COURSE OUTLINE **PHYSICS 721** **Spring 2018**

Classical Electromagnetism II

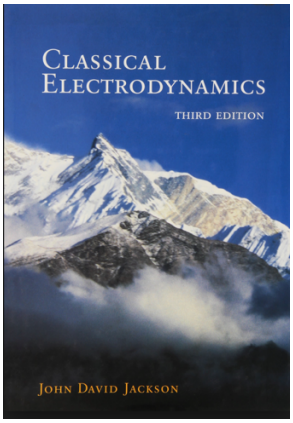
INSTRUCTOR: Slawomir Piatek: 423F Tiernan Hall, **piatek@njit.edu**

Office hours: T & R 1:00 PM – 2:00 PM; other times by appointment.

PREREQUISITE: Undergraduate course in electromagnetism

COURSE MATERIAL:

- Textbook: *Jackson, J. D., "Classical Electrodynamics", 3rd edition, J. Wiley*



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ATTENDANCE: It is expected that students will attend all lectures. Attendance will be taken at all classes. More than 3 unexcused absences (in total) are excessive. If you have excusable absences contact the Dean of Students. If you must withdraw from the course, do it officially through the Registrar. Do not simply stop attending and taking exams: that forces the instructor to assign a course grade of "F."

GRADING: Your final letter grade in Phys 721 will be based on a composite score for term's work that includes the the scores for lecture quizzes, midterm, and the final exam.

1) Lecture quizzes: Starting on 1/23, a lecture quiz will be given by the end of class. The quiz will contain 1 – 5 problems depending on the level of difficulty. The quizzes will be "open textbook" but "closed notes." Solution to a quiz will be posted on the class website and discussed in the following class.

2) Midterm: Tuesday, March 20.

3) Final Exam: Tuesday, May 8, 6:00 PM – 8:30 PM, FMH 314.

Final Letter Grades: Here are the weights to be used for calculating the composite score:

- **40%** for the total of all lecture quizzes
- **30%** for the midterm
- **30%** for the final

The cutoff percentages for various letter grades will be in the range of:
85% for A
80% for B+
70% for B
65% for C+
50% for C
40% D
F below 40 %

STUDENTS WITH DISABILITIES:

If you need accommodations due to a disability please contact Chantonette Lyles, Associate Director of Disability Support Services, Fenster Hall Room 260 to discuss your specific needs. A Letter of Accommodation Eligibility from the Disability Support Services office authorizing your accommodations will be required.

HONOR CODE STATEMENT: NJIT has a zero-tolerance policy for cheating of any kind and for student behavior that disrupts learning by others. Violations will be reported to the Dean of Students. The penalties range from a minimum of failure in the course plus disciplinary probation up to expulsion from NJIT. Avoid situations where your own behavior could be misinterpreted as dishonorable. **Students are required to agree to the NJIT Honor Code on each exam, assignment, quiz, etc. for the course.**

Turn off all cellular phones, wireless devices, computers, and messaging devices of all kinds during classes and exams. Please do not eat, drink, or create noise in class that interferes with the work of other students or instructors. Creating noise or otherwise interfering with the work of the class will not be tolerated.

Class Calendar

TOPIC	TEXT STUDIES	RECOMMENDED PRACTICE PROBLEMS
Week 1 (1/16/18) Plane Electromagnetic Waves	Ch. 7.1 – 1.4	Jackson, 7.2, 7.4, 7.6
Week 2 (1/23/18) Plane Electromagnetic Waves	Ch. 7.5, 8, 9	Jackson, 7.16, 7.19
Week 3 **(2/6/18)** Plane Electromagnetic Waves, problem solving	Ch. 7, above-covered sections	
Week 4 (2/13/18) Waveguides	Ch. 8.1 - 4	Jackson, 8.2, 8.4, 8.5
Week 5 (2/20/18) Waveguides	Ch. 8.5, 7, 8	Jackson, 8.6, 8.7
Week 6 (2/27/18) Waveguides, problem solving	Ch. 8, above-covered sections	
Week 7 (3/6/18) Radiation	Ch. 9.1 - 4	Jackson, 9.3, 9.8
Week 8 (3/20/18) Radiation **Midterm**	Ch. 9.1 - 4	Jackson, 9.15, 9.16
Week 9 (3/27/18) Scattering	Ch. 10.1 - 4	Jackson, 10.1, 10.2, 10.3
Week 10 (4/3/18) Scattering	Ch. 10.1 - 4	Jackson, 10.5, 10.7
Week 11 (4/10/18) Scattering, problem solving	Ch. 10, above-covered sections	
Week 12 (4/17/18) Relativity	Ch. 11.1 - 4	Jackson, 11.3, 11.4
Week 13 (4/24/18) Relativity	Ch. 11.4 - 8	Jackson, 11.5, 11.6
Week 14 (**5/1/18)** Relativity	Ch. 11.9 - 11	Jackson, 11.13, 11.16

Tuesday, May 1 follows a Friday schedule
Spring break: 3/11 – 3/18
Reading days: May 2 & 3
Final exam period: May 4 – May 10

LEARNING OUTCOMES

- Describe electromagnetic radiation using Maxwell equations.
- Analyze the propagation, dispersion, and energy flux of electromagnetic radiation through different types of materials. Assess the changes in direction and polarization of electromagnetic waves as they traverse interfaces between different media. Use these knowledge to describe everyday phenomena such as reflection, refraction, polarized sunglasses, or the bright reflections on the road on a sunny day.
- Evaluate the shape of electromagnetic waves confined to waveguides and resonant cavities.
- Characterize the electromagnetic field due to a localized oscillating source. Recognize the emergence of electromagnetic radiation.
- Sort the contributions to the electromagnetic radiation using the multipole expansion. Analyze the multipolar contributions to the radiation in order to characterize the source of radiation.
- Analyze experimental results using the theory of scattering at long wavelengths. Explain basic properties of the daytime sky (why is it blue, why polarized glasses are effective) using scattering theory.
- Explain Einstein's two postulates of the Special Theory of Relativity. Perform relativistic transformations of the fields. Recognize the properties of electromagnetic fields that are essentially relativistic. Analyze the motion of relativistic particles in the presence of electromagnetic fields.