PHYS 306: Wave Motion and Electromagnetic Radiation

Spring 2023

Course description: Plane waves, interference, diffraction, polarization, electromagnetic waves, dispersion, and relativity.

Prerequisites: PHYS 305 and PHYS 301 (min. grade of C or XS)

Scheduled Meeting Times: 12:00 am - 1:15 pm MW Horizon Hall 4016

Instructor: Karen L. Sauer
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Tentative Office Hours: Tuesdays 4 - 5 pm, Planetary 263
and/or by appointment, including virtual

Textbook: Introduction to Electrodynamics 4th Edition by David J. Griffiths and Darrell F. Schroeter

Grading: Homework = 20%, Exams = 20% each, Final = 35%, In-class quizzes = 5%.

Tentative Schedule:

Date	Topic		Associated reading Read *before* class
1/23	*Maxwell's equations:*	Magnetic Charge & in Matter	7.3
1/25		Boundary Conditions	
1/30	*Conservation:*	Charge and Energy	8.1
2/1		Momentum	8.2
2/6		Angular Momentum	
2/8		Magnetic Forces	8.3
2/13	*Waves* in One Dimension		9.1
2/15	*Electromagnetic Waves* in:	Vacuum	9.2
2/20		Matter	9.3
2/22		Reflection	
2/27	Absorption & Dispersion of *Waves:*	Conductors	9.4
3/1	**Exam 1**		
3/6		Permittivity	9.4
3/8	Guided *Waves*		9.5
3/13	Spring Recess		
3/15	Spring Recess		
3/20	*Potentials & Fields:*	Formulation	10.1
3/22		Continuous distributions	10.2
3/27		Lienard-Wiechert Potentials	10.3

3/29		Moving point charge	
4/3	*Radiation from:*	A dipole	11.1
4/5			
4/10		Point Charges	11.2
4/12	**Exam 2**		
4/17		Radiation Reactance	
4/19	*Relativity*	Special	12.1
4/24		Mechanics	12.2
4/26			
5/1		Electrodynamics	12.3
5/3			
5/15	**Final**, 10:30-1:15 pm		

Exams: In-class exams are closed-book and without calculators, but an equation sheet containing mathematical equation from Griffiths four back pages (not including Maxwell's equations) will be provided. It is the responsibility of each student to attend classes during scheduled examinations as listed in the syllabus regardless of work or family considerations. Make-up exams will be given only to students with a VALID medical excuse and they should contact the instructor as soon as they return to school.

Final: Mon. 5/15, 10:30 am - 1:15 pm, Horizon Hall 4016. The final exam will be comprehensive, with greater emphasis placed on the material covered after second exam.

Homework Assignments: Homework problems will be assigned in Blackboard and are due at noon on Wednesdays in person. You are encouraged to work on your homework assignments together in small groups, BUT copying homework from each other is not permitted. Full marks will only be given for homework where the full work is shown. Because solutions will be given out at the same time as the homework is handed in, no late homework will be accepted, except with a VALID medical excuse. The lowest homework grade will be dropped.

Note: You can email to a fellow student through Blackboard by going to Tools on the side bar and choosing "Send email."

Homework computation:

Some of the homework will require numerical computation. Include the code for the computation in your homework. You can choose the language/platform in which to do the computation. The appropriate *Matlab* commands, however, will be given in class. Matlab can be gotten for free through Mason: https://www.mathworks.com/academia/tah-portal/george-mason-university-31483444.html. It is also available in Planetary 220, which also has a printer.

If you are a student with a disability and you need academic accommodations: please see me and contact the Office of Disability Services at 703.993.2474. All academic accommodations must be arranged through that office. Students must inform the instructor at the beginning of the semester, and the specific accommodation will be arranged through ODS.

Academic Integrity: GMU is an Honor Code university; please see the University Catalog for a full description of the code and the honor committee process. Honor Code: To promote a stronger sense of mutual responsibility, respect, trust, and fairness among all members of the George Mason University community and with the desire for greater academic and personal achievement, we, the student members of the university community, have set forth this honor code: *Student members of the George Mason University community pledge not to cheat, plagiarize, steal, or lie in matters related to academic work.*