

ASTR 470/570: Solar System Physics: Syllabus - Fall 2015 Semester

AS OF 10 August 2015 - CHECK REGULARLY FOR CHANGES

INSTRUCTOR: Dr. David Alexander, HBH202 (x3633, dalex@rice.edu)

CLASS TIME/LOCATION: Tuesday/Thursday, Time: TBD; Location: TBD

CLASS WEBSITE: See Class website on OwlSpace. It is the student's responsibility to participate via the class website and to check it regularly for updated information.

OFFICE HOURS: anytime by (email) appt.

OBJECTIVES and LEARNING OUTCOMES: The main objective is to introduce students to a number of the fundamental physical processes at work in the Solar System with a focus on those processes that define the space environment. The basic theme behind the course is to identify current problems of interest to modern solar and planetary science and to explore the physics behind them. The mathematical formulation of the physics will be put in context with the research applications to help familiarize the students with the research process. Regular class lectures will be augmented by the occasional discussion topic and for graduate students, the class will involve the reading and summarizing of a relevant research paper.

Students will leave the class with an understanding of some of the fundamental processes that govern the physics of the Sun and its interactions with the planets of the solar system. The class provides rudimentary introduction to plasma physics, physics of radiation, and planetary magnetic fields that provide a backdrop to the more specialized classes on these topics. In addition, students will gain a better understanding of the Earth's space environment and its impact on robotic and human space flight.

This course will only succeed with feedback (including criticism) from the class participants. I am looking forward to active participation and healthy discussion.

Please note that I will be trying out a video-capture option for the class this year. Videos of each class will be posted online. There will be at least one perhaps two guest lectures and I may also try a flipped classroom approach on occasion.

PRE-REQUISITES: Understanding of undergraduate electrodynamics, electromagnetism, quantum mechanics (atomic physics) and the appropriate mathematics (calculus, differential equations, integral transforms). PHYS 301 and PHYS 302.

TEXT: The main text for this class will be a book I authored:

The Sun (Greenwood Guides to the Universe), David Alexander (2009)

ISBN-10: 0313340773

ISBN-13: 978-0313340772

<http://tinyurl.com/n8xekqd>

Unfortunately, there is no single textbook that covers all of the topics discussed in this class. The text will be augmented by class notes and additional material as merited. Suggestions for further reading will also be provided.

FORMAT: An interactive lecture course with problem solving exercises (homework), reading of research papers, in-class discussion, and two in-class exams. For students enrolled in ASTR 570 there will also be a written research paper of a relevant topic with presentation to class. Students are required to prepare for any designated discussion topic prior to attending class.

HOMEWORK PROBLEMS: Eight homeworks will be assigned during the semester. Eight will consist of problems associated with the work discussed in class (50 points each). Each problem set is due a week after being assigned unless otherwise stated. Collectively, these count for 40(30) percentage points towards the course grade for ASTR 470(570).

LATE POLICY: The grade for late homework will be 10% off for each part of a day late up to 50% off.

ASTR 570 Research Paper and presentation:

Students enrolled in ASTR 570 will be required to write and present a research paper on a topic of relevance to the study of physical processes in the solar system. Each student will present their project to the class at the end of the semester. The topic will be chosen by the student and approved by the instructor.

EXAMS: There will be two in-class open note exams during the semester worth 100 pts each and each contributing 30% each to your final grade.

GRADING (ASTR 470):

Task	Total Pts	Weighting
8 homeworks	= 400 pts	40%
1 mid-term exam	= 100 pts	30%
1 end-of-term exam	= 100 pts	30%
total	= 600 pts	100%

GRADING (ASTR 570):

Task	Total Pts	Weighting
8 homeworks	= 400 pts	30%
Research Paper + presentation	= 100 pts	10%
1 mid-term exam	= 100 pts	30%
1 end-of-term exam	= 100 pts	30%
total	= 700 pts	100%

Final grade will be determined on total score with appropriate scaling. The letter grade will be determined from the following: >90% (A), 80%-90% (B), 70%-80% (C), 60%-70% (D), <60% (F).

DEADLINES: *Strictly Enforced!* Requests for extensions must reach and be approved by the instructor **BEFORE** the due date!

HONOR CODE: It is expected that each student will attempt the problems assigned on their own. However, active discussion of the physics in the problems is allowed to attain a clearer understanding of the issues once the problem has been attempted to the best of each student's ability. On occasion I may specify one or more problems as being exempt from collaboration. These problems will be clearly identified. Check assignments section of website for copies of problem sets, due dates and additional information.

DATES TO NOTE:

TBD

SPECIAL NOTE: Any student with a documented disability seeking academic adjustments or accommodations is requested to speak with me during the first two weeks of class. All such discussions will remain as confidential as possible. Students with disabilities will need to also contact Disability Support Services in the Allen Student Center.