



**School of Arts & Science**  
**DEPARTMENT OF PHYSICS & ASTRONOMY**

**Astronomy 101: Night Sky and Solar System**  
**Winter Semester 2007**

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## **ASTRONOMY 101 COURSE OUTLINE**

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### **1. Instructor Information**

- (a) Instructor: Dr. James Nemec
- (b) Office Hours (M, T, W, Th): 1:45-2:30 pm
- (c) Office location: Fisher 346d
- (d) Office phone: 370-3460
- (e) E-mail: nemec@camosun.bc.ca

### **2. Intended Learning Outcomes**

*(No changes are to be made to this section, unless the Approved Course Description has been forwarded through EDCO for approval.)*

Upon completion of this course the student will be able to:

1. Identify constellations and famous bright stars.
2. Describe the daily, monthly and yearly motions of the Sun, Moon, planets and stars.
3. Explain the scientific method, as illustrated by the development of the geocentric and heliocentric models of the universe, and describe how the Greeks deduced that the Earth and Moon are spheres and estimated their relative sizes, distances, etc.
4. Outline how our modern knowledge of the four forces of nature (gravity, electricity and magnetism, the strong force and the weak force) and the over 100 elements in the Periodic Table, evolved from the ancient idea that there are two forces (gravity and levity) and four elements (earth, water, air and fire).
5. Summarize Kepler's Laws describing the motion of the Moon and planets, Newton's Laws of motion and gravity, Maxwell's Laws concerning electricity and magnetism, and the basic laws of light and matter.
6. Describe how optical, radio and other telescopes work.
7. Summarize the composition and structures of the planets, and explain why the inner planets all have solid surfaces while the outer planets do not. Also, explain why Venus and Earth have atmospheres but Mercury and Mars do not.
8. Describe the giant planets Jupiter, Saturn, Uranus and Neptune and their many satellites.
9. Describe and draw logical conclusions about the history of the debris in the solar system: meteorites (stony and iron) and asteroids, the asteroid belt, objects (such as Pluto) in the Kuiper belt, and comets (for example, Halley's comet).
10. Describe a scientific model for the formation and evolution of the solar system that successfully accounts for the many observed properties and systematic features, such as why all the planets revolve around the Sun in the same direction, and why all the major planets orbit in a flat plane.

### **Course Description and Prerequisites**

Astronomy 101 is one of two Introductory Astronomy courses offered at Camosun College. Astr101 concerns the Night Sky and the Solar System, while Astr102 deals with Stars, Galaxies and Cosmology. They can be taken in any order, and students that take both courses obtain transfer credit for Astronomy 120 at the University of Victoria. Either course satisfies the University of Victoria Education requirement for a science lab course.

The topics that are studied in Astr101 include: the first discoveries about the Earth and sky, the Copernican revolution, matter and energy in the Universe, the Earth-Moon system, the small inner 'rocky' planets, the giant outer gaseous planets and their moons, interplanetary bodies, and how planetary systems form.

The only prerequisite is English 11.

### **3. Required Materials**

- (a) Course textbook: THE UNIVERSE REVEALED by Chris Impey and W.K.Hartmann
- (b) Astr 101 Lab Notes (available from the Lansdowne Campus bookstore)
- (c) Scientific calculator (any pocket calculator is acceptable)

### **4. Course Content**

#### **1. First Discoveries about the Earth and Sky**

- 1.1 Bright Stars, Constellations, Star Catalogs and the Magnitude System
- 1.2 Cycles in the Sky
- 1.3 Retrograde motions of the planets
- 1.4 The Birth of Science

#### **2. The Copernican Revolution**

- 2.1 Copernicus and the Heliocentric Model
- 2.2 Tycho Brahe
- 2.3 Kepler and Elliptical Orbits
- 2.4 Galileo, his telescopic observations, his telescope, and Physics

#### **3. Matter and Energy in the Universe**

- 3.1 Sir Isaac Newton: Mechanics and Optics
- 3.2 Radiation and the Universe
- 3.3 The Electromagnetic Spectrum
- 3.4 Bunsen & Kirchhoff: Spectral Lines and the Structure of the Atom
- 3.5 Telescopes and Detectors
- 3.6 Light and Energy

#### **4. The Earth-Moon System**

- 4.1 How Old is the Earth-Moon System
- 4.2 Internal Structure of the Earth and Moon
- 4.3 Influences that Shape a Planet
- 4.4 Geological Time Scale
- 4.5 Earth's Atmosphere, Oceans and Environment
- 4.6 Explorations of the Earth-Moon System: ocean tides

#### **5. The Terrestrial Planets**

- 5.1 Mercury
- 5.2 Venus
- 5.3 Mars and its moons
- 5.4 Comparative Planetology: Rules of Planetary Evolution

#### **6. Giant Planets and their Moons**

- 6.1 Jupiter, Saturn, Uranus and Neptune
- 6.2 Ring Systems of the Giant Planets
- 6.3 Satellite Systems of the Giant planets

#### 6.4 Pluto: Ninth Planet or Interplanetary Body?

### 7. Interplanetary Bodies

- 7.1 Comets
- 7.2 Meteors and Meteor Showers
- 7.3 Asteroids
- 7.4 Meteorites

### 8. How Planetary Systems Form

- 8.1 The Protosun
- 8.2 The Solar Nebula
- 8.3 From Planetesimals to Planets
- 8.4 Planets around other Stars

## 5. Department Policies Regarding Testing and Labs

- (a) Students must write review-quizzes, the midterm test, etc. on the date and time assigned by the instructor. Instructors are not required to provide make-up tests. At their discretion, instructors may waive a test or provide a make-up test only in the event of documented illness or other extenuating circumstances.
- (b) All assigned laboratory exercises and reports must be completed with an overall grade of 60% or better to obtain credit for this course. A lab may be waived or made up at a later time only in the case of documented illness or other extenuating circumstances.
- (c) A student who is repeating an Astronomy course does not have to complete the laboratory exercises a second time if an average lab grade of 70% or better was obtained.

## 6. Study time and Basis of Student Assessment

*It is recommended that between five and 10 hours per week (or more for students with a weak background) be spent studying for this course outside of class time.*

- (a) **Labs**, Assignments and Homework. **[30%]**
- (b) **Review Quizzes** will be given at the beginning of most classes. These will be closed-book tests consisting of several questions/problems that can be done with work-groups of any size. They will be marked immediately after doing the test and a score assigned. You will then have one week to correct any mistakes you may have made and hand in the review quiz for an up-graded score. **[10%]**
- (c) **Midterm Exams** - there will be two midterm exams, the first on Tuesday, Feb.6, 2007, and the second on Thursday March 8, 2007. To encourage good study habits your stamped study notes will count for ~5% of your midterm scores. **[2 x 15% = 30%]**
- (d) **Final Exam** – a comprehensive final exam will take place in the Examination period for Winter '07, which runs **from April 16 to 24, 2007**. **[30%]**

## 7. Grading System

*The following percentage conversion to letter grade will be used:*

Percentage	Grade	Description	Grade Point Equivalency
90-100	A+		9
85-89	A		8
80-84	A-		7
77-79	B+		6
73-76	B		5
70-72	B-		4
65-69	C+		3

60-64	C		2
50-59	D	Minimum level of achievement for which credit is granted; a course with a "D" grade cannot be used as a prerequisite.	1
0-49	F	Minimum level has not been achieved.	0

## 8. Recommended Materials or Services to Assist Students to Succeed Throughout the Course

### LEARNING SUPPORT AND SERVICES FOR STUDENTS

There are a variety of services available for students to assist them throughout their learning. This information is available in the College Calendar, Registrar's Office or the College web site at <http://www.camosun.bc.ca>

### ACADEMIC CONDUCT POLICY

There is an Academic Conduct Policy **which includes plagiarism**. It is the student's responsibility to become familiar with the content of this policy. The policy is available in each School Administration Office, Registration, and on the College web site in the Policy Section.

[www.camosun.bc.ca/divisions/pres/policy/2-education/2-5.html](http://www.camosun.bc.ca/divisions/pres/policy/2-education/2-5.html)