**PHYS 175: Introduction to the Universe**

**Instructor:** Richard Epp  
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**Office:** Physics 241  
**Office Hours:** After class, or Thursday 2:30 – 4:00, or email me

**TA:** Anael Aberroue, Aberroue@uwaterloo.ca (*MasteringAstronomy* & assignments)

**Lectures:** Tues/Thurs 8:30 – 9:50 am, starting January 7th, Room Phys 150

**Textbook:** *The Cosmic Perspective 7th Edition* by Bennet et al with *MasteringAstronomy*

**Other Materials:** Lecture PowerPoint slides & blackboard notes, problem sets & solutions, reading assignments, course announcements, etc., will be posted on UW LEARN

**Course Structure:**

1. Reading assignments and quizzes: Survey of basic facts and concepts  
2. Lectures, problem sets, midterm test & final exam: Deeper concepts and calculations  
3. Complementary to PHYS 175L: Theoretical vs. observational

**Course Grading:**

1. 20%: Weekly online quizzes (based on textbook reading assignments)  
2. 20%: Biweekly take-home problem sets (based on lectures)  
3. 20%: Midterm test (based on lectures)  
4. 40%: Final exam (based on lectures and reading assignments)

**Course Outline:**

1. Solar System  
   a. Ancient Greeks  
   b. Copernicus, Kepler & Galileo  
   c. Newton  
2. Stars  
   a. Physics of Stars  
   b. Exotic stars (SR & QM)  
   c. Black holes (GR)  
3. Cosmology  
   a. The Big Bang  
   b. Dark Matter & Dark Energy  
   c. Modern cosmology & mysteries
Intended Learning Outcomes

**Knowledge: Survey of modern astrophysics (reading assignments)**
An introductory survey of basic facts & concepts in our current understanding of the universe
*Learn about and be able to explain a wide variety of basic astrophysical phenomena*

**Knowledge: High school physics and mathematics**
Newtonian mechanics, ideal gas law, electromagnetism, thermodynamics, etc., & basic mathematics
*Master basic concepts in physics and mathematics that will be used throughout the course*

**Knowledge: Basic modern physics**
Introductions to special relativity, general relativity, and quantum mechanics
*Understand the central ideas of these theories*

**Skills: Thinking like a physicist / Figuring it out**
Dimensional analysis, analogies, estimation, combining interdisciplinary knowledge, intuition
*Develop key skills used to solve problems, understand the basic mechanisms behind complex physical phenomena, and construct logical arguments that explain more deeply the facts of modern astrophysics*

**Values: The big picture**
1. Appreciate that mystery is what motivates science, and the mysteries keep getting deeper
2. Recognize that science is not just facts and formulas, but evolving ways of thinking
The Fine Print

Work Expected:

1. Attend lectures and take appropriate notes. You are responsible for everything presented.
2. Keep up with the reading assignments.
3. Complete and submit the quizzes and problem sets on time.
4. Sit the midterm test and final exam.

No exceptions will generally be made for students who submit assignments late, or who are absent from the midterm test or final exam. The weekly work-load for the course should be 3 hours of lectures, about 2-3 hours of reading, and about 3-4 hours of assignment work. Students should also check the UW LEARN course website regularly for course announcements.

Notes on Quizzes:

1. Register for MasteringAstronomy using the registration package that comes with the textbook.
2. The weekly quizzes are to be done on your own to maximize their benefit to you.

Notes on Problem Sets:

1. Collaboration and/or discussion with other students is allowed on the problem sets, but make sure you understand what you are doing—the test and exam are not group efforts! If you are working with others please indicate this on the work you hand in.
2. The problem sets are to be submitted in class, then will be graded and handed back in class. Uncollected problem sets will generally be kept for 1-2 months after the end of the course, but no longer (tests and exams are kept for longer, as per faculty requirements).

Notes on Midterm Test and Final Exam:

1. No form of collaboration, copying, discussion or use of notes or aids other than those provided by the instructor is allowed on the midterm test or final exam.
2. Attendance at the test and exam is mandatory, and they will not generally be rescheduled, except in cases of severe illness or personal trauma. Any medical exceptions must be accompanied by a Verification of Illness (VIF) form, and will only be accepted at the instructor’s discretion. The test and exam will not be excused for minor complaints or student travel plans.
3. For information on academic offenses and types of penalties, students should refer to UW Policy #71, Student Academic Discipline, http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm.

Note for Students with Disabilities:

The AccessAbility Office, 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 this service, please register with the AccessAbility Office at the beginning of each academic term.

Drop-dates:

Students concerned about the level of the course, course requirements, or their performance should keep in mind cut-off dates for dropping courses without penalty.