

LECTURE: M W 5:30 – 7:20 p.m.

LOCATION: 150 General Lectures Bldg.

LECTURER: Elisabeth Atems

OFFICE: 362 Physics Research Bldg. (666 W. Hancock)

E-MAIL: atems@physics.wayne.edu

OFFICE HOURS: M T F 11:45 - 12:40 or by appointment

TEXT: **PATHWAYS TO ASTRONOMY, 3rd Edition** by Steven E. Schneider and Thomas T. Arny (McGraw-Hill, 2012)

COURSE SYNOPSIS: This course is an introductory course in Astronomy. It is a survey course covering a very broad selection of topics including: the celestial sphere, the Earth-Moon-Sun system, the development of modern astronomy, some basic physics and astronomical measurement techniques, the Solar System, the formation, evolution, and death of stars, and finally galaxies, cosmology, and astrobiology.

LECTURE & READING ASSIGNMENTS: In order for you to appreciate, learn from, and participate in the discussion of material covered in each lecture, it will be very important for you to come to lecture prepared by having read and tried to understand the reading assignment for each lecture. Reading assignments for each week will be posted on Blackboard. You therefore need access to a computer. If you do not own a computer, the undergraduate library has a computer lab for you to use or you can use computers available at every public library. The lecture notes will also be available on Blackboard; I will try to post them as soon as possible after each class.

READING QUIZZES: To make sure that you are understanding the material, a Reading Quiz will be assigned each week, typically due Monday of the following week at class time, and consisting of 2 multiple choice questions from each unit to be covered that week. Reading quizzes will be graded and are worth a total of 25% of your grade. These quizzes will be taken on Blackboard, not in class. Since they are basically homework assignments, not exams, you are encouraged to refer to the textbook and/or the lecture notes when taking the quizzes.

OTHER ASSIGNMENTS: There will also be two scheduled planetarium visits during the term. These visits are a required part of the course and count for 5% of your grade. The WSU planetarium is in the basement of Old Main Building; see <http://planetarium.wayne.edu> for details and for links to the schedule. There will be quizzes on each of the planetarium visits for extra credit (each worth 2.5% in excess of the 100% regular credit total). There may also be bonus questions on exams, and these also count as extra credit.

EXTRA CREDIT: Extra credit raises the maximum possible percentage to over 100%. Since your final grade is based on a straight scale, extra credit can only raise your overall class standing, it cannot lower it.

PERFORMANCE EVALUATION:

Reading Quizzes (on Blackboard):	25%
3 partial exams (lowest dropped):	40% - Each partial counts for 20%
Final exam:	30%
Planetarium attendance:	5% - Each show counts for 2.5%
Total regular credit:	100%
Planetarium Quizzes Extra Credit:	5% - Each quiz counts for 2.5%

FINAL GRADES:

A	$\geq 90\%$
A-	85 - 89
B+	80 - 84
B	75 - 79
B-	70 - 74
C+	65 - 69
C	60 - 64
C-	55 - 59
D+	50 - 54
D	45 - 49
D-	40 - 44
F	< 40

TO GET A GOOD GRADE

- Purchase the book: it is sold at Barnes and Noble Bookstores and used copies may be available. The book is **required**.
- Do the reading assignments and all of the quizzes.
- **Come to class!** Research has shown that students who come to class do better, on average, than those who do not.
- **Ask questions in class!** If something isn't clear, or even if you need a slide up for longer to make a notation, don't be afraid to say something. You will likely not be the only one with the same question or request.
- Even though your lowest partial exam score will be dropped, you should not skip an exam because you feel it won't affect your grade. **If you miss more than one partial exam, you will receive a grade of F regardless of your class standing otherwise.** No exceptions.
- You cannot skip the final exam because you feel you are getting a good enough grade even without it. **If you miss the final exam, you will receive a grade of F.** No exceptions.

Week	Day	Date	Lecture Topics	Units
1	M	1/7	Earth, the Solar System, the Galaxy, the Universe; scientific notation & units; scientific method, fundamental forces & particles.	1 - 4
	W	1/9	Celestial coordinates, equator and ecliptic; Earth's axial tilt and seasons; sidereal and solar days .	5 - 7
2	M	1/14	Lunar phases, eclipses; calendars; ancient Greek astronomy, measurements of the size of the Earth and Moon, distances to the Moon and Sun.	8 - 10
	W	1/16	Phenomenology of the planets and Ptolemy's model; beginnings of modern astronomy: Copernicus's model and Kepler's laws; astronomical motion and forces.	11, 12, 14
3	M	1/21	MLK Holiday	
	W	1/23	Newton's laws of motion and universal gravitation; measuring astronomical masses.	15 - 17
4	M	1/28	Orbital and escape velocities; tides; conservation of energy and angular momentum.	18 - 20
	W	1/30	Electromagnetism, light, emission and absorption from atoms; electromagnetic waves and the electromagnetic spectrum; blackbodies and thermal radiation.	21 - 23
5	M	2/4	Thermal radiation; continuous and discrete spectra; atomic spectra; the Doppler effect.	23 - 25
	W	2/6	First Partial Exam	
6	M	2/11	Instrumentation and telescopes. The photoelectric effect and CCDs. Optical, radio, and x-ray telescopes. Refracting and reflecting telescopes.	28 - 30
	W	2/13	Telescope resolution & effects of Earth's atmosphere. Space observatories. Introduction to the Solar System.	31, 32, 34
7	M	2/18	The structure and origin of the Solar System. Introduction to extrasolar planets.	34 - 36
	W	2/20	Earth as a terrestrial planet and its atmosphere. Supervolcanoes. The greenhouse effect and the ozone layer. The Moon: its surface, structure, and theories of origin.	37 - 39
8	M	2/25	Mercury: surface, rotation, and orbit. Venus: atmosphere, surface, rotation. All about Mars.	40 - 42
	W	2/27	Jupiter and Saturn: features, composition, atmospheres. Uranus and Neptune. Satellite systems and rings.	45 - 47
9	M	3/4	Galilean satellites in detail; Kuiper belt and TNOs; Pluto, dwarf planets vs. planets. Comets, meteors, meteorites, impacts and mass extinctions.	48 - 50
	W	3/6	Second Partial Exam	
-----			SPRING BREAK	
10	M	3/18	The Sun: basic features, magnetic field, solar weather, power source. Nuclear reactions and fusion.	51 - 53
	W	3/20	Measuring stellar distances, luminosities, compositions. Parallax, parsecs, apparent and absolute magnitudes; standard candles; stellar spectroscopy.	54 - 56

11	M	3/25	Measuring stellar temperatures, masses, sizes. Wien's and Stefan-Boltzmann's laws. Stellar classification. Binary star systems: visual vs spectroscopic binaries; eclipsing binaries. Relationship between stellar size, temperature, and luminosity.	56 - 58
	W	3/27	The H-R diagram; stellar evolution, star formation. Life cycle of stars: main sequence stars.	59 - 62
12	M	4/1	Life cycle of stars: giant stars, variable stars. The fates of low and high mass stars; white dwarfs and supernovae.	63 - 67
	W	4/3	Neutron stars; general relativity and black holes. Star clusters.	68 - 70
13	M	4/8	The Milky Way, stars and populations. Gas and dust.	71 - 73
	W	4/10	Third Partial Exam	
14	M	4/15	Galaxies, Hubble's law. Active galaxies, quasars, their energy source. Galactic rotation curves and dark matter.	75, 78, 79
	W	4/17	Cosmology and the expanding universe; Olbers' paradox, the Big Bang and the CMB; geometry of space, density of matter and the fate of the Universe.	80, 81, 82
15	M	4/22	Astrobiology; the Gaia hypothesis; the anthropic principle; the origin of life, Panspermia; criteria for extraterrestrial life; the Drake equation; SETI.	85, 86
	M	4/29	Final Exam (cumulative)	

Note: This schedule is subject to change, except for dates of exams. The exact reading assignments for each week will always be given on Blackboard and/or in the description under the week's Reading Quiz.