ASTA02 Spring 2018

Introduction to Astronomy and Astrophysics II: Beyond the Sun and Planets

LOCATION Thursday 5-8 pm (SW505B)

DESCRIPTION

This course is an overview of modern astrophysics beyond our Solar System and planets. We will learn about the **stars, galaxies and the Universe**, their origin, structure, evolution and fate. The questions to be addressed include: What are stars? How do stars evolve? What will happen to the Sun? What are galaxies? How do they organize themselves? What is the Big Bang model of the Universe?
The course is suitable for both science and non-science students.

INSTRUCTOR: Professor Diana Valencia UTSC Office SW504B
dvalencia@utsc.utoronto.ca
Office hours: Tuesdays 11:00am-12:00pm and by appointment

TUTORIALS: Tutorials are in place for your benefit and the Teaching Assistants are here to help you learn and be successful in the course. Use this resource to the fullest extent possible. Tutorials are designed to help you consolidate concepts and practice your skills. Your TA is your main contact person for the course, face-to-face during tutorials and by email outside of tutorials. Tutorials start on Thursday January 18th 2018.

TEACHING ASSISTANTS:

Nathan Winsor - winsor@astro.utoronto.ca [Head TA]
Tim Henley - tim.henley@mail.utoronto.ca
Jean Michel Boudreau - @mail.utoronto.ca

When you email me or your TAs, please include ASTA02 in your title message.

PREREQUISITES: none in terms of classes. However, you will need basic mathematical skills such as arithmetic (addition, subtraction, multiplication, division, logarithms), and be able to interpret basic graphs.

BOOKS:

ASTRO 2st Canadian Edition by Shohini Ghose, Vesna Milosevic-Zdjelar, L. Arthur Read
ISBN-10: 0-17-653214-5
ISBN-13: 978-0-17-653214-7

For further reading: *Universe*, by Roger A. Freedman & William J. Kaufmann III

CNOW:

Intro to this online system will be provided by Barbara March, Nelson Publ. representative. Note that you're asked to include student number in your id/ registration and use a special format of the name (see below), or else we may not recognize you & may not be able to give you proper credit.
Class Key: E-X7FGYWYBD2362

ASSIGNMENTS: There will be four assignments distributed throughout the course. In addition, there will be assigned readings and multiple-choice homework through CNOW for you to complete. The intent behind these assignments is to help you understand the material.

Assignments are here for your benefit. The goal is to gain practice (especially in the quantitative aspects of this course) and understanding, while getting *feedback* (such an important part of learning) so that you can be successful in your midterm, final exam, and in the course.

QUIZZES: Throughout the course there will be 3 pop-quizzes given in the tutorials. The goal is to help you assess how you are learning and to reward those that attend tutorials.

MARKING SCHEME:
Assignments ……..…. 20% (5% each)
Pop Quizzes …….. 10%
Online Quizzes ……. 5%
Midterm ……. ……... 25%
Final Exam ..…… 40%

Term work or test missed because of illness requires a signed medical note. Please show me the original and provide me with a photocopy for my records. Also please inform me as soon as possible regarding the fact that you missed a PS deadline or test due to illness.

Info on academic integrity policies can be found here:
http://www.artsci.utoronto.ca/osai/students

APPROXIMATE SCHEDULE: (we'll try to cover all topics listed time permitting)

- Light, matter and gravity: Chapter 5
- Observed properties of Stars: motion, brightness, masses, radii, spectra, H-R diagram: Chapter 6
- Star's structure and evolution: Chapter 7
- Star's death: Supernova, Neutron Stars and Black Holes: Chapter 8
- The Milky Way, galaxy classification: Chapter 9
- Groups and clusters of galaxies: Chapter 10
- Large scale structure of the universe: Chapter 11
- Expanding universe, the Hubble Constant, The Big Bang Theory: Chapter 11

LEARNING OUTCOMES

By the end of the course, students will understand

- how light and matter are connected and the principles behind how we study the universe through light
- how we know the properties of stars and the technique we use to measure **each** of them (distance, motion, mass, radius, brightness, temperature, spectra, etc)
- the importance of measuring distances, and describe how we do this for close stars, and far away objects via the Distance Ladder
- what is the spectra of a star, what it tells us about the star, and why
- what is the HR diagram, how to read it, and what information it contains
- the evolution of a star, from birth to death, including pre-main sequence stars, main-sequences stars, red giants, super-red giants, etc
- the relation between the properties of mass, temperature, luminosity, radius for main sequence stars
- why the evolution of a star depends on its mass, and what the fate for each type of star is
- what a white dwarf, a neutron star and a blackhole are and evidence to support the existence of these objects
- the structure of our own galaxy, how we know there are other galaxies, and their types
- what is redshift and what it tells us about the expansion of the universe, and implications for the origin
- a heuristic view of the big bang and fate of the universe
- a heuristic view of what dark matter and dark energy are

As a general rule, students at the end of this course will understand the why and how behind what we know of stars, galaxies and the universe.