Astronomy 114

Spring 2021

Assignments Grading scale Course schedule Policies University help and links

Instructor: Dr. Rebecca Ericson
Email: rericso1@gmu.edu
Phone: 703-638-5417
Office hours: Tuesdays 3:45 to 5 on Zoom or by appointment

February 1	Last day to add classes
February 12	Last day to drop classes without tuition penalty
February 16	Last day to drop (50% tuition penalty)
March 2 – April 1	Selective withdrawal period
May 3 – May 10	Final exams
May 14	Commencement

See GMU Spring 2021 Calendar for complete schedule at
https://registrar.gmu.edu/calendars/spring-2021/

Course Description

This is the laboratory that goes along with the introductory course Astronomy 113. The purpose of this course is to help students understand the process of science through astronomy investigations and the use of realistic simulations. An important learning goal is to help students understand and practice the rudiments of scientific reasoning as a model for investigations in other disciplines.

Blackboard Login Instructions

Access to My Mason and GMU email are required to participate successfully in this course. Please make sure to update your computer and prepare yourself to begin using the online format BEFORE the first day of class. Check the IT Support Center website. Navigate to the Student Support page for help and information about Blackboard. In the menu bar to the left you will find

all the tools you need to become familiar with for this course. Take time to learn each. Make sure you run a system check a few days before class. Become familiar with the attributes of Blackboard and online learning.

Required Textbooks

There are no required textbooks for this course. All materials will be found in the course on Blackboard. If you are currently enrolled in Astronomy l13 the assigned textbook will be useful for background information. In addition, the course has a link to the text, ***Astronomy***, a free, open education resource from OpenStax.

Course Learning Outcomes

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1. Understand how scientific inquiry is based on investigation of evidence from the natural world, and that scientific knowledge and understanding:
    a. evolves based on new evidence
    b. differs from personal and cultural beliefs
2. Recognize the scope and limits of science.
3. Recognize and articulate the relationship between natural science and society and the application of science to societal challenges
4. Evaluate scientific information (e.g., distinguish primary and secondary sources; assess credibility and validity of information).
5. Participate in scientific inquiry and communicate the elements of the process, including:
    a. Making careful and systematic observations
    b. Developing and testing a hypothesis
    c. Analyzing evidence
    d. Interpreting results

Technology Requirements

Hardware: You will need access to a Windows or Macintosh computer with at least 2 GB of RAM and access to a fast and reliable broadband internet connection (e.g., cable, DSL). A larger screen is recommended for better visibility of course material. You will need speakers or headphones to hear recorded content and a headset with a microphone is recommended for the best experience. A web cam will be valuable, though not absolutely required. For the amount of Hard Disk Space required taking a distance education course, consider and allow for:

- the storage amount needed to install any additional software and
- space to store work that you will do for the course.

If you consider the purchase of a new computer, please go to Patriot Tech to see recommendations.

Software: You will need a browser and operating system that are listed compatible or certified with the Blackboard version available on the the myMason Portal. See supported browsers and operating systems. Log in to myMason to access this course. Labs may use Acrobat Reader, and Windows Media Player, QuickTime and/or Real Media Player.. Your computer should be capable of running current versions of those applications. Also, make sure your computer is protected from viruses, see some possibilities here: Mason IT suggested anitvirus software

Students owning Macs or Linux should be aware that some courses may use software that only runs on Windows. You can set up a Mac computer with Boot Camp or virtualization software so Windows will also run on it. Watch this video about using Windows on a Mac. Computers running Linux can also be configured with virtualization software or configured to dual boot with Windows.

Note: If you are using an employer-provided computer or corporate office for class attendance, please verify with your systems administrators that you will be able to install the necessary applications and that system or corporate firewalls do not block access to any sites or media types.

Course-specific Hardware/Software
Free software that you can download and install will be used for some labs.

Stellarium is a planetarium type program that you can download. A web based version is also available here though it has a slightly different navigation system and more limited possibilities though it should be sufficient for the lab class.

http://stellarium.org/

NAAC labs native aps installation. These can be installed on your own computer and are necessary for several labs. Instructions for the download are on the website.

https://astro.unl.edu/downloads/

Course Schedule – ***Pre-lab assignments (individual work) are due at midnight the day before your section meets. Group assignments are due at the end of the scheduled class period. Post-lab assignments (individual follow-on to the group lab) should be completed as soon as possible after the group part of the lab is complete and are due before the next scheduled class meeting. Specific lab topics may change during the semester.***

Assignments week of	Lab Topic (subject to change)	Overview
January 25	**Introduction to the lab**	Orientation to lab procedures and introductory activity involving how astronomers can know distances and time scales in the universe.
February 1	**1-Virtual observatory lab**	This is a two-part lab. The group portion explores the use of filters in observational astronomy. The second half of the lab is an individual virtual tour of the GMU observatory. Students sign up for this on the GMU Observatory organization.
February 8	**2-Size of the universe lab**	Understand the basic structure of the universe from the solar system and Earth's position in it to the galaxy, galaxy clusters and observable universe.
February 15	**3-Atomic Spectra**	Basics of atomic structure and the origin of emission lines and how they serve as "fingerprints" for the chemical elements
February 22	**4-Stellar Classification**	Learning about differences in stars and how stars are classified by spectral type
March 1	**5-HR Diagram**	Learn how a fundamental graphic in stellar astronomy is constructed and its power in understanding how stars change over their lifetimes.
March 8	**6-Photoelectric Photometry of the Pleiades**	Another rung on the distance ladder using clusters of stars that form at close to the same time and same distance from the sun.
March 15	**7- Variable Stars**	Explore how certainly classes of very bright stars in their giant phase can provide another measure of distance.
March 22	**8-Radio Astronomy of Pulsars**	Understand how radio waves can be a powerful tool in astronomy with yet another possible way to measure distance.
March 29	**9-Galaxy Analysis**	Sorting galaxies by observed physical characteristics.
April 5	**10- Hubble Redshift**	Measuring galactic redshifts to calculate the expansion rate of the universe using real data.
April 12	***Make-up lab possibility -you must coordinate with the instructor at the first opportunity in case of illness, equipment failure etc. Make-up lab opportunities are not automatic. Preferably students will make up missed group work the week it is assigned.***	
	No final exams for Astronomy 114 labs	

Course Policies: The labs will be conducted with Collaborate Ultra or Zoom. You are expected to attend each of the scheduled sessions. A short check-in and prep session will be recorded in case you have technical difficulties during the real time meeting. If you have such difficulties, you must contact the instructor as soon as possible and work out a make-up possibility. Recordings will be posted for all to refer to if needed for the post-lab assignments.
Students should be prepared to show themselves on camera during the class session. Make sure you have good lighting, a reasonably uncluttered background, etc.

Instructor-Student Communication: I will respond to your emails as quickly as possible. Before sending an email, please check the following (available on your Blackboard course menu) unless the email is of a personal nature:

1. Syllabus
2. Ask the Professor
3. On-demand Blackboard videos on how to use Blackboard features, and Technical Requirements.

Feel free to respond to other students in the Ask the Professor forum if you know the answer.

Technology. You will need a reliable computer and internet access to view course materials in Blackboard. You may also need to download programs, or use an application such as Flash to complete lab assignments.

In case of difficulties: If our synchronous meetings are interrupted by technical problems, for example I lose connectivity, or there is a power outage, please continue working with your group if we have reached that stage. Otherwise stand-by for at least 15 minutes while I try to reconnect, etc. If the session can't be restarted I will contact you by email or announcement to let you know the work-around.

If the problem is on your end try to rejoin the session. If nothing works you will need to wait for the video of the session and will complete the group lab work as an individual assignment. I will record the introductory material for you to watch if this happens. Sometimes just exiting and re-entering is sufficient. You may also need to try joining the session by phone, or with a different browser.

Grading Scale

Your grade is based on the points from 10 lab exericses. Each lab except the virtual observatory lab has a possible 75 points from group work in class, 10 points for the individual prelab and 15 points for the individual post-lab assignment done out of class. The observatory assignment has a possible 50 points for the group portion and 50 points for the virtual observatory tour. Each lab, therefore, is worth up to 100 points, with 1000 points the maximum possible for the semester.

Points	Letter grade
930 - 1000	A
900 -929	A-
870 - 899	B+
830 -86	B
800 -829	B-
750 -799	C+
700 -749	C
670 -699	C-
600 -669	D
Below 60	F

University Policies and Resources

a. Academic Honesty: You are expected to be familiar with and abide by the University's Honor Code. The Code can be found here. It is your responsibility to see me if you have questions about these policies. George Mason University has an honor code that states the following:

> *To promote a stronger sense of mutual responsibility, respect, trust, and fairness among all members of the George Mason University community and with the desire for greater academic and personal achievement, we, the student members of the University Community have set forth this:*

b. Students must follow the university policy for Responsible Use of Computing.

c. Student services: The University provides range of services to help you succeed academically and you should make use of these if you think they could benefit you. I also invite you to speak to me (the earlier the better).

d. Students are responsible for the content of university communications sent to their George Mason University email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students solely through their Mason email account.

e. The George Mason University Counseling and Psychological Services (CAPS) staff consists of professional counseling and clinical psychologists, social workers, and counselors who offer a wide range of services (e.g., individual and group counseling, workshops and outreach programs) to enhance students' personal experience and academic performance. Counseling Center: Student Union I, Room 364, 703-993-2380.

f. Students with disabilities who seek accommodations in a course must be registered with the George Mason University Office of Disability Services (ODS) and inform their instructor, in writing, at the beginning of the semester. All academic accommodations must be arranged through that office. Please note that accommodations MUST BE MADE BEFORE assignments or exams are due. I cannot adjust your grade after the fact.

g. Students must follow the university policy stating that all sound emitting devices shall be turned off during class unless otherwise authorized by the instructor.

h. The George Mason University Writing Center staff provides a variety of resources and services (e.g., tutoring, workshops, writing guides, handbooks) intended to support students as they work to construct and share knowledge through writing. University Writing Center: Robinson Hall Room A114, 703-993-1200. The writing center includes assistance for students for whom English is a second language.
i. Diversity: George Mason University promotes a living and learning environment for outstanding growth and productivity among its students, faculty and staff. Through its curriculum, programs, policies, procedures, services and resources, Mason strives to maintain a quality environment for work, study and personal growth.