PHYS275:

What it's all about; where you'll be going: this is a rough outline of the course plan and the things you should be able to do or understand by the end of this course. For a more detailed outline, see below.

Introduction to Astronomy (~ 1-2 weeks)

- interpret the language of astronomers and what they observe

Properties of our Solar System (~6-7 weeks)

- describe, explain properties of the solar system, its members
- show how we observe, calculate, know those

Solar System in Perspective (~1-2 weeks)

- use knowledge of SS to create and test SS formation models
- use knowledge of current SS + formation and evolution to search for other planetary systems
- use observations to compare/contrast with our SS

Stars: Their Structure and Evolution (~2 weeks)

- understand the basic physical properties of stars
- explain different stages of stellar lifecycle

New Discoveries (anywhere, anytime)

- now and in the future, be able to summarize and evaluate key elements of a "news" story on Planets and Stars
- judge the reliability of story and be able to explain it to your friends, family

Tools of the trade you'll be using along the way:

physics	• forces and gravitation • light/radiation • atomic structure • matter
mathematics	• calculus • algebra • computer simulations and models
your brain	• think • read • calculate • synthesize, analyze

Evaluating your work and understanding of the course material: your final grade will be based on your work in assignments and two tests as shown below.

Assignments	• 4@ 7% each • total = 28%
Midterm	• 22%
Final Exam	• 50%
Total	• 100% - based on sum of work in ALL elements

PHYS 275: Astrophysics I–The Solar System

Prof. Niayesh Afshordi:

Office:

1- Physics 369

2- Perimeter Institute, 203B

or somewhere in between the two!

E-mail: nafshord@uwaterloo.ca

Office Hours: Tue. 1100-1230, Thu. 1430-1600, or by appointment

Email office hours: I read emails 24/7, but my response time is less predictable.

TA:

Razieh Pourhassan, PHY 208 (office hour TBD, or by email), rpourhas@uwaterloo.ca

Introduction:

Learning Outcomes:

This course is an introduction to planets and stars, both inside and outside our own solar system. We will examine the ways in which astronomers figure out the properties of planets and stars- such as size, mass, composition, orbits, and age. The information we gather allows us to then consider models of how the solar system formed and evolved to what it is like today. We also learn about the physics of stars and different stages of stellar evolution.

Twenty years ago, a study of planetary systems would have been limited to one system - our own. But we have now discovered 547 planets in orbit around 458 stars (as of May 2, 2011). And so in this course you will also learn about how we detect planets around other stars, the results of searches for Extra Solar Planets, and what this might tell us about both our own solar system, planetary systems in general, and the possibility of life elsewhere.

In PHYS 275, the topics will be covered in a combination of quantitative and descriptive approaches. The quantitative material will include mathematical and physical concepts which are used to observe and interpret the properties of planets and the systems to which they belong. Some examples of these are: gravitation and orbits, using geometry to determine sizes and distances of planets, and uncovering the internal structures of stars and planets. The descriptive material will include such things as the overall properties of SS bodies, patterns connected with orbital properties etc. that we have learned and how well we understand them. Awareness of the methods used is key to understanding the limitations of our knowledge - thus both are important as well as interconnected.

Lecture Period Format:

Focus in each lecture period will vary. Some classes will be centered on basic physics concepts used in studying stars and planetary systems, some on problem solving, discussion of what is known, and interpretation of it all. You will benefit most from the class time if you have done the reading in advance of each session. The required and suggested readings for each class are listed in *Lesson Plan*, which can be found on UW ACE, and is updated regularly. The problems in the two textbooks can be used to practice for the assignments, as well as midterm and final exams.

Resources:

- Text: There is a required and a suggested text for this course:
    - **RYDEN AND PETERSON**: PHYSICS & ASTRONOMY *(Required)*;

      This is customized selection of *Foundations of Astrophysics* by Ryden and Peterson, which can be obtained from the bookstore for ~90$. The full textbook can be obtained for ~ 150$, e.g., from Amazon.ca
    - **EALES**: PLANETS AND PLANETARY SYSTEMS *(Optional)*;

      This book can be obtained from bookstore or other retailers. However, you can access an e-copy on the library website for free (which is linked on UW ACE)
- UWACE: There is a course website on UWACE and this is where you will find lecture notes, assignments and solutions, this syllabus, the lesson plan, and other relevant course material. I will post announcements from time to time here as well so please get into the habit of checking the UWACE site at least once a week.

- Wikipedia.org: Of course, this is the first place to look, if you're puzzled about something inside (or outside) solar system.
- APOD (Astronomy Picture of the Day): http://apod.nasa.gov/apod/ There are many good websites on astronomy and this one is my favorite. It features a new photo every day on a wide range of astronomy topics and a high percentage are SS related. I recommend it as a regular browsing site – maybe even as your browser homepage. The NASA web page http://www.nasa.gov/home/ will also link you to NASA missions, many of which are directly related to planetary astronomy.
- Hubble Space Telescope (HST): http://www.stsci.edu/hst/ This is a popular site because of the wonderful images you can find and also the regular news items they have or provide links to. Lots of observatories have these and I encourage you to browse from time to time.

Student Assessment/Marking Scheme etc.:

- You will be evaluated on the basis of four assignments, one midterm exam, and a final exam. **Your grade will be based on all elements as given in the table above unless exceptional circumstances warrant a change.** In such cases, you will be required to provide relevant forms: verification of illness, counseling letters etc.
- Assignments: There will be four assignments due at intervals of ~2 weeks throughout the term. They will include both numerical and short answer questions and will be posted in the **Assignments** folder of the course website ~7-10 days before they are due. Solutions will be available within a few days after the due date and always before a test/exam if relevant. Assignments can be submitted in class or to my office by 4PM on the due date. Assignments are to be submitted on paper (hard copy).
- Delayed/Expedited Assignments: The assignments can be handed in on the first class before (after) they are due. This will result in 30% bonus (penalty) on the final mark for that assignment.
- Midterm and Final Exams: There will be one test during class time and a final exam. Both the test and final exam will include numerical calculations and short answer questions similar to those in assignments and class discussion. The class test will cover material in the course up to that time and I will clarify the specifics at least one class in advance.

The final exam will cover topics in the whole course, but with a stronger emphasis on topics covered in the second half of the term.

- Equations: You will be expected to understand and know how to apply all of the equations used in the lectures, but an equation list will be developed throughout the term and available at both the class test and final exam. Moreover, students can bring and use their own books and notes. This means you won't have to do a lot of memorizing and you also won't get points on a test just for writing down an equation.
- Calculators with alpha-numeric display and long-term memory are permitted, but laptop or notebook computers may not be used.
- Course Schedule: The course lesson plan and the schedule of due dates given below will be followed as closely as possible, but some changes may occur. Any changes in assignment due dates or test date will be discussed and announced in class and posted on the course webpage. However the grading scheme will remain the same.

Important Dates		PHYS 275/Spring11
Assignments	A1	Thursday - May 26
	A2	Thursday - June 9
	A3	Thursday - July 7
	A4	Thursday - July 21
Tests	Midterm	Thursday – June 23
	Final Exam	Date TBA (Registrar)

Other:

- Return of Assignments and Tests: Assignments and class test papers will be returned to you at the first lecture after the marking is complete. Any papers not collected will be put in the box outside my office door for you to pick up when you wish. If this procedure is unacceptable to you, let me know and I will keep all of your marked work in my office for you to pick up in person.

- Final Exam Dates: The final exam schedule is normally available ~midway into the term; for spring this means mid-June. The exam period for S11 is from August 2 to August 13. Don't make travel plans until you know when your exams are as *"student travel plans are not considered acceptable grounds for granting an alternative examination time".* (see http://www.registrar.uwaterloo.ca/exams/finalexams.html).
- Note for Students with Disabilities: The Office for Persons with Disabilities, located in Needles Hall Room 1132, collaborates with all academic departments to arrange appropriate accommodation for students with disabilities; this is done without compromising the academic integrity of the curriculum. If you require academic accommodation to lessen the impact of your disability, please register with the OPD at the beginning of each academic term.
- Avoidance of Academic Offenses: You are expected to know what constitutes academic integrity, to avoid committing academic offenses, and to take responsibility for your actions. Students who are unsure whether an action constitutes an offense, or who need help in learning how to avoid offenses (e.g. plagiarism or cheating) or about "rules" for group work/collaboration should seek guidance from the course professor, TA, academic advisor, or the Undergraduate Associate Dean. For information on categories of offenses and types of penalties, students should refer to Policy # 71, Student Academic Discipline, http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm. Students who believe they have been wrongly or unjustly penalized have the right to grieve; refer to Policy #70, Student Grievance, http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm. Also, the Faculty of Arts has an excellent website on "Avoiding Academic Offenses" which can be found at http://arts.uwaterloo.ca/arts/ugrad/academic_responsibility.html.