Syllabus Astronomy 113 DL 1

Spring 2020

This is the distance education version of Astronomy 113 (3 credits). Lecture material, homework, discussions, at-home experiments and exams are presented entirely on-line, with strict submission deadlines.

Deadlines:

New materials will be released each *Wednesday*. All assignments are due on *Tuesdays at midnight*.

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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."

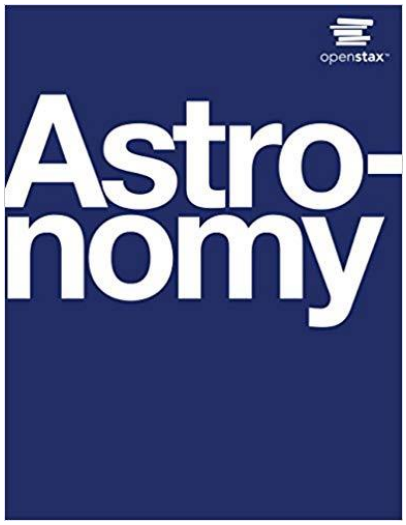
General education natural sciences courses engage students in scientific exploration; foster their curiosity; enhance their enthusiasm for science; and enable them to apply scientific knowledge and reasoning to personal, professional and public decision-making.
To achieve these goals, students will:

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):



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 and test 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.

While the College of Science testing center is available to use for the tests, you may also use Respondus Lockdown Browser to take the tests but should check to make sure it is functional on your computer before the first test.

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. Before the first week of the semester 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. Visit the Week 1 page on Blackboard 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.

Policies:

Distance education courses require more organization and input by students than do traditional large lecture format courses. 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 (the two scores are averaged)
3. Participating in group discussions on alternate weeks, and
4. Completing weekly journal entries

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 participate in all activities in the online environment and that they 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 1000 points. Note that there are more that 1000 total points available. This builds extra credit into the class. I will simply total points at the end, then assign a letter grade based on total points you earned. If your strength is in multiple choice type tests, then you may do very well on these and could skip a short assignment or two on busy weeks. But if tests are problematic for you, be sure to complete all the other assignments to build points that will make up for potential low scores.

Multiple choice tests, and quizzes are graded by of points earned per question. The discussions, and journal submissions, are graded on a 0,1,2,3 scheme as shown in the table below.

Score	**Meaning**	**Points earned**	**Recourse**
0	Not submitted, submitted late, or no indication of significant learning	0	Submit again for half the original value
1	Major problems but indications that effort and time were spent on the assignment	0-10	Submit again within one week for full credit if adequately upgraded
2	Mostly correct, some minor errors possible but indication of significant learning	11-20	Read any comments or notes and keep In mind for future assignments
3	Outstanding work, Congratulate yourself, A rare grade and indicates Exceptional understanding	21 -25	Keep up the good work!

Type of assignment	**Number of assignments**	**Points per assignment**	**Total Possible points per type of assignment**
Quizzes	12	30	12x30=360
Discussions	7	20	7x20=140
Journals	7	20	7x20=140
Exams	4	100	4x100 = 400
Final (optional)		(100)	Replaces one of the original 4 exams
Total			1040 points

Grading-Total points earned based on table above:

A = 930-1000
A- = 900-929
B+ = 870-899
B = 830-869
B- = 800-829
C+ = 770-799
C = 730-769
C- = 700-729
D = 600-700
F = 0-599

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.*

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.

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, but the score will average both attempts, so do your best the first time. 4) follow up after the quiz with pursuing answers to questions that puzzled you as you took it in order to understand the material for the exams.

Exams

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. The three exams will be given in the testing center in the basement of Planetary Hall (http://ttc.gmu.edu), or can be taken at home using the Respondus Lock-down browser, a web cam and a microphone.

If you use the lock-down browser, you must keep your face in view the entire time, and keep external noise to a minimum. Covering the camera, having excessive noise, other people in the room, or external sources of any kind will trigger an honor code referral and the requirement that you take future tests in the testing center or a proctored center arranged with me well in advance of the test date.

A is only for students who failed an earlier test and will require deep preparation. The score on the final would replace the lowest scoring early exam. You will have a specific *window* of time for each exam. I will give two extra credit points for taking the test during the first two days it is open.

Assignment Schedule

(subject to change – test dates depend on the availability of the testing center)

Week of	Reading assignment from Astronomy from OpenStax	Discussions	Weekly objectives
Jan 21	**Science and the Universe** **Ch. 1 and Ch.2 section 2.3**	***Journal 1*:** *personal introduction*	Learn the general structure of the universe, and consider the difference between astronomy and astrology
Jan 28	**Laws of physics** **Ch.3 sections 3.1, 3.2 ad 3.3**	***Discussion 1***	Understand astronomy through key physics principles. Be able to reason about magnitude and direction of the force of gravity.
Feb 4	**Radiation and matter** **Ch. 5 and Ch. 6**	***Journal 2***	Understand the nature of light and matter and their interactions, the relationship between frequency, wavelength and speed of light, and the different parts of the E.M. spectrum and the instruments that collect this data.
Feb 11	**The Sun** **Chapter 16 sections 16.3 and 16.4** **Chapter 15**	***Discussion 2***	Understand the properties of the Sun and its interaction with Earth. Be able to reason about atoms and electrons and how they relate to emission and absorption lines. Understand the forces that make the Sun stable and how energy is created in its interior.
Feb. 13-15	**Exam 1 over Science and the Universe, Laws of Physics, and Radiation and Matter**		
Feb 18	**Starlight** **Chapter 17** **Chapter 19 Sections 19.1 and 19.2**	***Journal 3***	Understand the general properties and classification of stars. Describe star appearance and temperature, and infer their size based on blackbody curves. Know the process of determining distance and be able to use logarithms.
Feb 25	**Star census** **Ch. 18** **Ch. 22.2, 22.3**	***Discussion 3***	Understand the birth of stars and the interstellar medium. Interpret the meaning of stars' positions on the HR diagram and understand relationships between spectral type and temperature.
Feb. 27 -29	**Exam 2 – Light and matter, The Sun, and Starlight**		
Mar 3	**Star birth and evolution** **Ch. 21.1 and 21.2** **Ch. 22.1, 22.4 and 22.5**	***Journal 4***	Understand the evolution of stars. Develop a working knowledge about star formation and the role played by mass in the star's lifetime.

Mar 9 – 15	**SPRING BREAK**		
Mar 17	**Death of stars** **Ch 23.1, 23.2, 23.4** **Ch. 24.1, 24.5.24.6**	***Discussion 4***	Understand the final stages of star evolution: compact objects. Be able to interpret the motion of eclipsing binary stars using light curves.
Mar 24	**The galaxy and interstellar medium** **Ch. 25** **Ch. 20.1, 20.2, 20.3** **Ch. 19.3**	*Journal 5*	Understand the components, motions, and recycling in our Galaxy. Develop a better sense of the structure and scale of the Milky Way, and of its place in the Local Group.
Mar 26 – Mar 28	**EXAM 3 – star census, star birth and evolution and death of stars**		
Mar 31	**Galaxies** **Ch. 26**	***Discussion 5***	Understand galaxy classification, distances and Hubble law. Understand that the images of distant objects show how these objects appeared in the past, and that light years are units of distance.
Apr 7	**Galaxy evolution and active galactic nuclei** **Ch. 28** **Ch. 27.2**	***Journal 6***	Understand the evolution of galaxies, active galaxies & quasars. Be able to reason about the expanding universe and understand strength and limitations of the balloon analogy.
Apr 14	**Cosmology** **Ch. 29**	***Discussion 6***	Understand the basics of the Big Bang Theory and its observational evidence.
Apr 23 - 25	**EXAM 4 – The Galaxy and interstellar medium, Galaxies, Galaxy evolution**		
Apr 21	**Life in the Universe** **Ch. 30**	***Journal 7***	The search for life beyond Earth. Be able to reason about how the light received from galaxies provides information about their stars.
Apr 28	***Wrapping it up***	***Discussionn 7***	
May 6 - 8	**FINAL EXAM – will replace lowest test score**		