

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.

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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 a 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:

<http://www.uni.edu/morgans/astro/course/Notes/section4/new16.html>

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:

<http://www.uni.edu/morgans/astro/course/Notes/section4/new19.html>

2 — June 25, 26, and 27

Jupiter and Saturn:

<http://www.uni.edu/morgans/astro/course/Notes/section4/new20.html>

Uranus, Neptune, and Pluto:

<http://www.uni.edu/morgans/astro/course/Notes/section4/new21.html>

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:

<http://www.uni.edu/morgans/astro/course/Notes/section2/new9.html>

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:

<http://www.uni.edu/morgans/astro/course/Notes/section3/new12.html>

14 — July 19 and 20

homework # 3 (post-test)

unusual galaxies:

<http://www.uni.edu/morgans/astro/course/Notes/section3/new13.html>

15 — July 23, 24, and 25

homework # 4 (term project is due)

cosmology:

<http://www.uni.edu/morgans/astro/course/Notes/section3/new14.html>

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
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:

percentage	0 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	85 - 89	90 - 100
grade	F	D-	D	D+	C -	C	C+	B-	B	B+	A-	A