



Astronomy 112 Section 227

The Solar System - Synchronous Online

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Office Hours: Virtual by appointment or immediately after class

Virtual Classroom: Zoom on Blackboard course

Meeting time: 10:30 – 1:20 Tuesday

Important Dates:

August 22: First Day of Classes

August 23 First Day of class for this section

August 29: Last Day to add a course

September 5: Labor Day (no classes)

September 6: Last Day to drop with 100% tuition refund

September 13: Last Day to drop with 50% tuition refund

Course Description:

The Solar System lab goes along with the Solar System lecture course, Astronomy 111. 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.

Course learning Outcomes

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. Evaluate scientific information (e.g., assess credibility and validity of information).
4. 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, and
- d. interpreting results

Blackboard Login instructions:

Access to [myMason](#) 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.

Textbook

There is no textbook required for this course. All material can be found in the course on blackboard. If you are currently enrolled in ASTR 111, the assigned textbook will be a good reference for this course. If you have no Astronomy book available, you can go to [Astronomy](#) and download the PDF or read the book online. It is available to you for free from OpenStax and you will also find a link to it in the course.

Nature of Course Delivery

The format of this online course is synchronous online and is structured around 10 learning units consisting of exercises and quizzes. Lab reports and quizzes must be submitted on the due date. The quizzes are due by 11:59 pm the day BEFORE the lab meeting. Lab reports are due by the end of the virtual class meeting. The course schedule is synchronized with the equivalent face-to-face course although not all lab exercises are the same in the f2f course and the synchronous online course.

Technology Requirements

Hardware: You will need access to a Windows or Macintosh computer and access to a fast and reliable broadband internet connection (e.g., cable, DSL or Fios). You will need speakers or headphones to hear recorded content.

Software: This course uses Blackboard as the learning management system. You will need a browser and operating system that are listed compatible or certified with the Blackboard version available on the [myMason Portal](#). Log in to access your registered courses. Online courses typically 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 by downloading the latest version of Anti-Virus software. Students owning Macs or Linux should be aware that that some software 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.

Course-specific Hardware/Software

Stellarium: <https://stellarium.org/>

MS Excel or equivalent spreadsheet software: Spreadsheet software is essential for data analysis.

Google Chrome: The only browser in which Blackboard Collaborate Ultra works well.

Course Schedule

Lab	Date	Topic	Assignment Description
1	08/23	Course Introduction	<i>Do you know.....?</i> - Orientation to lab procedures and introductory activity
2	08/30	Observatory visit	<i>Do you know that the GMU Observatory is one of the largest on campus telescopes on the East coast?</i> - In the first part of this lab you will learn about how images are created and get an introduction to the observatory. Students need to sign up for an observatory tour. In the second part students will visit the observatory during the semester and write a report. The report is due one week after the tour is completed.
	09/05	Labor Day (no classes – no labs meet this week including our Tuesday lab)	No classes - No assignments
3	09/13	Solar System Walk	<i>How big is the Solar system?</i> -You will learn how to scale and build a model of the solar system. You will be introduced to building formulas in Excel and in using a spreadsheet for data analysis.
4	09/20	Navigating the Sky	<i>How can I find an object in the sky?</i> - You will learn about the different coordinate systems in Astronomy and use a model of a celestial sphere to navigate the sky.
5	09/27	Planetary motion	<i>Why don't planets fall into the Sun?</i> - This lab focuses on Kepler's laws and how they describe the motion around the Sun. You will learn the connection between Kepler's Laws and Newtonian Gravity.
6	10/04	The Moon	<i>Do you know what a waning crescent is?</i> - in this lab you will learn about the phases of the Moon and how tides are influenced by the Moon.
	10/10	Columbus Day (no classes and no astronomy labs meet this week)	No classes - No assignments
7	10/18	Reflectance spectroscopy	<i>How do we use light to understand planets and their atmospheres?</i> – You use reflected light to make “fingerprints” of

Lab	Date	Topic	Assignment Description
			different kinds of rock using different wavelengths of light in the visible and infrared part of the spectrum in an experiment to try to match known and unknown rock sample.
8	10/25	Solar System Formation	<i>How did the solar system come into being?</i> – In this lab you will make observations that will help you understand how the solar system was formed.
9	11/01	Exploring Mars with Mars Trek	<i>What are scientists discovering about Mars and how it compares to Earth?</i> -You will analyze different pictures from the surface of Mars with respect to different geological activities.
10	11/08	Planetary Atmospheres	<i>Why do planets have such different atmospheres?</i> - In this lab you will learn about different types of planetary atmospheres and how they influence the impact of meteoroids coming through to the surface.
11	11/15	Habitable Zones	<i>Why is it so difficult to find another Earth?</i> – You will learn what it takes for a planet to create life as we know it.
	11/21	Thanksgiving Recess	No classes - No assignments
12	11/29	Make-up Lab	Students who missed one lab can use this session to do a make-up lab

Assignments

Pre-lab assignments: The pre-lab assignments must be completed by 11:59 pm the day BEFORE the lab report is due. These are open notes, open book quizzes, but must be your own work.

Assignments: You will work in groups of 2-3 students to explore the lab topic, gather data to use in an investigation of the concept and answer questions based on what you have found. These must be completed and submitted before or on the due date.

Observatory out of class lab (25 points in class, 75 points observatory tour): This lab is unique in that it is a combination of an in-class group activity and an individual tour that you will sign up for on a date and time that you can attend. A report on the tour is due one week after you attend your selected tour. More information and sign up for the tours will be available during the first week of class.

Course Policies

Instructor-Student communication: Your instructor will respond to your emails as quickly as possible. Before sending an email, please, check the syllabus. 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.

Grading Scale

Your grade is based on the points from 10 lab exercises. Each lab is worth up to 100 points, with a possible maximum of 1000 points. Your grade is assigned as shown below.

Points	Letter Grade
930-1000	A
900-929	A-
870-899	B+
830-869	B
800-829	B-
750-799	C+
700-749	C
670-699	C-
600-669	D
Below 600	F

University Policies and Resources

Academic Integrity: GMU is an Honor Code university; please see the university catalog for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously and violations are treated gravely. What does academic integrity mean in this course? Essentially this: when you are responsible for a task, you will perform that task. When you rely on someone else's work in an aspect of the performance of that task, you will give full credit in the proper, accepted form. Plagiarism is a violation of the honor code. Sharing of instructor created materials, particularly materials relevant to assignments, to public online "study" sites is considered a violation of Mason's honor code. It also violates important ethical standards.

Students are required to comply with all university policies. For more information go to <https://universitypolicy.gmu.edu/all-policies/>

Withdrawal: If you need to withdraw from this course you must do it within the University established time frame. For fall 22 the last day to withdraw with no tuition penalty is September 6. From then on tuition penalties apply. See the GMU academic calendar https://registrar.gmu.edu/calendars/fall_2022/ for other important dates.

Diversity and inclusion: We seek to create a learning environment that fosters respect for people across identities. We welcome and value individuals and their differences. We encourage all members of the learning environment to engage with the material personally, but to also be open to exploring and learning from experiences different than their own.

Resources

Office of Disability Services:

If you are a student and you need academic accommodations, please see me and contact the Office of disability Services (ODS) at 993-2474. All academic accommodations must be arranged through the ODS. <https://ds.gmu.edu/>

COVID -19 Note: Students who have a Covid-related disability should contact the ODS. The instructor is not expected to create accommodations outside of the DS official guidelines.

Other Useful Campus Resources:

Learning services Department helps students with time management and study skills. Use this resource for short classes, videos to watch, or counseling toward becoming a master of your own time. <https://ulife.gmu.edu/>

Writing Center:

A114 Robinson Hall; (703)993-1200 <https://writingcenter.gmu.edu/>

Counseling and Psychological Services (CAPS):

(703)993-2380; <https://caps.gmu.edu/>