering and engineering technology students, non-engineering majors are welcome to schedule an appointment. For more information and tutor availability click on:
<http://www.niu.edu/ceet/CurrentStudents/Tutors/index.shtml>

Course Content

This course will adhere to the following topics (for the exact content and order see course schedule):

Part I - Electricity

Electric Charges, Electrical Forces, and the Electric Field:

Polarization and induction, Coulomb's force law, electric fields and electric dipoles, motion of a charged particle in a uniform electric field.

Electric Potential Energy and the Electric Potential

Electrical potential energy and the electric potential and electric potentials and electric fields

Gauss's Law for the Electric Fields

The elegant application of Gauss's law.

Circuit Elements, Independent Voltage Sources, and Capacitors

Terminology, notation and conventions, circuits elements, an independent voltage source, connection of circuits elements and capacitors and dielectrics.

Electric Current, Resistance, and dc Circuit Analysis

Electric current, Resistance and ohm's law, Characteristic curves, Electric power Electrical Networks and Circuits, Electronics, Kirchhoff's laws and Transients in circuits

Part II- Magnetism

Magnetic Forces and the Magnetic Field

Magnetic field, magnetic forces on currents, Work done by magnetic forces, Torques, Biot-Savart law, Forces of parallel currents on each other and the definition of the Ampere, Gauss's law for the magnetic field Magnetic poles and current loops, Ampere's law, Displacement current and the Ampere-Maxwell law

Part III - Electromagnetism

Faraday's Law of Electromagnetic Induction

Faraday's law of electromagnetic induction, Lenz's law, AC generators, Maxwell equations of electromagnetism, Electromagnetic waves, Self inductance, A series LR circuit, A parallel LC circuit and mutual inductance

Part IV - AC circuits

Sinusoidal ac Circuit Analysis

The potential difference and current phasors for resistors, inductors, and capacitors, impedances, independent ac voltage sources, power absorbed by circuit elements in ac circuits, a filter circuit and a series RLC circuit.

Methods of Assessment:**Exams: 45%**

There will be a total of five exams during the semester (4 partial exams and 1 comprehensive final examination). Each partial exam constitutes 10% of the final grade and the final examination constitutes 15% of the final grade. Note that the lowest score of the four partial examinations will be dropped. However, if the student misses a partial exam without providing a well-documented and convincing evidence, a score of 0% will be assigned for that particular exam and the student will not have the option to drop that score (the instructor reserve the right to enforce the same policy for low scores on a particular partial examination). There will be no make-up tests for any of the partial exams under any circumstances.

The format of the exams will be discussed a week prior the examination date (each exam may have a different format). See the course schedule for the exact dates of the exams.

Students will be granted with a failing grade (0% F) on the exam if any device other than a calculator (or the clicker if applicable) is seen during the testing period. Please make sure that such devices are stowed away. Similar outcome will apply if a student is seen copying from a neighbor or from any source.

Note: The final examination grade will not be dropped under any circumstances. Students who do not complete the final examination will not pass the course. The final exam may be rescheduled only in case of a well-documented and serious emergency.

Homework: 15%

The homework grade will be based on (but not limited to) homework problems, assigned readings and Blackboard discussions.

There will be a total of 13 assignments worth 100 points each. The lowest 3 scores will be dropped (again missed homework will result in 0% grade that will not be dropped – similar policy will be enforced on suspicious low scores). The homework problems will be available through mastering physics a week prior the due date. Students should expect about ten homework problems each week. The course ID for mastering physics is “MPCOLON59023”

Note: The Homework deadlines are rigid and as such, late homework will not be accepted.

Participation: 20%

The students are expected to participate in class via “clickers” and by interactive communication. In general, most of the questions will require a response using “clickers”. However, the instructor reserves the right to ask question to the students at any time during the lecture. The number of points obtained for answering the questions will be determined by the instructor and will be announced before the question is asked.

Keep in mind that this grade is not only determined by the points obtained for answering questions, there will be other factors that will contribute to the grade (random absence checks, tardiness, etc).

Note: Tardiness is disruptive and rude to your instructor and your fellow students. Students are expected to be in their seat by 3:30 pm and remain in the lecture room at least until 4:45 pm. Students who arrive to the classroom late or leave early will be penalized by points (or percent) subtraction from the participation grade. If your personal and/or professional schedules prevent you from arriving to class on time, please discuss this with the instructor immediately.

Laboratory Sessions: 20%

There will be a three hours laboratory session each week. Students are expected to write a formal report due week after the lab session took place. A minimum average lab grade of 60% is required to pass the course. Students with lab score below this mark will fail the course. Likewise, students will fail the course if all coursework requirements as described here and throughout the syllabus are not satisfied. Please, refer to the Laboratory Syllabus for more information about the laboratory.

Extra Credit:

There may be a possibility for extra credit. If extra credit is assigned, it will be through in class participation (either verbally or through the automated response system). There will be no extra credit assigned for special projects, essays, research papers, etc.

Letter Grades:

The letter grades will be assigned based on the following percentage:

Letter Grade	Percentage (%)
A	100 – 93.0
A ⁻	92.99 – 90.0
B ⁺	89.99 – 87.0
B	86.99- 83.0
B ⁻	82.99 – 80.0
C ⁺	79.99 – 74.0
C	73.99- 70.0
D	69.99- 60.0
F	59.99 - 0

Attendance

Students are strongly encouraged to attend every lecture. It is very likely that the example problems in the lecture will be different than those in the textbook, so it is in your best interest to attend. Also, students must understand that there will be no one-on-one instruction for a missed class and no lecture notes will be provided to those who miss the class.

Late Work:

Please use the course schedule to accomplish your academic, personal, and professional goals. Late work will not be accepted.

Office Hours:

While I can be reached at my office hours, students are strongly encouraged to contact me with questions related to the course anytime via email or phone. Students are welcome to stop by my office out of the office hours; however, I cannot guarantee my availability to answer questions.

Special Notes:

- 1) Cheating and plagiarism are serious offenses. Offenders will be referred to the University's judicial office.
- 2) No newspapers or electronic devices of any kind (Cell phone, MP3 player, iPod, etc) are allowed during class time (i.e., during lectures, tests, etc). Small laptops may be accepted if a student is using the electronic version of the book but he/she must sit in the front rows. No electronics allowed on the tests and final exam other than a calculator and clicker (if applicable).
- 3) The example problems used in the lecture are likely to be different than those in the textbook. It is your responsibility to solve and understand all solved strategic examples and problems found within each chapter of the textbook as well for all equations derived in those problems. Of course, you are welcome to ask if in doubt!
- 4) I strongly encourage that you submit your homework at least a day before the due date. This will ensure that if there is an issue with the mastering physics website, you will have enough time to solve it. Claims that homework was not submitted due website issues or that a different answer to a problem was submitted (or other claims of such nature) will be investigated. If the issues are found to be illogical, there will be no changes in the grade of the homework.

Severe Weather and Cancellation Notices

To check for campus severe weather closing call: 815.752.6736 (local) or 1.888.648.9847. If classes are cancelled by the University or by the instructor for any reason, an announcement will be made at the earliest opportunity possible on Blackboard and all students will be emailed regarding the cancellation.

Academic Integrity:

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.

Attendance:

The university does not use a "cut" system. Each instructor decides whether to excuse class absences and determines how to permit make-up work. If a student will be absent from classes for a week or more because of an accident, illness, or other emergency, instructors will be notified of the absence only if students or their parents request it through the Division of Student Affairs. Health Services will not release information about students unless they provide a written request. Leaves of absence will be granted for volunteer services related to disaster relief in accordance with applicable Illinois statutes or executive orders issued by the State of Illinois in response to emergency situations. To initiate a leave of absence, students should contact their College Dean's office, or the vice provost (or the vice provost's delegate) for any student who has no college affiliation. Following the period of volunteer service, Registration and Records will facilitate reenrollment of the student. Students are expected to comply with each individual instructor's established attendance policy. It is recommended that students avoid registering for classes in which they would amass significant absences. In the case of an absence due to required

attendance at a university-sponsored event such as a department trip, performing arts activity, ROTC function, or athletic competition, reasonable attempts shall be made by faculty members to allow the student to make up missed work. Students are responsible for completing the work assigned and/or due on the days they are absent for university sponsored events. Both the sponsoring unit and the student should inform the faculty member as soon as possible in the semester in order for arrangements to be made for completing missed assignments, examinations or other required course work. The student is required to provide each instructor with an official notification in advance of the absence (e.g., a letter from the chair of the sponsoring department, the head of the sponsoring unit, or the coach).

Accommodations for Students with Disabilities:

A student who believes that reasonable accommodations with respect to course work or other academic requirements may be appropriate in consideration of a disability must (1) provide the required verification of the disability to the Disabilities Resource Center, (2) meet with the Disabilities Resource Center to determine appropriate accommodations, and (3) inform the faculty in charge of the academic activity of the need for accommodation. Students are encouraged to inform the faculty of their requests for accommodations as early as possible in the semester, but must make the requests in a timely enough manner for accommodations to be appropriately considered and reviewed by the university. If contacted by the faculty member, the staff of the Disabilities Resource Center will provide advice about accommodations that may be indicated in the particular case. Students who make requests for reasonable accommodations are expected to follow the policies and procedures of the Disabilities Resource Centering this process, including but not limited to the Student Handbook.

A wide range of services can be obtained by students with disabilities, including housing, transportation, adaptation of printed materials, and advocacy with faculty and staff. Students with disabilities who need such services or want more information should contact the Disabilities Resource Center (815-753-1303).