This 4 credit course is a survey of the science of the planets, solar system, stars, galaxies, and the large-scale structure of the universe, with emphasis on the underlying physical principles. A laboratory component explores the essentials of scientific measurements, physical laws, optics, telescopes, and subatomic physics. Optional night-time observation sessions will be announced for interested students.


Lecture: MWF 12:40 - 1:35  A108

Labs:  Th 9:30-11:30, 12:30-2:30, 2:30-4:30  A113
Instructor: George M. Irwin, Ph.D., Associate Professor of Physics
        Office Archer 100E, Lab: GE212, GE212A
        Telephone: 880-8243
        email: gmirwin@lamar.edu
        Office Hours: MWF 10:00-12:00, T 9:00-11:00, 1:00-3:00

Grading System:

A student’s final grade percentage will be calculated with the following weights:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory</td>
<td>15%</td>
</tr>
<tr>
<td>Exams (4)</td>
<td>60%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>10%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>15%</td>
</tr>
</tbody>
</table>

Letter grades for the course will be assigned accordingly: >90% A, 80%-90% B, 70%-80% C, 60%-70% D, <60% F

The instructor reserves the right to alter the grading system as long as students’ final grade percentages are improved.
Physics Core Learning Outcomes – After completing this course the student will demonstrate

1) critical thinking skills by applying fundamental physical principles to real world examples,

2) quantitative analysis skills by applying basic mathematical principles to the solution of real world examples,

3) the ability to work with others in a common effort to achieve an outcome through cooperation and teamwork in a laboratory exercise,

4) communication skills by reporting the process and results of a laboratory exercise in a written laboratory report.

Laboratory (15%) Laboratory sessions are a combination of experimental exercises and demonstrations less suitable for the lecture, involving concepts of astronomy or the underlying physical principles. Students may not miss more than 2 of the 10 laboratory sessions or must drop or receive a failing grade for the course. All other laboratory policies will be set by the laboratory instructor.

Final Exam (15%) The Final Exam is comprehensive, and will cover all four units in the textbook. Students may use a calculator and a single 3 inch by 5 inch note card.

Exams (4, @ 15% each) Four Exams are scheduled for the course. Exams will largely involve knowledge directly from the textbook, with some additional elements from the laboratory. Students may use an electronic calculator and a single 3 inch by 5 inch note card. Students may NOT make-up exams without prior instructor approval except in extreme circumstances. It is expected that students will adhere to all Rules and Regulations regarding academic honesty and student conduct as outlined in the student handbook or face failure and subsequent disciplinary action.

Quizzes (10%): The instructor will occasionally administer unannounced quizzes over current topics in the course. These quizzes will consist of questions similar to exam questions. In accordance with the mandatory attendance policy outlined below, it is the student’s responsibility to be present for quizzes. Prior notification of quizzes will not be given under any circumstances, and make-up quizzes will not be allowed.

Attendance: Class attendance is required. Students may not miss more than 4 of the scheduled lecture/exam days without prior instructor approval or they will receive a failing grade in the course. As stated above, makeup quizzes will not be allowed for lack of attendance.
Class participation is encouraged (but not required) within the limits of the lecture format. However, interruptions such as lateness, pagers, and cell phones will not be tolerated. All other classroom disturbances will be limited to the instructor.

**Homework:** Homework questions from the textbook are indicated in the course schedule below, and others will occasionally be assigned by the instructor. Some questions are computational and some test factual knowledge and conceptual understanding. Homework will not be collected for credit, but students are responsible for the solutions. Many will be discussed in class. In general, students should become familiar with all *Review Questions, Key Terms and Key Ideas* at the end of each chapter for exam preparation. Homework solutions will be posted on the Blackboard course page.

**Observation Sessions:** Students and other interested persons are encouraged to attend night-time observation sessions. Observation sessions will involve the telescopes in the Physics department and may include observations of the Moon, Mars, Jupiter, Saturn and other astronomical objects. Due to unpredictable and often cloudy southeast Texas weather, these sessions will be announced at appropriate times in class.

**Academic Honesty Policy:** It is expected that students will adhere to the Academic Honesty Policy as detailed in the Student Handbook or face failure and subsequent disciplinary action.

**Students with Disabilities** - Students requiring special accommodations should contact the instructor in the first week of classes. All reasonable effort will be made to ensure that students with disabilities enjoy a full educational experience.

**Important Dates:**

- First class day: Aug. 27, 2012
- Last day to drop or Withdraw without Academic penalty: Oct. 1, 2012
- Last day to drop or withdraw with academic penalty: Nov. 5, 2012
- Last class day: Dec. 5, 2012
- No Class: Sept 3, Nov. 22, 23

**Final Exam:** Friday Dec. 7, 11:00 am - 1:30 pm
Course Schedule

The following tentative course schedule based on the textbook material indicates homework questions from the textbook and the dates of all exams, and is subject to change by the instructor.

UNIT I Understanding Astronomy

Chapter 1 Discovering the Night Sky
2, 3, 9, 12, 14, 17, 22, 24, 26, 28

Chapter 2 Gravitation and the Waltz of the Planets
2, 5, 8, 10, 15, 22

Chapter 3 Light and Telescopes
1, 2, 4, 5, 11, 13, 19, 25

Chapter 4 Visible Light and Other Electromagnetic Radiation
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12

Exam I M. Sept. 24

UNIT II Understanding the Solar System

Chapter 5 Formation of the Solar system
1, 2, 5, 6

Chapter 6 Earth and Moon
2, 8, 9, 10, 12, 19, 30

Chapter 7 The Other Terrestrial Planets
1, 3, 6, 7, 8, 9, 12, 13, 14

Chapter 8 The Outer Planets
4, 5, 17, 29, 31

Chapter 9 Vagabonds of the Solar System
1, 5, 6, 14, 18, 19, 20
Chapter 10  The Sun
4, 6, 7, 10, 12, 13, 15, 16

Exam II  M. Oct. 22

UNIT III  Understanding the Stars

Chapter 11  Characterizing Stars
1, 2, 5, 10, 11, 16, 17

Chapter 12  The Lives of Stars from Birth Through Middle Age
1, 3, 4, 10, 12, 13, 14, 15, 19, 22

Chapter 13  The Deaths of Stars
1, 4, 5, 6, 7, 10, 18, 19

Chapter 14  Black Holes
2, 3, 5, 6, 7, 8

Exam III  W. Nov. 12

UNIT IV  Understanding the Universe

Chapter 15  The Milky Way Galaxy
4, 6, 9, 10, 12, 17, 18

Chapter 16  Galaxies
1, 3, 7, 8, 12, 13

Chapter 17  Quasars, Active Galaxies, and Gamma-Ray Bursters
4, 5, 6, 9, 10

Chapter 18  Cosmology
1, 2, 4, 5, 6, 7, 8, 12

Chapter 19  The Search for Extra-Terrestrial Life
2, 4, 11

Exam IV  M. Dec. 3
Last class day  W, Dec. 5

FINAL EXAM  Friday, December 7, 11:00 am - 1:30 pm
## Laboratory Schedule

The following tentative laboratory schedule is subject to change by the instructor.

### Unit I
- Aug. 30: Earth’s Gravity
- Sept. 6: TBA
- Sept. 13: Human Gravitation
- Sept. 20: Atomic Spectra

### Unit II
- Sept. 27: Optics of Mirrors
- Oct. 4: Optics of Lenses
- Oct. 11: Telescopes I
- Oct. 18: Telescopes II

### Unit III
- Oct. 25: Parallax
- Nov. 1: Black-body Radiation
- Nov. 8: Nuclear Physics and Radioactivity

### Unit IV
- Nov. 15: Low Temperature Physics
- Nov. 22: No Lab (Thanksgiving Holiday)
- Nov. 29: TBA