Syllabus

Graduate Catalog Description:
PHYS 811 - Astronomy for High School Teachers - 3 credit-hours
The basic principles of astronomy are studied and applied through research and observation to topics ranging from sunspots and meteors, to quasars, pulsars and black holes. Summer only.

Course Objectives:
By the end of this course, students will be able to:
• Discuss historical and technological developments that have contributed to a scientific understanding of the universe
• Identify the major events in the history of the universe, solar system, and Earth
• Explain how the movement of objects in the solar system is related to phenomena such as seasons, eclipses, and ice ages
• Observe, describe, and predict patterns of motion for objects in the solar system.

Instructor: Dr. Jose Mena-Werth
Email werthj@unk.edu
Work Phone 308-293-3041 (cell)
Office Location Room #220, Bruner Hall of Science
University of Nebraska at Kearney
2401 W. 11th St.
Department of Physics and Physical Sciences
Kearney, NE 68849
Office Hours If you would like to email or phone my office, please note that I will be checking my messages on Monday through Friday afternoons and will return your messages within 24-48 hours.

Required Text:
Astronomy by Dr. Siobahn Morgan, University of Northern Iowa
This is an online text. The link to the text is below.
http://www.uni.edu/morgans/astro/
The textbook is free. There is no copyrighted material. You are free to print any or all parts of the book.

Course Topics:
Section 1: Introductory material, motions of the Sun, Moon, and planets, physics of light, telescopes
Section 4: Planets and other things in the solar system
Section 3: The Milky Way and other galaxies, active galaxies, the Universe and its fate
Section 2: The Sun, other stars, their properties, formation, life and death, supernovae, pulsars, black holes
Schedule:
This is an eight-week class beginning on June 4 and ending on July 27. Homework that is not part of the textbook reading assignments is listed here as well as in the “Assignments” section.

Module — Date — Assignments
1 — June 4, 5 and 6
homework # 1 (survey & pre-test)
Reading # 1 (introduction and sky motion):
http://www.uni.edu/morgans/astro/course/Notes/section1/new1.html

1 — June 7 and 8
motions of the sun and moon:
http://www.uni.edu/morgans/astro/course/Notes/section1/new2.html
Decision on which Lab Assignment you will do. See Lab Assignment folder for more details.

1 — June 11, 12, and 13
history of astronomy:
http://www.uni.edu/morgans/astro/course/Notes/section1/new3.html

1 — June 14 and 15
light and telescopes:
http://www.uni.edu/morgans/astro/course/Notes/section1/new4.html
first quarter exam on Section 1 located in the Tests folder

2 — June 18, 19, and 20
the solar system overview:
earth and moon:
http://www.uni.edu/morgans/astro/course/Notes/section4/new17.html

2 — June 21 and 22
mercury and venus:
http://www.uni.edu/morgans/astro/course/Notes/section4/new18.html
mars:

2 — June 25, 26, and 27
Jupiter and Saturn:
http://www.uni.edu/morgans/astro/course/Notes/section4/new20.html
Uranus, Neptune, and Pluto:

2 — June 28 and 29
comets, asteroid, meteors, and impacts:
http://www.uni.edu/morgans/astro/course/Notes/section4/new22.html
second quarter exam on Section 4 located in the Tests folder

3 — July 2 and 3
extra credit is due
the sun:
http://www.uni.edu/morgans/astro/course/Notes/section2/new5.html
stars and the HR diagram:
http://www.uni.edu/morgans/astro/course/Notes/section2/new6.html

3 — July 5 and 6
star birth and middle age:
http://www.uni.edu/morgans/astro/course/Notes/section2/new7.html
star death — low mass stars
http://www.uni.edu/morgans/astro/course/Notes/section2/new8.html

3 — July 9, 10, and 11
star death — high mass stars:

3 — July 12 and 13
neutron stars and black holes:
http://www.uni.edu/morgans/astro/course/Notes/section2/new10.html
third quarter exam on Section 2 located in the Tests folder

13 — July 16, 17, and 18
milky way:
http://www.uni.edu/morgans/astro/course/Notes/section3/new11.html
galaxies and clusters:

14 — July 19 and 20
homework # 3 (post-test)
unusual galaxies:

15 — July 23, 24, and 25
homework # 4 (term project is due)
cosmology:
origin and fate of the universe:
http://www.uni.edu/morgans/astro/course/Notes/section3/new15.html

16 — July 26 and 27
fourth quarter exam on Section 3 located in the Tests folder
Assignments:
The majority of the assignments are readings from the online textbook. The other assignments are two diagnostic exams and a term project. The topic of the term paper will address one of the course objectives.

1 — June 4 — survey & pre-test
2 — June 11 — topic and outline for term project
July 3 — extra credit is due
3 — July 20 — post-test exam
4 — July 25 — term project is due

Online Activities:
There will be a weekly discussion board assignment based on the homework and the textbook reading assignments.

Extra Credit
An extra credit reading assignment is possible. You may choose to read one of the books listed below. The exam on the book must be taken by Tuesday, July 3. In calculating the final grade, the exam on the book will have a value of 10% of the final grade.

*Flatland* by Edwin A. Abbott
*T-Rex and the Crater of Doom* by Walter Alvarez
*Nemesis* by Isaac Asimov
*Spider Star* by Mike Brotherton
*Star Dragon* by Mike Brotherton
*Ender's Game* by Orson Scott Card
*Childhood's End* by Arthur Clarke
*The Fountains of Paradise* by Arthur Clarke
*The Andromeda Strain* by Michael Crichton
*Carl Sagan: A Life* by Keay Davidson
*Disturbing the Universe* by Freeman Dyson
*The Immense Journey* by Loren Eiseley
*The Unexpected Universe* by Loren Eiseley
*S surely You're Joking, Mr. Feynman* by Richard Feynman
*What Do You Care What People Think?* by Richard Feynman
*Horseshoe Crabs and Velvet Worms* by Richard Fortey
*Life* by Richard Fortey
*Trilobite* by Richard Fortey
*Dragon's Egg* by Robert Forward
*Maria Mitchell* by Beatrice Gormley
*Ishmael* by Barbara Hambly
*Galaxies* by Paul Hodge
*The Little Book of the Big Bang* by Craig Hogan
*The Black Cloud* by Fred Hoyle
*Ossian's Ride* by Fred Hoyle
The Listeners by James Gunn
Woman's Work at Harvard College Observatory by Keith Lafortune
The Left Hand of Darkness by Ursula LeGuin
A Wrinkle in Time by Madeline L'Engle
The Periodic Table by Primo Levi
Perelandra by C.S. Lewis
Till We Have Faces by C.S. Lewis
A Canticle for Leibowitz by Walter M. Miller, Jr.
The Golden Compass by Philip Pullman
Just Six Numbers by Martin Rees
Women Scientists in America by Margaret Rossiter
The Sparrow by Mary Doria Russell
Children of God by Mary Doria Russell
Contact by Carl Sagan
The Demon-Haunted World by Carl Sagan
Through Rugged Ways to the Stars by Harlow Shapley
The Big Bang by Simon Singh
Galileo's Daughter by Dava Sobel
Longitude by Dava Sobel
The Planets by Dava Sobel
The Lives of a Cell by Lewis Thomas
Rare Earth by Peter Ward and Don Brownlee
The Double Helix by James Watson
The First Three Minutes by Steven Weinberg

Grading:
Final grade assignment will be consistent with college and departmental guidelines. The instructor reserves the right to lower the percentage required for each letter grade, but not raise them.
There will be four exams (one on each section of the course). All four exams will carry equal weights in the grading. Each exam will count about 20% of the final grade. The exams are at the end of each of the four sections of the course. The final 20% of the grade is from the term project. Grading will be on a fixed scale rather than a curve. The scale is as follows:

<table>
<thead>
<tr>
<th>percentage</th>
<th>0 - 39</th>
<th>40 - 44</th>
<th>45 - 49</th>
<th>50 - 54</th>
<th>55 - 59</th>
<th>60 - 64</th>
<th>65 - 69</th>
<th>70 - 74</th>
<th>75 - 79</th>
<th>80 - 84</th>
<th>85 - 89</th>
<th>90 - 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>grade</td>
<td>F</td>
<td>D-</td>
<td>D</td>
<td>D+</td>
<td>C-</td>
<td>C</td>
<td>C+</td>
<td>B-</td>
<td>B</td>
<td>B+</td>
<td>A-</td>
<td>A</td>
</tr>
</tbody>
</table>