Syllabus Astronomy 113 DL 1

Spring 2021

This is the distance education version of Astronomy 111 (3 credits). Lecture material, homework, discussions, at-home experiments and exams are presented entirely on-line, with strict submission deadlines.

Textbook ***Technology requirements*** ***Getting Started*** ***Grading System*** ***Schedule***

Deadlines:

New materials will be released each *Wednesday*. All assignments are due the following *Tuesday at midnight*.

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Office Hours: Tuesday 3:30 to 5:00 via phone or collaborate

Purpose:

Astronomy 113 is part of the GMU Core curriculum. 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."

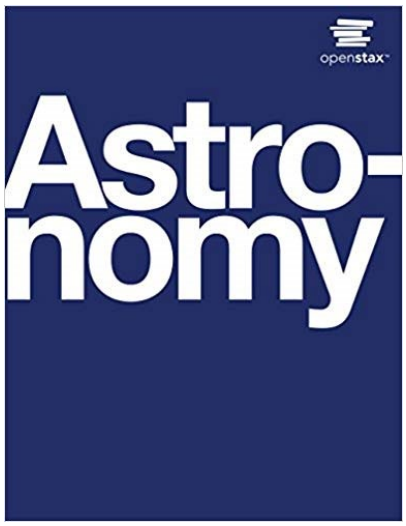
General education natural sciences courses engage students in scientific exploration; foster their curiosity; enhance their enthusiasm for science; and enable them to apply scientific knowledge and reasoning to personal, professional and public decision-making.
To achieve these goals, students will:

1. Understand how scientific inquiry is based on investigation of evidence from the natural world, and that scientific knowledge 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 113:

Astronomy 113 is a Mason Core natural science 3 credit lecture course focused on stars, galaxies and the origin of the universe. 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 universe and how it came to be based on the light that reaches us.

Text Book (Required but free!):



This free textbook is available online and can be downloaded as a Pdf or viewed online. You can access it here: *https://openstax.org/details/books/astronomy*

If you prefer you can also buy the book in print form from online sources.

Fraknoi, A., Morrison, D. and Wolff, S. (2016). Astronomy. Rice University. ISBN-10 1-938168-28-3, ISBN-13 978-1-938168-28-4.

Readings are required weekly and will be the main source of quiz questions. Videos and other materials in the Blackboard course for this section may also be tested and will help with basic understanding of the material.

Technology requirements:

You will need reliable computer access to participate in this course. You must be able to both upload and download documents and may need to install programs or upgrades to use some features of Blackboard.

A smartphone or tablet may not be sufficient for the course, be sure you also have access to a fully featured computer.

You will need to ***check emails (use the GMU account) and Blackboard regularly*** and will be required to submit materials and read what your classmates are writing several times a week. For more detailed requirements about some of the necessary technology for different applications see the information below on *Blackboard* and *Collaborate*.

Blackboard:

The course is delivered through Blackboard. Please be sure you have adequate technology to access the site and do the required work. Go to My Mason, sign in and select the Courses tab, then look for Astronomy 113 DE1.

If you need help there is a section of the courses page of My Mason called *Courses 9.1 Resources for Faculty and Students* with helpful links. Other sources of help with Blackboard:

- Contact courses@gmu.edu and include your Mason email and G#
- Walk in and Phone support at the Collaborative Learning Hub, Johnson Center 311, (703) 993-3141
- Contact the ITU Support Center at (703) 993-8870 for general help, including login or network issues

Getting started:

1. Be sure you can access the Blackboard site for Astronomy 113 and can navigate the tabs and course elements.

2. Go to the journal link on Blackboard and post an introductory message and picture for the class as instructed. Ask questions that you have on "ask an instructor" as well.

3. Look at materials for the first week materials and assignments.

4. Work on week 1 materials, reading, watching short videos and doing assignments and the quiz. Note deadlines for each of the course elements and be sure to complete work on time.

Succeeding in this course:

You will need to participate fully each week by:

1. Reading the textbook, watching the videos on Blackboard and preparing for the quiz,
2. Taking the quiz, and taking it again if necessary
3. Participating in group discussions on alternate weeks, and
4. Completing weekly journal entries
5. Turning in all work by the deadline each week

Students with disabilities:

Students with documented disabilities or special needs should contact the instructor during the first week of class so that we can accommodate your needs throughout the course. 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

Classroom conduct:

Astronomy 113 DE is designed as a collaborative learning experience. It is important that students contribute actively to class discussions. Discussions should be conducted with respect for each other and at a high level of discourse. Disruptive behavior will not be tolerated and may result in a student being temporarily barred from participating in on-line activities. Please do not share student contributions outside of this course.

Work Ethic:

Astronomy 113 involves both individual and collaborative work (discussions). You are expected to contribute actively and to respect and value opinions and work of classmates.

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 what 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 during discussions by reading and responding thoughtfully and respectfully to each other, while not claiming credit for another's work.
- 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. If in doubt about how to do this contact the instructor.

Grading System:

The table below shows types of assignments, the number of each type that will be available over the semester points for each assignment of each type. A perfect score for the class is 200 points. Note that you must take all quizzes, and all points are counted. You can build a point total by doing all the discussions and journals, or you can skip one or two. You can also build points by attending social hours or by doing an occasional extra credit assignment offered during the semester.

Type of assignment	Number of Assignments required	Points per assignment	Total Possible points per type of required assignment
Quizzes	12 out of 12	10	11 x 10 = 110
Discussions	3 out of 7	5	3 x 5 = 15
Journals	3 out of 7	5	3 x 5 = 15
Final Project or Final exam	1	60	1 x 60 = 60
Social Hours On-line	Optional	2	Up to 6 extra credit points
Total			200

The points are distributed to help you understand the material in the text and videos (quizzes and discussions), and to help you prepare the final project, a work that is creative and innovative and demonstrates your mastery of at least one of the goals of natural science (journals and projects).

Note: You can do additional quizzes discussions and journals beyond the required ones. This is a good way to make up for possible quiz points missed or a low grade on a discussion or journal, but each most be submitted by the due date to get credit.

Grading-Total points earned based on table above:

A = 188 - 200
A- = 180-187
B+ =173-179
B = 167-172
B- = 160-166

C+ = 153-159
C = 147-152
C- = 140-146
D = 127-139
F = below 127

Discussions

Discussions give you an opportunity to think about issues in astronomy and to try out your ideas by discussing them with peers. They may be thought or quantitative problems. You should submit twice for each graded discussion, the first time with your own response to the question and the second post in response to a classmate's post. You will not see any discussion posts until you post for the first time. *Your first response to a discussion post is due between Wednesday and Saturday. Additional posts are due on Tuesday at midnight. Topics will be announced as we go. Posts will not be scored until the response to a classmate is posted.*

Journals

Journals are generally available for your classmates to read unless marked otherwise. They are short, 100 – 250 word reflections on a topic. They should be well-worded and contain

correct astronomy and some evidence of thinking and learning. *Many of these will be opportunities to suggest and work on your final project.*

Quizzes

Quizzes are based on the readings, and the short videos. Quizzes are released on Wednesday and *must be completed by Tuesday night of the following week*. You should 1) read the material, 2) watch the videos and other materials on Blackboard, then 3) take the quiz as if it were a test with no external material allowed. You may retake the quiz once, and the last attempt is the one that will score. 4) follow up after the quiz with pursuing answers to questions that puzzled you as you took it in order to understand the material.

On-line Social Hours

Although we don't meet regularly on-line, I know many of you will miss getting to know other students this semester. The on-line social hours will give you a chance to get to know other students in an informal atmosphere.. There is a little extra credit for coming, but the real benefit will be getting to know each other a bit. Settle in with a cup of coffee and your favorite snack for what I hope will be a stress reducing time.

Project or Final Exam

I like to leave this fairly open so that you can use what you enjoy or do well to both understand the science better and help us all understand better as well. Below are some suggestions to get started, but if you have an idea, something you think would fit well with the goals let's talk!

I have about 70 of you in class so I need to have different times for you to submit so I don't get 70 videos to watch on the last day of class. There are different due dates for different possibilities…confusing I know. It may help you to do the project at a time that works best for you…so choose wisely!

Possible topics

1. Identify an astronomer who contributed to one of the topics in the course who comes from a cultural heritage or background similar to yours. Due in the 8th week of the semester.

2. Research one of the unsolved mysteries in astronomy to discuss what we do know, why it is still unsolved, and what might help us understand it. Due in the 12th week of the semester.

3. Choose one of the topics in the course of personal interest to you that we didn't cover in detail and do more in-depth research. Due in the 12th week of the semester.

4. Final exam. Comprehensive exam. Offered during final exam week.

Methods of presenting include :

1. podcast
2. video
3. teaching segment (lecture or activity)
4. creative work, short play or story based on the science

Guidelines:

1. science portrayed must be a significant part of the work

2. project displays accurate understanding
3. projects should have an educational component (the audience should leave awith a deeper understanding of the astronomy involved

Schedule (subject to change)

Materials released on Wednesdays	Open Stax reading	Assignments due on the following Tuesday	Weekly objectives
Jan 25	**Science and the Universe Ch. 1 and Ch.2 section 2.3**	***Journal 1***: *personal introduction*	• **Learn the general structure of the universe** • **Consider the difference between astronomy and astrology**
Jan 27	**First social hour, 7:30 PM to discuss the course and get to know each other. NOT required, but recommended -these were enjoyable in fall!**		
Feb 1	**Laws of physics Ch.3 sections 3.1, 3.2 ad 3.3**	***Discussion 1***	• **Understand key physics principles.** • **Apply reasoning to questions of magnitude and direction of the force of gravity.**
Feb 8	**Radiation and matter Ch. 5 and Ch. 6**	***Journal 2***	• **Understand the nature of light and matter** • **Relate frequency, wavelength and speed of light** • **Connect different parts of the E.M. spectrum to instruments that collect this data.**
Feb 15	**The Sun Chapter 16 sections 16.3 and 16.4 Chapter 15**	***Discussion 2***	• **Understand how the Sun interacts with Earth.** • **Relate atomic structure to emission and absorption spectra.** • **Know forces that make the Sun stable and how energy is created in its interior.**
Feb 22	**Starlight Chapter 17 Chapter 19 Sections 19.1 and 19.2**	***Journal 3***	• **Understand classification of stars.** • **Apply blackbody curves to star properties** • **Understand and use logarithms to calculate stellar distances**
Mar 1	**Star census Ch. 18 Ch. 22.2, 22.3**	***Discussion 3***	• **Understand how stars form** • **Interpret the meaning of positions on an HR diagram** • **Understand relationships between spectral type and temperature.**
Mar 8	**Star birth and evolution Ch. 21.1 and 21.2**	***Journal 4***	• **Relate evolution of stars to their mass** • **Develop a working knowledge about star formation and stellar properties**

Materials released on Wednesdays	Open Stax reading	Assignments due on the following Tuesday	Weekly objectives
	Ch. 22.1, 22.4 and 22.5		
Mar 15	Death of stars Ch 23.1, 23.2, 23.4 Ch. 24.1, 24.5.24.6	*Discussion 4*	• Relate end stages of stellar formation to stellar properties • Interpret the motion of eclipsing binary stars using light curves.
March 15 - March 22	Project due if your choice is to do a biography of a figure in astronomy not covered in the textbook.		
Mar 22	The galaxy and interstellar medium Ch. 25 Ch. 20.1, 20.2, 20.3 Ch. 19.3	*Journal 5*	• Understand recycling in our Galaxy. • Develop sense of the structure and scale and surroundings of the Milky Way
Mar 29	Galaxies Ch. 26	*Discussion 5*	• Understand galaxy classification, distances and Hubble law. • Restructure concept of time realizing that images of distant objects show how these objects appeared in the past
Apr 5	Galaxy evolution and active galactic nuclei Ch. 28 Ch. 27.2	*Journal 6*	• Differentiate evolution of galaxies, active galaxies & quasars. • Reason about the expanding universe • Understand the strength and limitations of the balloon analogy.
Apr 12	Cosmology Ch. 29	*Discussion 6*	• Describe the basics of the Big Bang Theory • Outline supporting observational evidence
April 12 -19	Project due if your choice is to do a mystery of astronomy or a topic of personal interest to you that we didn't cover in detail. Either involves in-depth research beyond textbook coverage of the topic.		
Apr 19	Life in the Universe Ch. 30	*Journal 7*	• Describe basic techniques for searching for life beyond Earth.
Apr 26		*Discussion 7 reflection on classmate's projects*	

Materials released on Wednesdays	Open Stax reading	Assignments due on the following Tuesday	Weekly objectives
Final Exam on-respondus Lock-down browser if you choose this rather than a project. Required to use your microphone and video during the comprehensive exam. May 5 – 6 (90 minute exam- no notes or other resources allowed)			