Introduction to Astronomy PHYS 162 - SP 2014 - Sect 1 + 2

Section 1: T-Th 11:00-12:15 Faraday West 200

Section 2: T-Th 3:30-4:15 Faraday West 200

Provides geneneral education credit.

RECOMMENDED BOOK

I am recommending but not requiring The Cosmic Perspective Fundamentals by Bennett, Donahue, Scheider and Voit. You can also use a different textbook in particular Discovering the Essential Universe by Comins editions 4 or 5. We will discuss in the first lecture.

This course covers the science of the stars and other heavenly bodies. We use our knowledge of physics, chemistry, and geology to understand planets, stars, galaxies,and the Universe itself. Planets and stars also serve as laboratories for conditions beyond human-built experiments and studying them increases understanding of sciences. Early studies of planetary motion lead to understanding of gravity and forces (physics and so in this course). Modern studies of planets concern geology and weather (and are not in this course). Studies of stars, the formation of galaxies and the universe depend on the properties of basic matter and forces (physics and so in this course). The details of the course are contained in the syllabus below.

- **Syllabus**
- **Assigned Problem Sets**
- **Example Test 1**
- **Example Test 2**
- **Example Test 3**

The NIU Observatory is managed by Melisa Butner (e-mail matthewwiesner@aol.com).

The NIU Night sky highlights 2013

Transparencies from Lectures

- Lecture 1: Class overview and Early Observations 1/14/2014
- Lecture 2: Star Location and Constellations 1/16/2014
- Lecture 3: Introduction to Planetary Motion + Models of the Solar System + Kepler 1/21/2014

  Solar System Motion

- NOT YET UPDATED for this term

- Lecture 4: Winter Sky (guest lecture by Matt Wiesner plus **MOVIE "Cosmic Voyage"** 1/23/2014
- Lecture 5: Galileo, Newton and Gravity 1/28/2014

  Fake news story on Galileo

- Lecture 6: Finish gravity plus Light and Electromagnetic Force 1/30/2014

  Asteroid at Earth's Trojan point

  Center of mass examples

- Lecture 7: Light Demo, Absorption, Doppler Effect, and Lens 2/4/2014

  Water Vibrational Modes

- Lecture 8: Telescopes 2/6/2014

  Mauna Kea Summit 3:40 inside

  Hotel Mauna Kea (parody) 1:07-1:40 3:30

  Sloan Digital Sky Survey

  SDSS publication with NIU students co-author

  Dark Energy Survey

  Dark Energy Survey press room

  Arecibo telescope from movie Contact

  VLA array (in movie Contact)

- Lecture 9: The Sun: Introduction and Nuclear Reactions 2/11/2014

  Asteriod passing close to Earth 2-15-2013

  animation Fusion in the Sun

  Movie 2012 - Neutrinos from the Sun

  India-based Neutrino Observatory

- Lecture 10: Layers of the Sun Test 1 study guide 2/13/2014

NASA video - a solar flare

Solar Storm January 2012

NASA video - more on solar flares/HESSI

- Lecture 11: Stars' Properties 2/18/2014

  Algol System - wikipedia

  Algol System details

- Lecture 12: Classifying Stars and Hertzprung-Russell Diagram 2/20/2014

Class 13 - Test 1 - 2/25/2014

- Lecture 14: Nebula + Star Formation 2/27/2014 **In-class worksheet on HR diagram**

  Flyby through Orion Nebula

- Lecture 15 Star Formation and Evolution 3/4/2014

  Video - Star Formation and Evolution

  Video - Nebula and Star birth

- Lecture 16 Star Formation and Evolution 3/6/2014

SPRING BREAK 3/9 - 3/16

- Lecture 17: White Dwarves and Supernovas 3/18/2014

  Video - Sun --> Red Giant, planetary nebula, white dwarf

  Video - Type Ia supernova explosion simulation

  Video - SN1987a over time

- Class 18: Supernovas and Neutron Stars **plus Movie - NOVA - Death of a Star 3/20/2014**

  Video - Crab Pulsar audio

- Lecture 19: Neutrons Stars, Black Holes and test 2 Overview 3/25/2014

Video - black hole interacting with star

Video - Life cycle of stars

- Lecture 20: Formation of Planets, Exoplanets, Planetary Atmospheres 3/27/2014

  Alpha Centauri exoplanet

  Cool star could host habitable planet

  Kepler planet hunter site

- Lecture 21: Life in the Universe 4/1/2014

  NASA - faster than light drives

  NASA - faster than light drives

  Golidliocks planet - trailer for movie Battleship

  asteriod passing by Earth 11/8/2011

  asteriod passing by Earth and meteor in Russia 2/15/2013

  How dangerous are asteroids?

  asteriod spotting telescope?

Class 22 - Test 2 - 4/3/2014

- Class 23: Coomunicating with ET 4/8/2014 **NOVA:Origins Where are the Aliens?**
- Lecture 24: Galaxies - Intro, Types, Measuring Disstances, Hubble Law 4/10/2014

  Video - Andromeda Galaxy

- Lecture 25: Galaxies - Structure, Mass and Formation may begin turning in extra credit 4/15/2014

  Video - Galaxy Formation

  M31(Andromeda) - M33(smaller spiral) Galaxy Interactions video

  Video - Andromeda and Milky Way Colliding Galaxies

- Lecture 26: Guest lecture Matt Wiesner on a career in astronomy 4/17/2014 **In-class worksheet on Hubble Law**
- Lecture 27: Cosmology and Early Universe Universe Test 3 overview 4/22/2014

  Olber's Paradox

  video - Why is the sky dark at night?

- Lecture 28:Early Universe, Extra Dimensions and Multiverse. class evaluations 4/24/2014

  video - What is the Universe expanding into?

  # Class 29 - Test 3 - 4/29/2014

- **Class 30 - Movie:Through the Wormhole:Beyond the Darkness - 5/1/2014 Will have grades prior to taking the final**

  # Final Section 1 - Wednesday 5/7/2014 10:00-10:50

  # Final Section 2 - Monday 5/5/2014 4:00-4:50

- **Honors Section Projects and older listing of Honors Section Projects**
- SYLLABUS--PHYSICS 162--ELEMENTARY ASTRONOMY--Spring 2014 Sec 1,2
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- Satisfies general education requirement
- David Hedin, LaTourette Hall FW224, 753-6483, hedin@niu.edu
- nicadd.niu.edu/~hedin/162/162.html www.physics.niu.edu/~observatory/
- Office Hours: Tuesday and Thurssday 10:30-10:55, 1:30-2:00
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- The Cosmic Perspective Fundamentals by Bennett, Donahue, Scheider and
- Voit. Or Discovering the Essential Universe by Comins editions 4 or 5.
- BOOK NOT REQUIRED. Assigned Problems are on course web page
- Book Chapter
- Section Cosmic Perspective EssentialUniverse
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- 1 View of Universe and the Sky 1+2 1
- 2 Gravitation and Planet Motion 2+3 2 (App R)
- 3 Light and Telescopes pages 43,80,125,130,133, 3
- 135,148,180,196
- 4 The Sun 8 8
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- 5 Characteristics of Stars 8 9
- 6 The Lives of Stars 9 10
- 7 The Death of Stars 10 11

8	Formation of the Solar System	4+7	4
9	Astrobiology	14	15
10	The Galaxies	11	12
11	Cosmology	12+13+14	13

Test 1. Chapters 1,2,3,8 Tuesday February 25
Test 2. Chapters 9,10,11 Thursday April 3 all exams:
Test 3. Chapters 4,12,13,14 Tuesday April 29 50 minutes
Test 4. final all chapters Section 1 Wednesday May 7 10:00
Section 2 Monday May 5 4:00

Grading: Each test will count 100 points and the lowest test score will be dropped. There will be no makeups allowed after the day of the test; a missed test will be considered as the lowest score and dropped. You can choose to skip the final and just count the first three tests. Sample tests are on the web page. The assigned problems are due the day of the test (1/2 credit if late). They contribute 24 points to your grade. The problems will be reviewed at the end of the class immediately preceeding each exam day. There will be two in-class worksheets (1/2 credit if done out of class) each counting 10 points. You can turn in two extra credit papers.

An extra credit paper should be from 2.5-4 typed pages. I will not accept papers e-mailed to me. The deadline is before the final. Possible papers are:

1. a visit to the observatory. 10 points maximum (1 report only). Sign in when there.
2. report on a movie shown in class. 10 points maximum/paper Sign in after watching the movie

You can also receive 2 extra credit points/movie for watching the movies shown in class. Sign in after watching the movie. This is in addition to the 10 points for the paper.

Class Curve	260+	A	The letter grades posted on Blackboard are
	225-259	B	meaningless. If you take 4 exams, Blackboard
	180-224	C	does not drop the lowest exam and so the
	150-179	D	Blackboard sum of points is incorrect

- Northern Illinois University is committed to providing an accessible
- educational environment in collaboration with the Disability Resource
- Center (DRC). Any student requiring an academic accommodation due to a
- disability should let his or her faculty member know as soon as possible.
- Students who need academic accommodations based on the impact of a
- disability will be encouraged to contact the DRC if they have not done so
- already. The DRC is located on the 4th floor of the Health Services
- Building, and can be reached at 815-753-1303 (V) or drc@niu.edu.