Syllabus Astronomy 111/112

Fall 2020

Astronomy 111/112 is an active learning version of the general education astronomy course on the solar system. This course fulfills the requirement for a 4 credit natural science lab course.

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Learning Assistants: Alysa Aroonsakulwongse and Artem Kharko

Contact Information:

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Office Hours in person in Lecture Hall 1: Thursday 12:00 pm - 13:15 pm. Additional virtual office hours using Blackboard Collaborate can be scheduled by appointment.

Safe Return to Campus

All students taking courses with a face-to-face component are required to take Safe Return to Campus Training prior to visiting campus. Training is available in Blackboard (https://mymason.gmu.edu). Students are required to follow the university's public health and safety precautions and procedures outlined on the university Safe Return to Campus webpage (www2.gmu.edu/safe-return-plan). Similarly, all students in face to face and hybrid courses must also complete the Mason COVID Health Check daily, seven days a week. The COVID Health Check system uses a color code system and students will receive either a Green, Yellow, or Red email response. Only students who receive a "green" notification are permitted to attend courses with a face-to-face component. If you suspect that you are sick or have been directed to self-isolate, please quarantine or get testing. Faculty are allowed to ask you to show them that you have received a Green email and are thereby permitted to be in class.

General Student Learning Outcomes:

Astronomy 111/112 is part of the core natural science program. According to the GMU catalogue the purpose of general education courses is: "to educate, liberate, and broaden the mind, and to instill a lifelong love of learning." Core natural science 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.

At the end of the semester, students should be able to:

1. *Understand how scientific inquiry is based on investigation of evidence from the natural world, and that scientific knowledge evolves based on new evidence and 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 (for lab courses only) by: a) Making careful and systematic observations, b) Developing and testing a hypothesis, c) Analyzing evidence, d) Interpreting results.*

Course Objectives for Astronomy 111/112:

Astronomy 111/112 is a core natural science course (lecture and lab combined) focused on the *solar system*. It is designed to help students understand the scientific process and to develop their scientific reasoning skills in the context of astronomy. *The main emphasis of the course is investigating how astronomers have come to know what they know about the solar system based on the light that reaches us.*

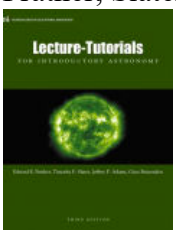
Course Structure and Philosophy:

The course is hybrid with a "flipped" approach. ***Outside the class, students are expected to read the material, watch short videos, and do homework with weekly deadlines on Sunday***. During the ***class sessions on Tuesday***, students will be involved in several collaborative activities such as lecture tutorials, mini-investigations, and labs.
Most of the time you will ***work in small groups*** (made of 2 members) randomly assigned. Working with others can be an effective way to learn, and importantly most jobs require some level of collaborative work. An important part of general education is becoming a lifelong learner, able to think broadly and deeply, and to communicate effectively with others. Virtual tables (larger groups of 8 members) are randomly assigned every four weeks. To succeed it is important to ***dedicate adequate time and effort outside the class*** to study the basic concepts, which are further mastered through class activities. The level of engagement and commitment required for this class is greater than for a standard lecture; as with all things worth doing, it will require effort, attendance, and commitment.

Text Books (required):

1) Astronomy (open educational resource)
(https://openstax.org/details/books/astronomy)

2) Lecture-Tutorials for Introductory Astronomy (3th Edition).
Prather, Slater, Adams & Brissenden.



Blackboard & Technology requirements:

You will need a ***reliable laptop*** to participate in the class activities and complete your homework (the course's material is delivered through Blackboard). You must be able to both upload and download documents.
You will need to download the ***Respondus Lockdown Browser,*** which will be used for the proctored tests in class.
You will need to ***check your emails (use the GMU account) often and Blackboard at least weekly.*** For issues with Blackboard contact courses@gmu.edu, and the ITU Support Center (703 993-8870) for general help with information about technology.

Work Ethic & Policies:

Active learning courses require more participation and input by students than do traditional large lecture format courses. Astronomy 111/112 involves both individual and collaborative work. You are expected to contribute actively to group activities and to respect and value opinions and work of other group members.
You will need to participate fully each week by:

1) coming prepared to class and completing the collaborative class activities;
2) completing the at-home activities (one collaborative, one quiz and one reflection).

There are three mandatory tests: two midterms and one comprehensive final. All tests will be taken in our classroom. The first two will be on Thursday, the final will be on Tuesday.

Supplies:

Each student needs the following supplies for each face to face meeting:

- Laptop
- Notebook or loose leaf of paper (and pencils/pens)
- Lecture tutorial book

Students with disabilities:

Students with documented disabilities or special should contact the instructor during the first week of class. Students who suspect they have disabilities that need accommodation should contact the Office of Disability Services at George Mason as soon as possible in order to get proper documentation.

Student resources:

Academic advising center – 703-993-2470
Campus counseling center – 703-993-2380
Office of Disability Services – 703-993-2474
Writing center – 703-993-1200
Math tutoring center – 703-993-1460
Office of Diversity, Inclusion, and Multicultural Education
Religious Holiday Calendar

Honor Code:

George Mason's Honor code states that "Student members of the George Mason University pledge not to cheat, plagiarize, steal, or lie in matters related to academic work." If you have questions about the meaning of these terms, please ask. We expect you to hold to this standard by carefully citing sources used in your work and by doing your own work on tests and individual assignments.

In an environment where group work is highly valued it can be difficult to sort out which policies apply. At a minimum follow these guidelines:

- Work identified as individual should be strictly your own.
- Cheating on exams or presenting another's work as your own (plagiarism) will result in a zero grade for the assignment.
- Students are expected to actively collaborate on assignments identified as group, but it is important that only students who actively participate are given credit. The group is responsible for ensuring that all members take part and assume responsibility for group assignments.
- Material that is drawn from written or electronic sources must be appropriately cited. For on-line discussion it is usually enough to simply reference a text page or web site. In a more formal paper a bibliography and appropriate in-text citations are mandatory. If in doubt about how to do this contact an instructor.

Grading System:

Graded assignments include both at-home and in class activities. The grade is computed as follows: 1) *Individual homework quizzes (5%)*, 2) *Active participation* (5%), *2) in class activities (30%)*, *and 3) at-home collaborative assignments (20%).* Adding up these assignments yields 60% of your final grade. The remaining 40% is provided by three mandatory exams. ***If you miss 5 activities or 5 labs, you will get a zero in that category (and likely fail the class)***. There is extra credit in some of the class activities and in all exams. During the semester, no more than 3 missed activities or labs can be made up out of class. *Partial credit* can be earned for late work (not for the quizzes): *up to 80% within one week*, 0% after one week. Late arrivals, texting, use of computers unrelated to class activities will result in systematic point deduction.

Type of Assignment	**Percentage of grade**	**Method of calculating**
Homework individual quizzes	5%	***Due each Sunday at 11:59 pm*** ***No temporal extensions.***
Active Participation	5%	***Points deducted for lack of participation, texting, being late.***
In-class activities	30%	***Submission in class.*** ***Full credit for honest participation and demonstrating comprehension***
At-home activities	20%	***Submission due Sunday 11:59pm***
Exams 1, 2, 3	40%	***In class with Respondus***

Grading-Percentage based on calculations in table above:

A = 93-100
A- = 90-93
B+ = 87-90
B = 83-87
B- = 80-83
C+ = 77-80
C = 73-77
C- = 70-73
D = 60-70
F = 0-60

Homework Quiz

Each week you must complete one quiz, made of multiple choice, multiple-answer, and ranking questions, that cover the material introduced at the beginning of the. Please, take this homework seriously, and take the quiz only after you have studied the material and without external help. Some questions in the tests are very similar to those in the homework quiz. To encourage you to study on weekly basis (which is necessary for keeping up with the class and for a deeper understanding of the subject), *no temporal extensions are allowed for the quiz submission.*

At home collaborative activities grading system

A variety of activities (which comprise lecture tutorials, mini-experiments, crosswords, visualization activities, video and audio analysis, etc.) will be performed at home to help you master the most important concepts of the course. At the end of the class period, you will submit the daily assignment, which will be generally graded according to the 3-2-1-0 High Performance System:

- Score 2: Your work meets my expectations, is essentially correct and free of most major errors. No substantial feedback is necessary, but feel free to ask if you want any explanation.
- Score 1: Your work is missing some important components or has some important errors that need to be resolved before you can progress. Please meet me or an LA as soon as possible.
- Score 0: Your work was not submitted according to the directions or no meaningful attempt is evident in your work. Please meet with me or an LA as soon as possible.
- Score 3: Your work is exemplary and goes far beyond my expectations for this particular assignment. This score is rarely assigned and you should be very proud of your efforts.
- Important Note: Strive to earn a "2" on every assignment. A consistent "2" will earn an A for this portion of the grade. More specifically, in a 25-point assignment 3 means 25, 2 means a grade between 20 and 24, 1 means a grade between 10 and 15, 0 means 0.

Exams

There are three mandatory tests: two midterms and one comprehensive final. If the grade of the final test is better than one of the midterm tests, the lowest grade will be dropped and the grade of the final will be counted twice. Exams are to be done completely individually and I expect full adherence to the honor code with no collaboration, no outside notes, etc. Your responses should come exclusively from your well-prepared and thoughtful brain.

Schedule (subject to change)

Week	Weekly Learning Goals	Learning Support Tasks	Assessments
Sept 1	*Describe our place in the Universe*	**Discussion:** personal introductions **Activity:** discussion in pairs, clarifying misconceptions. **Lab1:** solar system walk	**Activity submission** **Lab report** **Homework Quiz**
Sept 8	*Describe the main traits of science and distinguish between science from pseudoscience*	**Math skill #1:** Graph reading, interpretation **Activity + lecture tutorial** **Lab2:** astronomy vs. astrology	**Activity submission** **Lab report** **Homework Quiz**
Sept 15	*Explain & use basic physics laws science and apply them to different contexts*	***Math skill #2*:** Powers of 10 **Activity + lecture tutorial** **Lab3:** Planetary motion	**Activity submission** **Lab report** **Homework Quiz**
Sept 22	*Explain and distinguish light-matter interactions*	***Math skill #3*:** Scientific notation **Activity + lecture tutorial** **Lab4:** light & matter	**Activity submission** **Lab report** **Homework Quiz**
Sept 29	*Interpret and compare phenomena in the night sky*	**Math skill #4:** Manipulating numbers **Activity + lecture tutorial** **Lab5:** Coord systems & Moon	**Activity submission** **Lab report** **Homework Quiz**
Oct 1	**EXAM 1 on Weeks 1, 2, 3, 4**		
Oct 6	*Explain the main properties & evaluate advantages of telescopes*	**Math skill #5:** Unit conversion **Activity + lecture tutorial** **Lab6:** video analysis	**Activity submission** **Lab report** **Homework Quiz**
Oct 13	*Explain the theory of solar system formation*	**Math skill #6:** Dimensional analysis **Activity + lecture tutorial** **No class meeting**	**Activity submission** **Lab report** **Homework Quiz**
Oct 20	*Discuss terrestrial atmosphere, greenhouse effect, climate change*	**Math skill #7:** Fractions, decimals, percentages **Activity + lecture tutorial** **Lab7:** Climate change: science vs. myth	**Activity submission** **Lab report** **Homework Quiz**
Oct 27	*Examine, compare and contrast the terrestrial world*	**Activity + lecture tutorial** **Lab8:** Exploring planetary surfaces	**Activity submission** **Lab report** **Homework Quiz**

Oct 29	**EXAM 2 on Weeks 5, 6, 7, 8**		
Nov 3	*Examine, compare and contrast the Jovian planets*	**Activity** **Lab9:** Jovian worlds	**Activity submission** **Lab report** **Homework Quiz**
Nov 10	*Explain the origin and role of asteroids, comets, and dwarf planets*	**Activity** **Lab10:** Citizen science & solar system	**Activity submission** **Lab report** **Homework Quiz**
Nov 17	*Discuss and compare extrasolar planets*	**Activity + lecture tutorial** **Lab11:** Extrasolar planets	**Activity submission** **Lab report** **Homework Quiz**
Nov 24	**EXAM 3 final and comprehensive**		