Astr 111-DL1: The Solar System (3 credits)

Spring 2022

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Office hours: by appointment. Office hours will be held in my virtual office on Zoom. A link will be provided 15 minutes before the scheduled time.

Course Description

This science course fulfills 3 credit hours of general education science. If taken with a section of the Solar System lab (Astronomy 112), it satisfies the natural science core requirement for a lab science at GMU. It is designed to provide a stimulating environment for learning about the solar system and how astronomers come to understand things like the scale of the solar system and its likely origins as well as details about the various planets and other components of the solar system.

In addition to learning the basic facts necessary to have a good mental picture of the solar system and objects in it, students will have a chance to consider how scientists construct, test and evaluate theories, a powerful way of thinking that can be applied outside of purely scientific fields.

Required Textbooks

Fraknoi, Morrison, Wolff, Astronomy, Openstax. Chapters 1→14 and sections 21.4 and 21.5 will be covered.
ISBN – 13: 978-1-938168-28-4
This course has been designed as an "Open Educational Resource" course. This means that we have found a free on-line textbook, courtesy of OpenStax at Rice University. It is printable, or you can simply download and read the PDF copy.

Natural science goals and learning outcomes

The general education natural sciences courses engage students in scientific exploration; foster their curiosity; enhance their enthusiasm for science; and enable them to apply scientific knowledge and reasoning to personal, professional and public decision-making.

To achieve these goals, students will:

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 the natural sciences and society and the application of science to societal challenges (e.g., health, conservation, sustainability, energy, natural disasters, etc.).
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

Course Structure
Readings, supplemental videos, and weekly quizzes are on Blackboard. This allows you to work in a somewhat self-paced and relaxed environment as you learn traditional lecture material.

In order to really understand you need to do something with the material. This includes participating in short on-line discussions, journal entries, doing some "at home investigations" and taking two exams.

To succeed it is important for you to commit to doing your best working and thinking as you study the on-line materials and prepare discussion postings. The level of engagement and commitment required for this class is greater than for a typical face-to-face lecture. As with all things worth doing, it will require effort, attendance, and preparation.

This course will have succeeded if long after you have forgotten the composition of the atmosphere of Jupiter you remember how to ask the kinds of questions a scientist might ask and continue to develop curiosity and interest about how the world works.

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 on the first day of class. Check the IT Support Center website. Make sure you run a system check a few days before class. Become familiar with the attributes of Blackboard and online learning.

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.

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. See supported browsers and operating systems. Log in to myMason to access your registered courses. Online courses typically use Acrobat Reader, Java, 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.

Course-specific Hardware/Software

Webcam: You are required to have a webcam which is either integrated in your computer or attached to your computer. You will need it to be able to take all exams.

Respondus Lockdown Browser: You must install Respondus Lockdown Browser on your computer before you start an exam.

Google Chrome: You need to download and install google chrome on your computer. Certain applications only function well in Google Chrome.

Assignments Description

Assignments consist of quizzes which are open book, discussion posts, at- home-investigations and journal reflections, one midterm exam and a final exam.

Exams: The tests and exams in this course will be mostly conceptual questions with a few problems requiring you to do some calculations. Questions will tend to focus on understanding of the concepts and principles of Astronomy under study; Questions could have any format including multiple-choice, essay questions, fill in the blank etc. All exams must be taken online in Respondus Lockdown Browser. You will be given a practice exam to try out the technology.

You can earn 3 extra credit points for attending a 30- 60 minutes synchronous session. There will be seven to eight synchronous sessions. These meetings will be announced at the beginning of the week.

ASSIGNMENT	SCORING	POINTS	TOTAL POSSIBLEPOINTS
MIDTERM EXAM	You can choose to do the exam in the testing center in Planetary Hall or at home with a Respondus Lockdown Browser.	100	100
DISCUSSIONS, AT HOME INVESTIGATION AND JOURNAL ENTRIES	15 discussions and at-home investigations and journal entries. These are scored on completeness and scientific accuracy.	Points vary depending on difficulty	170
QUIZZES	15 Weekly quizzes	10	150
FINAL EXAM		120	120
TOTAL POSSIBLE *(note that there are extra points. You must do the final exam, the midterm exam and enough discussions and at-home investigations to get the grade you want to achieve.).*			**540**

Grading Scale:

Letter Grade	Points needed
A+	> 500
A	465 - 500
A-	450 - 464
B+	435 - 449
B	415 - 434
B-	400 - 414
C+	375 - 399
C	350 - 374
C-	335 – 349
D	300 - 334
F	Below 300

Course Policies

Late Assignments: All assignments must be turned in within 48 hours of the due date.

Instructor-Student Communication: I will respond to your emails within 12-24 hours. If I will be away from email for more than one day, I will post an announcement in the Blackboard course folder. 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 Your Professor (forum on the discussion board)
3. On-demand Blackboard videos on how to use Blackboard features, and Technical Requirements.

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

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: Student Members of the George Mason University community pledge not to cheat, plagiarize, steal, or lie in matters related to academic work.

b. Students must follow the university policy for "Responsible Use of Computing" which you can access through the course website.
c. Sharing of instructor created material: Sharing of instructor-created materials, including materials relevant to assignments or exams, to public online "study" sites is considered a violation of Mason's Honor Code. For more information, see the Office of Academic Integrity's summary of information about online study sites.
d. 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.
e. 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.
f. 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 3129, 703-993-2380.
g. 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.
h. Students must follow the university policy stating that all sound emitting devices shall be turned off during class unless otherwise authorized by the instructor.
i. 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 B Room 213, 703-993-1200. The writing center includes assistance for students for whom English is a second language.
j. 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.

Course Schedule

Week	Reading assignment	Main ideas covered this week
01/24 – 01/30	Ch 1: Science and the Universe	-Introduction – What is a solar system? -Overview of our solar system
01/31 – 02/06	Ch 4: Earth, Moon, and Sky	-Learning the night sky -Seasons and apparent motion of objects in the sky
02/07 – 02/13	Ch 7: An introduction to the Solar system	-Overview of planets in the solar system -Composition and structure of planets
02/14 – 02/20	Ch 2: Observing the Sky	-Motion and apparent motion in the sky -Sorting out what makes science different
02/21 – 02/27	Ch 3: Orbits and Gravity	-Kepler's Laws -Newton's laws of motion -Newton's law of gravitation
02/28 – 03/06	Ch 5: Radiation and Spectra	-The behavior of light -The electromagnetic spectrum
03/10 and 03/11	Midterm Exam	Testing Center or at home
03/07 - 03/13	Ch 6: Astronomical Instruments	-Telescopes, Radio telescopes, Space based telescopes
03/21 – 03/27	Ch 8: Earth as a planet	-Earth geology -Earth's atmosphere
03/28 - 04/03	Ch 9: Cratered Worlds	-Moon and Mercury
04/04 – 04/10	Ch 10: Earthlike Planets	-Venus and Mars
04/11 - 04/17	Ch 11: The Giant Planets Ch 12: Rings, Moon and Pluto	-Giant planet overview -Atmospheres of giant planets -Rings and moons -New Horizon mission to Pluto
04/18 – 04/24	Ch 13: Solar System Debris	-Collisions! -Comets and meteorites
04/25 – 05/01	Ch 14: The Origin of the Solar System	-Formation of the solar system
05/02 – 05/06	Ch 21: Exoplanets (sections 21.4 and 21.5)	-The search for planets outside our solar system
05/05 and 05/06	Final Exam	All missing work due by 05/06