Astr 121: Introduction to Astronomy – Stars, Galaxies, & Cosmology

Professor: Dr. Anca Constantin
Class: Tu & Thur 11:00 am - 12:15 pm

Website: STARS, GALAXIES, & COSMOLOGY SP10 on Blackboard

Office Hrs: Tu 1–3 pm & Fri 10 - 12am, or by appointment;
Rm 2182, Physics and Chemistry Bldg
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Phone: 540-568-5630

Required Textbook:
The Cosmic Perspective, 5th edition, Bennett et al.
(You are also expected to register for access to www.masteringastronomy.com)

Course Objectives: by the end of this course, you should:

- understand that we live in a huge universe described by a relatively small number of rules, which we have figured out through scientific inquiry.
- appreciate how scientific inquiry happens, particularly through the eyes of an astronomer.
- learn how these rules can help us understand nearly everything that happens in the Universe, and of course, around us, throughout our daily routines.
- develop a life long interest in promoting science in general, and astronomy in particular (the icing on the cake!)

Overview
Astronomy 121 is an introduction to modern astronomy, with an emphasis on Things outside our Solar System. The course begins with an exploration of the historical development of astronomy, tracing the path by which we have come to our present understanding of the Universe. Along the way we will build up the basic toolkit of physical concepts that we will need for our later explorations, specifically the nature of light, matter, and gravitation. The second part of the course is devoted to an overview of modern stellar and extragalactic astronomy, with particular emphasis on the nature of stars and their evolutionary cycle, including birth and their exotic graveyards, and on galaxies and their evolution throughout the life of the universe. We will end by discussing the exciting dark matter and dark energy, and our understanding of the beginning and the fate of the Universe.
**Instructional Philosophy**

Every scientific field has its own vocabulary and syntax. There are as many vocabulary terms in your textbook as in an introductory language class, and learning to read and think scientifically is no different from learning another language. You probably don’t already speak science, so it’s like being tested on "Les Misérables" in the first semester of French.

As an astronomer, I speak *I-know-astronomy*, but you have to learn it. No matter how hard I try, I can’t pretend that I don’t speak it, so there will always be times when, despite my best efforts, you might not understand me. The solution is twofold. First, if you don’t understand something, ask me for help!!! Ask in class, come to office hours, make an appointment, send me an e-mail, but ASK ME FOR HELP!! Second, learn from your peers. Your classmates all speak various stages of *I’m-learning-astronomy* and you can all help each other, often more than I can! In this course, we will continuously use collaborative learning and self-evaluation exercises. By working together, you will be more actively involved in your own learning, and you will learn more from each other than only from my lectures, no matter how entertaining and engaging I am.

Finally, whether you are taking my class, or the history of indie music, we professors all want the same thing: to develop a deep, conceptual understanding of the subject. We don’t want you to blindly memorize 3,000 things, only to spit them out onto a final exam and then forget them the next day. We want your understanding to grow in a deep and meaningful way. We all really do love what we teach, and we really do care about achieving these goals. Our primary goal and concern is that you learn. No matter what happens over this semester, try to remember that.

**Attendance and Being Prepared**

Attendance will not be taken. Note however that my job during class isn’t to teach you everything under the sun or beyond it, but to clear up difficult points and make connections from your readings. It is your responsibility to read the corresponding sections of your text *before* you come to class. Failure to come prepared may seem benign, but it makes me waste class time, causes you to learn and retain less from my lessons, and negates the self-assessment I offer.

**Grading Policy**

Your Final Grade=HW(10%) + Quizzes(20%) + Midterm1(20%) + Midterm2(20%) + Final(30%)

There will be opportunities for extra credit via projects and additional assignments.

**Final Grade Structure:**

A (93-100%)
A- (90-92.9%)
B+ (86-89.9%)
B (83-85.9%)
B- (80-82.9%)
C+ (76-79.9%)
C (73-75.9%)
C- (70-72.9%)
D+ (66-69.9%)
D (62-65.9%)
D- (58-61.9%)
F (57.9% or lower)

**Homework**

Homework is assigned roughly every week on www.masteringastronomy.com. For the textbook publisher’s online system at www.masteringastronomy.com, our course number is MACONSTANTIN33172 (the access code is provided with your purchase of a new textbook or you can purchase access online). This is your chance to master course material. You have a lot of time to work on them and a lot of opportunity to consult with me or your peers for help. There is really no reason why you can’t have nearly-perfect grades on all your homework, provided you put in the appropriate time and effort. No late homework will be accepted. "Late" means after the beginning of class (11:00 am) on the due date. Exceptions will be made only for legitimate, documented emergencies. *Late homework receive a zero.*
Exams
There will be:

- (roughly) weekly quizzes
- two in-class exams
- a comprehensive final exam.

All tests will stress reasoning and problem solving rather than memorization.

The Final Exam for this course is scheduled for Tuesday, May 4th, 10:30a – 12:30p. Attendance at the Final Exam is mandatory. The final will be comprehensive, covering all lectures and in the same format as the in-class exams, only longer. It is worth 30% of your final course grade.

No makeup final will be offered.
Persons who miss the final exam will be given an incomplete (I) with an alternative grade equal to getting a zero on the final (which at 30% of the total course grade, will be guaranteed to be much lower than you will like).
In keeping with official University policy, early finals will not be available for those persons who wish to depart early for (any) Break. Please plan ahead and make your travel plans accordingly, as I will make no exceptions.

Office Hours
Office hours are to augment the contact we have together, for those who need or want it. These are hours that I set aside for you, held for your benefit, not mine. Outside of office hours, I maintain an open-door policy, i.e. if my door is open, you are free to talk to me, provided I’m not busy at that moment. I will not hunt you down and force you to seek help. It is your decision and responsibility to monitor your learning, to make time to see me, and to do so in a timely manner. You should not come to me the day before your exam needing to learn everything in the course. Also, do not expect me to entertain questions about homework or tests on the day they are given or due.

Academic misconduct
All students in attendance at the James Madison University are expected to be honorable and to observe standards of conduct appropriate to a community of scholars. The University expects from its students a higher standard of conduct than the minimum required to avoid discipline. Academic misconduct includes all acts of dishonesty in any academically related matter and any knowing or intentional help, or conspiracy to help, another student. The Summary of HONOR SYSTEM Procedures will be followed in the event of academic misconduct.

Students with disabilities
Students with disabilities are encouraged to register with the Office of Disability Services (568-6705). Thereafter, you are invited to schedule appointments to see me during office hours to discuss accomodations or other special needs.

Tentative weekly schedule:
Week 1: Our Place in the Universe (ch. 1)
Week 2: Discovering the Universe for Yourself (ch. 2)
Week 3: The Science of Astronomy (ch.3)
Week 4: Motion, Energy, and Gravity (ch. 4)
Week 5: Light and Matter (ch. 5)
Week 6: First Midterm (1h), Telescopes (ch. 6)
Week 7: Our Star (ch. 14)
Week 8: Surveying the Stars (ch. 15)
Week 9: Star Birth/Star Stuff(ch. 16, ch. 17)
Week 10: Star Stuff/ The Bizarre Stellar Graveyard (ch. 17, ch. 18)
Week 11: Second Midterm (1h), Our Galaxy (ch. 19)
Week 12: Galaxies & Modern Cosmology (ch. 20)
Week 13: Galaxy Evolution (ch. 21)
Week 14: Dark Matter, Dark Energy, the Fate of the Universe (ch. 22), Review