Physics 239: Radiative Processes in Astrophysics

Fall 2016

Instructors:

Lecturer: Prof. Karin Sandstrom
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Office: SERF 426
Office hours: by appointment

Course Schedule:

Lecture: MW 12:30-1:50pm SERF 329

Course Materials:

Web Page:

Course Webpage: http://karinsandstrom.github.io/f16_phys239.html

Texts & Other Material:

Textbook: *Radiative Processes in Astrophysics* by Rybicki & Lightman

Other Resources:

Online LaTeX for writing up problem sets (if you don't have it on your computer): http://sharelatex.com or http://overleaf.com

Overview:

Physics 239 is a graduate level class on the interaction of light and matter in astrophysics. We will cover a range of topics relevant for studying light from astronomical objects.

Course Logistics:

On Monday and Wednesday we will have lectures covering the topics listed in the schedule below. **The schedule for this course is subject to change!! Updated schedules will be posted on the website and announced in class.**

Grading:

Your grade in this class will be based on the following:

- **Homework:** There will several problem sets assigned throughout the term. You will be expected to submit your answers to some of the problem sets as a pdf. I highly

recommend writing up the problem set in latex using one of the free online latex tools (sharelatex or overleaf). Some of your homework will include generating computer codes to solve problems. The code may be written in whatever language you prefer but needs to be executable by your instructor (python is recommended). Your code should be thoroughly commented. The coding based assignments will be submitted via github - the first assignment is to set up git and github and create a repository for your Physics 239 assignments.

- **Final Project:** The final project will involve a 4-5 page written report and a 10 minute class presentation on a radiative processes topic relevant to your research interests. The goal of this project is for you to summarize the relevant literature from your field on some aspect of the interaction of light and matter. An abstract and bibliography will be due approximately 5 weeks into the class. A rubric that outlines the expectations and grading for the report and presentation will be posted on the course website early in the quarter.

The overall percentage of your grade set by the various components is the following:

Activity	Grade Percentage	Notes
Homework	60	several will be assigned
Final Project - Presentation	20	10 minute presentation on 11/30
Final Project - Written Report	20	4-5 pages due 11/30

While collaboration is encouraged, all assignments you turn in must be your own work - i.e. the write up must be yours. Extra credit may be given at the instructor's discretion.

Final letter grades will be set by the following scale (+/- assigned at instructor's discretion):

Letter Grade	Percent		Letter Grade	Percent		Letter Grade	Percent
A	90 - 100%		**C**	70 - 79.9%		**F**	0 - 59.9%
B	80 - 89.9%		**D**	60 - 69.9%			

Course Policies and Expectations:

Academic Conduct: In this course you are expected to abide by UCSD's policy on academic integrity, which every student should read in detail here: http://academicintegrity.ucsd.edu. This policy provides a detailed, strict definition of what constitutes academic misconduct. Students who are found to have committed academic misconduct will be reported and face administrative and academic sanctions. The current sanctioning guidelines for academic misconduct are available here: https://students.ucsd.edu/_files/Academic-Integrity/Sanctioning-Guidelines.pdf. Note that academic misconduct is not just blatant cheating, but also includes things like copying off other student's homework or tests, copying old assignments from friends or websites, or turning in work completed in part or fully by someone else as your own.

Academic Accommodations: The UCSD Office for Students with Disabilities (OSD) is available to work with students with disabilities to facilitate accommodations. These include adaptive software and technologies, captioning and interpreters, AS and peer notetakers and exam modifications. Students requesting these services must obtain and submit an Authorization for Accommodation (AFA) letter to the instructor no earlier than 3 working days prior to receiving accommodations (i.e., exam date). For more information, see the OSD website at http://disabilities.ucsd.edu.

Late Policy: If you need to turn in the homework late, please send me a note ahead of the due date to ask for an extension. I will give extensions, but it is best to keep up with the assignments as they are due, the work will pile up!

Class Schedule

Week	Lecture Date	Lecture Topic	Reading	Assignments Due
1	Sept 26	#1 - Course Overview, Macroscopic Description of Radiation	RL 1	HW 1 assigned
	Sept 28	#2 - Radiative Transfer, Thermal Radiation		
2	Oct 3	#3 - Absorption, Emission, Scattering		HW 1 due 10/3 HW 2 assigned
	Oct 5	#4 - Basic Theory of Radiation Fields	RL 2	
3	Oct 10	#5 - Basic Theory of Radiation Fields		HW 2 due 10/14 HW 3 assigned
	Oct 12	#6 - Basic Theory of Radiation Fields		
4	Oct 17	#7 - Radiation from moving charges	RL 3	
	Oct 19	#8 - Radiation from moving charges		
5	Oct 24	#9 - Bremsstrahlung Radiation	RL 5	Final Project abstract & bibliography due 10/28
	Oct 26	#10 - Atomic Structure	RL 9	
6	Oct 31	#11 - Radiative Transitions (Fuller)	RL 10	
	Nov 2	#12 - Radiative Transitions (Fuller)		
7	Nov 7	#13 - Molecular Structure	RL 11	
	Nov 9	#14 - Relativistic Covariance & Kinematics	RL 4	
8	Nov 14	#15 - Relativistic Covariance & Kinematics		
	Nov 16	#16 - Synchrotron	RL 6	
9	Nov 21	#17 - Synchrotron		
	Nov 23	#18 - Compton Scattering	RL 7	
10	Nov 28	#19 - Plasma Effects	RL 8	Final Project Report due 11/30
	Nov 30	#20 - Final Project Presentations		