Astronomy 308: Into the Final Frontier

Instructor: Bernie McNamara, Regents Professor of Astronomy

Office: New Mexico State University
Address: Department of Astronomy
1320 Frenger Street
Las Cruces, NM 88003

Office phone: 575-646-2614
FAX: 575-646-1602
Email: bmcnamar@nmsu.edu

Welcome to this class!

Bernie McNamara received his Ph.D. in Astronomy from the University of California at Santa Cruz in 1975. He came to New Mexico State University as a post-doctorate fellow and joined the faculty in 1977. In 2005, he was named, Regents Professor, a rank that is held only by about 25 of the institution's faculty of 700. His astronomical research area is star formation and evolution. This work has been supported by the National Science Foundation and several high-energy NASA satellite programs including: ROSAT, RXTE, CGRO, and HST. He has published over 60 scientific articles and has given numerous conference presentations. He is a frequent reviewer for NSF and NASA panels.

Dr. McNamara is very active in the field of science education. He has published five books in this area. His most recent book is titled, "Into the Final Frontier" and deals with past, present, and future international endeavors in human spaceflight. His other texts deal with the development of critical thinking in college level astronomy classes and interdisciplinary science instruction for pre-service teachers. He won the Griffith Observatory award for science writing in 2000.
Course Description

What is the likely future direction of human space flight? Astronomy 308 provides an overview of human space flight from the early 1900s to the present time. The past is used as a guide to the likely directions of future exploration. The class emphasizes the international nature of work in this field. Developments in space flight have been heavily influenced by political, economic, and military considerations. This class discusses the importance of these influences. Major topics addressed are the international pioneers of space flight, the development of rocketry from the pre-World War II period through the launch of Sputnik, the Apollo and post-Apollo American and Soviet space efforts, the space shuttle, and the International Space Station. The class concludes by discussing possible future missions such as Moon Base and an outpost on Mars. Tribute is paid to astronauts and cosmonauts who gave their lives to advance this field.

Course Objectives

By the conclusion of this class students will be able to:

- Discuss the international manner in which space flight developed
- Describe how rocketry progressed from individual to national efforts
- Describe why space flight became an area of international competition
- Discuss the rationale, major missions, and findings of the Apollo program
- Discuss the U.S. decision to build the space shuttle
- Recount the development of earth orbiting space stations
- Understand the arguments for and against future human space missions.

Course Time-Line

Topics will be discussed in the order given below:

<table>
<thead>
<tr>
<th>Jan</th>
<th>19</th>
<th>-</th>
<th>Introduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>Chapters 1,2,3</td>
<td>The Pioneers of space flight</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Chapter 4</td>
<td>World-wide interest in rockets</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Chapter 5</td>
<td>World War II, Von Braun</td>
<td></td>
</tr>
<tr>
<td>Feb</td>
<td>2</td>
<td>Chapter 5</td>
<td>Pioneer plays</td>
</tr>
<tr>
<td>7</td>
<td>Chapters 6,7</td>
<td>The Space Race, Mercury, Gagarin</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Chapters 10,11</td>
<td>Project Mercury</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Chapters 11,12,13</td>
<td>Ranger, Lunar Orbiter, Surveyor</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>catch-up, review</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Exam 1 Tuesday, Feb 21

<table>
<thead>
<tr>
<th>Feb</th>
<th>23</th>
<th>Chapter 14</th>
<th>The Mercury 13</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>Chapters 15,16</td>
<td>Project Gemini, Apollo Part I</td>
<td></td>
</tr>
</tbody>
</table>
Mar 1 Chapters 19, 20 *Apollo Part II*
6 Chapters 20, 21 *Apollo Part III*
8 Chapters 22, 23 *Apollo Part IV*
13 Appendix 1,2 *Science of Apollo*

**Exam 2 Thursday, March 15**

**Spring Break March 19-23**

Mar 27 Chapters 24, 25 *Korolev, Soviet Launch facilities*
29 Chapters 26, 27 *Vostok, Voskhod, Moon race*
Apr 3 Chapters 28, 29, 30 *Soviet space stations and difficulties*
5 Chapters 31, 32, 33 *Skylab and Apollo-Soyuz*
10 Chapter 34 *The Space Shuttle*

**Exam 3 Thursday Apr 12**

Apr 17 Chapters 35, 36 *Second generation Space Stations*
19 Chapters 37, 38 *Flights of the Space Shuttle*
24 Chapter 39 *Shuttle/Mir program*
26 Chapter 40 *The International Space Station*

May 1 Chapter 41, 42 *Moon Base, Mission to Mars*
3 - *New Mexico Space port*

**Final Exam Tuesday, May 8 between 1pm -3pm**

**Assessments**

- All assignments are due, according to the announced due dates. Please anticipate your school's breaks and holidays, and plan to finish your work in a timely fashion. If a problem arises and you cannot complete an assignment, LET ME KNOW before the due date.
- Assessments will include:
  - **Discussions** - You will receive credit for thoughtful, insightful, complete, considerate comments. Be respectful of other postings. Build upon them, and encourage others to comment.
  - **Projects** - Projects will be graded either by rubric or criteria specified for that project in its hand-out.
  - **Homework** – Exercises are to be submitted on the assigned date. They are to be accurate, carefully done, and are to follow the directions for the assignment.
  - **Quizzes and Tests** - You will receive credit, based on the points listed on each quiz and test.
Your final grade will be determined in the manner shown below.

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes &amp; Homework</td>
<td>30%</td>
</tr>
<tr>
<td>Exam 1</td>
<td>15%</td>
</tr>
<tr>
<td>Exam 2</td>
<td>15%</td>
</tr>
<tr>
<td>Exam 3</td>
<td>20%</td>
</tr>
<tr>
<td>Final exam</td>
<td>20%</td>
</tr>
</tbody>
</table>

Grade Score and Letter Grade

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Score Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90-100</td>
</tr>
<tr>
<td>B</td>
<td>80-89</td>
</tr>
<tr>
<td>C</td>
<td>70-79</td>
</tr>
<tr>
<td>D</td>
<td>60-69</td>
</tr>
<tr>
<td>F</td>
<td>0-59</td>
</tr>
</tbody>
</table>

Materials

Class materials can be accessed on the web on NMSU Black Board

Suggestions for Success

*Don't put off completing assignments until the last moment!*  

*Come to class ready to take any quizzes and contribute to the discussion.*

Carefully reread your answers. Don't lose credit by hurrying. There is no prize for the first paper submitted, and no penalty for being the last. Submit your best work.

*The last thing you want is to get is a zero on an assignment by failing to turn it in.*

e-Book Comments

1. Don't be fooled. It takes time to read each chapter.

2. View the online videos. They are sometimes hard to see, but they provide first-person comments on the mission they portray.