

## **NATS 1311-From the Cosmos to Earth**

### **Fall 2005**

This course presents a multidisciplinary study of nature expressly designed for those who have chosen not to major in the natural sciences or engineering. Early models of the solar system and the transformation to current models are examined, as are order in the universe, the nature of matter and the planets, sun, and life cycle of stars. This course can be a very rewarding experience. Few topics have inspired humans throughout the ages so much as the mysteries of the heavens. You will be provided with the opportunity to explore these mysteries in depth and learn about many important concepts from physics and astronomy using some simple mathematics. The course will be enhanced by frequent demonstrations of the principles underlying the origin and evolution of the universe.

#### **INSTRUCTOR:**

- **Dr. Phillip C. Anderson 972-883-2875 — Room FO2.708D**  
email: [phillip.anderson1@utdallas.edu](mailto:phillip.anderson1@utdallas.edu)

#### **TEACHING ASSISTANTS:**

- **Lecture: Russell Stoneback 972-883-2867 — Room FO1.424**  
email: [rstoneba@utdallas.edu](mailto:rstoneba@utdallas.edu)
  
- **Labs: Crystal Brown — Room FO1.432**  
email: [ceb042000@utdallas.edu](mailto:ceb042000@utdallas.edu)

#### **OFFICE HOURS:**

- **Dr. Anderson: Tuesday/Thursday 11:00 – 12:00 PM and by appointment**
- **Mr. Stoneback: Tuesday/Thursday, 2:00 – 3:30 PM and by appointment.**

#### **TEXT:**

- **The Cosmic Perspective: Bennett, Donahue, Schneider, Voit, 3<sup>rd</sup> Edition**
- **Slides will be available on the web at: [www.utdallas.edu/~pca015000](http://www.utdallas.edu/~pca015000)**

#### **GRADING:**

- **Exams (3)**
- **2 Exams (Sep 22, Oct 27) @ 25% each = 50%**  
**Final Exam (Dec 1 @ 8am) = 30%**
- **Quizzes = 10%**
- **Short quizzes may be given during any class period**

— Homework – See below -

= 10%

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### HOMework PROJECT

Select an article from a newspaper or a news magazine dealing with **science** and its relationship with society, that is, with the environment, weather, global warming, space exploration, health, dna, genetic engineering, etc.

Articles dealing with purely social issues will not be accepted.

Write a report on the article. The report must contain:

- 1. Title of the article.
- 2. Name of publication (Dallas Morning News, New York Times, Time, Newsweek. Reports from the internet are acceptable.)
- 3. Date of publication.
- 4. A paragraph of two or three sentences on the main theme of the article and how it relates to a current science issue.
- 5. Your name and assigned seat number in the upper right hand corner.

Attach a copy of the article to the report. Please **staple** the article to the report before coming to class. We do not have a stapler in class.

Reports are due every Thursday starting on August 25 with the last one due on November 17.

Late reports will not be accepted. A report is considered **late** if not handed in by the end of class (10:45 am) on the date due.

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**SYLLABUS - Fall 2005**

		<b>Chapter</b>
<b>1.</b>	<b>Introduction -</b> Overview of the mysteries of the Universe Exploration of Nature, Science – A Way of Knowing Fundamental quantities Measurement units Scales of distances	1
<b>2.</b>	<b>The Sky and the Calendar</b> Coordinate Systems – Celestial Sphere Motions of earth – Rotation, Revolution, Precession Eclipses Time – Day, Year, Calendar, Seasons	2/3
<b>3.</b>	<b>The Universe – A sense of time.</b> Early Models of the Universe Greek Astronomers - Ptolemaic Model Heliocentric Model - Copernicus, Tycho Brahe,  The Origin of Modern Astronomy Galileo, Kepler Kepler’s Laws of Planetary Motion	3
<b>4.</b>	<b>The Material World</b> Particles of Matter – Atoms, Atomic Structure Atomic Spectra – Hydrogen Atom What is Inside the Atom? The Nucleus – Geochronology, Stability, Radioactivity, Fission, Fusion	4
<b>5.</b>	<b>Order in the Universe – Newton</b> Motion - Velocity, Acceleration Force, Work, Energy, Power Newton’s Laws of Motion Gravity, Tides	5
<b>6.</b>	<b>Exploring the Universe</b> Waves and wave motion Electromagnetic radiation, Spectrum Light Radiation – Black Body, Planck’s Law Wien and Stefan-Boltzmann Law Telescopes and Observatories	6,7

<b>7.</b>	<b>The Solar System</b>	
	Overview	<b>8</b>
	Formation. Extrasolar planets	<b>9</b>
	Planetary Geology - Terrestrial Planets – Mercury, Venus, Earth, Mars	<b>10</b>
	Planetary atmospheres	<b>11</b>
	Jovian Planets – Jupiter, Saturn, Uranus, Neptune, Pluto	<b>12</b>
	Comets, Meteorites, Asteroids	<b>13</b>
	Life in the Universe	<b>14</b>
<b>8.</b>	<b>The Sun</b>	<b>15</b>
	Properties of the sun	
	Energy production	
<b>9.</b>	<b>The Stars</b>	<b>16</b>
	Magnitudes, Color temperature	
	Hertzprung-Russell Diagram	
	Birth, Youth and Middle age of Stars	
	Death of Stars	<b>18</b>
	White Dwarfs, Neutron Stars, Black Holes	
<b>10.</b>	<b>Cosmology, Big Bang Theory, Missing Mass</b>	<b>23</b>