ASTR 1040 Accel Intro Astronomy 2: Stars & Galaxies

Spring 2008
Prof. Juri Toomre
TA: Kyle Augustson
TR 11am, Duane G-131 + M recitations (E-126: 9am, 10am)
Lecture 1 15 Jan 08
Detailed course syllabus now being passed out
zeus.colorado.edu/astr1040-toomre

Who should take this course?
Prerequisites:
1030 + calculus
Moderate amounts of quantitative work (algebra + physics)

Required Text
The Cosmic Perspective
by Bennett et al., 4th ed, 2006)
Includes:
Access to textbook website
www.masteringastronomy.com
You will need your own account!
Most homeworks require it
Course: ASTR1040TOOMRE2008

Course Information
COURSE WEB PAGE:
zeus.colorado.edu/astr1040-toomre
Can find info on all assignments (passed out in class), course calendar, lecture notes, and other links
Grading is shown on CULearn

How to succeed in this course
• GOT TO PUT IN THE TIME:
4 credits at CU → 6 to 10 hours outside of classroom (no kidding)
• Read sections BEFORE discussion in class (secrets of memory)
• Come see us during office hours!

Planetarium sessions
• Three class meetings will be at Fiske Planetarium on campus
Observatory Nights

- Starting next Tues 22 Jan at 7pm, then about every 2 weeks (6 in all) – signup for two nights, one in group A, another in B
- Sommers-Bausch Observatory (next to Fiske): 16", 18", 24" telescopes

Read all course information in your syllabus handout (after class)!

Three in-class mid-term exams (m/c, short essay, quantitative analysis): 45%
Homework + observing assignments: 20%
Final exam: 25%
Clickers + discussion contributions: 10%

There are no make-up exams or late turn-ins

New i-clickers (radio frequency)

- Required -- bring to each class and recitation!
- Register clicker to your name in next class
- Used for reading quizzes, in-class discussion questions, feedback

More on i-clickers

- Credit starts next week
- Graded 100% for correct answer, 50% for any answer
- Your grades available online weekly (CULearn)
- Register in next class!

Important classroom policies

- Working together on homework is encouraged, BUT:
- Your answers must be in your own words -- exact copies will be awarded split credit
- Note sources and whom you worked with on homeworks
- Using another person’s clicker is cheating
- Students are expected to follow the CU Honor Code and behave with courtesy to the instructors and their classmates

Beginning of Today’s Class

- Course goals
- Course overview
- Course information
- Introduction: Sizes and Scales
Course Goals

Develop a broad view of what we know about the universe

Understand the forces that shape the universe and its history

Help you understand how we can figure all this out

Appreciate the beauty and richness of what goes on

Course Overview: What we shall study

- Vast range of SIZES and SCALES: finding our way through the universe

Light (Electromagnetic Radiation)

- What is light?

- How do we use it to find out what and where things are?

- Waves vs particles

Telescopes (Tools of the Trade)

Our Nearest Star: The Sun

Star in middle of its life on MS

STARS of very many sizes and colors

Evolution path and color / brightness depends on MASS
STELLAR Birth and Life

STAR DEATH: white dwarfs, neutron stars and black holes

OUR GALAXY: The Milky Way

Exploring a Universe of GALAXIES

GALACTIC evolution

Dark matter, dark energy and fate of universe
BIG BANG beginning

Specific Topics for Today + Thur

- Nature of astronomy as a science
- Scientific method: we observe, hypothesize, test its predictions, maybe fix it and try again
- Light as waves
- Special colors of light associated with each element
- Homework 1 passed out today

Homework Set 1

- Part A involves going to book website, after login ’joining our class’ (ASTR1040TOOMRE2008, as in syllabus), doing the ’Light & Spectroscopy’ tutorial in Chap 5 while having your performance e-recorded (can repeat as often as wish). Complete by Thur 24 Jan. (Most homeworks out Tues – back next Tues)
- Part B involves completing the ’Energy Level Diagrams & Spectral Lines’ problem sheet passed out in class today. Due next Thur in class, no lates.

For next class meeting, read:

- How to Succeed in this course, p. xxviii+
- Chapter 1, all (Our Place in Universe)
- Review Basic Astronomical terms, p. 4
- Chapter 2, review all (Motion of Stars, Seasons)
- Chap 3, sec 3.5 (Science of Astronomy)
- Chap 4, review all (Making Sense of Universe)
- Begin reading Chap 5, carefully (Light and Matter)

- You can get a copy of these slides after class from course website (can be helpful)

Atoms Behave the Same Everywhere (we hope, and keep testing)

Gravity Acts Everywhere

Universality of Laws

Science ’Laws’ are constantly being tested
ELEMENTS OF ASTRONOMY

FUNDAMENTAL ASSUMPTIONS

(always being tested)

1. THE COPERNICAN PRINCIPLE

2. UNIVERSALITY OF LAWS OF NATURE

FUNDAMENTAL FORCES

(at work everywhere, we assume and test)

1. GRAVITY
2. ELECTROMAGNETIC (EM)
3. STRONG NUCLEAR
4. WEAK NUCLEAR

COPERNICAN PRINCIPLE

Copernicus (1473-1543)

THE COPERNICAN PRINCIPLE

Direction of Sun, intensity (spectral), positions of stars
ALL THE REST IS INTERPRETATION