Syllabus Astronomy 115

Spring 2021

This four - credit natural science course satisfies 3 credits of lecture and one credit of laboratory for the Mason Core requirement. It is a hybrid, active learning course with four in-person hours and two hours of on-line learning materials.

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Course Purpose and goals:

Astronomy 115 is part of the core (general education) program at GMU. 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 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 115:

Astronomy 115 is a Mason Core natural science course that explores the edges of current understanding of exoplanets, planets orbiting other stars. As you come to understand how astronomers develop and test ideas you will develop a deeper understanding of the scientific

process and will develop your 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 exoplanets and how solar systems seem to form and develop based on study of our own solar system and comparison of ours to systems of planets orbiting nearby stars.

Deadlines:

On-line mini-lectures and videos in addition to readings are required to prepare for the week's work. New on-line lecture materials will be available each Tuesday and a quiz over these materials is due the following Monday at midnight. The assumption is that by viewing the videos and on-line materials, reading and taking quizzes, you will learn what you will need to do well in the class activities for that week.

Text Books (Required):

Fraknoi, A, Morrison, D. and Wolff, S.C. (2016) **Astronomy**, OpenStax, Rice University. Availablefor free online at (https://openstax.org/details/books/astronomy)

Tasker, E. (2017). **The Planet Factory: Exoplanets and the search for a second earth**. Bloomsbury Signa.

Trefil, J. & Summers, M. (2019) **Imagined Life: A speculative scientific journey among the exoplanets in search of intelligent aliens, ice creatures, and supergravity animals**. Smithsonian Books.

The first text, **Astronomy**, is free, available in a variety of formats from OpenStax at the address above. We will use it for background astronomy readings.

The **Tasker** book is a mass market paperback, that should be available from the bookstore and is the main focus for the exoplanet information. Much of the quiz material will come from this book.

The **Imagined Life** book by two Mason Physics and Astronomy scientists is more speculative. Dr. Summers is an expert on planetary atmospheres and was one of the investigators with instruments onboard the New Horizons mission to Pluto and beyond. This book should help you imagine possible worlds within the constraints of the physics and chemistry we know.

Technology requirements:

You will need reliable computer access to participate in this course. You must be able to both upload and download documents and watch videos as well as download some select programs to your device.

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 only) and Blackboard regularly*** and will be required to submit quizzes before the due date and time each week. At times we may do on-line discussion postings as well, these will be assigned during in-person class time.

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 the Astronomy 115. If you need help consult links on the main page as you enter Blackboard. Other sources of help:

- Contact courses@gmu.edu and include your Mason email and G#
- 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 115 and can navigate the tabs and course elements for the first week.

2. Go to the Blackboard "Journals" and post a message and picture for the class as instructed.

3. Visit the Week 1 page to work on course materials, readings, short videos, the first graded journal assignment and the quiz. Note deadlines for each of the elements and complete work on time.

Policies:

Active learning 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 materials and watching the on-line lectures and other materials
2. Completing the quiz based on the week's materials by Monday night of the following week.
3. Completing the journal by Monday night following week.
4. Coming to class with questions about the material you have read and watched.
5. Contributing to class and small group discussions.
6. Carrying out laboratory experiments in small groups.

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 115 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 groups and 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 activities and incurring a grade penalty. Please do not share student contributions outside of this course.

Work Ethic:

Astronomy 115 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.

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. I 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 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.

Important dates for Spring 2021

First day of classes	Mon. Jan 25
Last Day to Add	Feb 1
Last Day to Drop without tuition penalty	Feb 12
Last Day to Drop (Last Day for 50% Refund)	Feb 16
Selective Withdrawal Period	Mar 2-Apr 1
Last day of classes	Apr 30
Final exams	May 3 - 10
Commencement	May 14

Grading System:

Your grade will be based on both lecture and lab work.

Activity	Percent of course grade
Weekly blackboard quizzes	15% of grade
Lab reports (group grades)	30% of grade
Journals	10% of grade
Project	25% of grade
Portfolio	10% of grade
Participation	10% of grade
Total	***100%***

Grading-Percentage based on calculations in table above:

A = 93-100
A- = 90-92.9
B+ = 87-89.9
B = 83-86.9
B- = 80-82.9
C+ = 77-79.9

C = 73-76.9
C- = 70-72.9
D = 60-69.9
F = 0-59.9

Quizzes

Quizzes help you know whether you are grasping the material or not, and where to focus your effort to understand. You may take the quiz twice. Quizzes are to be your individual work. They will usually be provided through Blackboard.

Lab reports

The heart of a laboratory science course is the laboratory experience. Astronomy is somewhat different from many of the sciences in that it is more historical than experimental. Astronomers base their hypotheses and theories on data and on experimental results from fields such as physics and chemistry but cannot recreate such things as planet formation in the laboratory. Computer simulations, spectral analysis, and studying astronomical objects in multiple wavelengths are just some of the techniques that help us understand the universe.

We will have lab activities during in person sessions on-line. Occasionally they will involve some out of class preparation. Labs will generally be done in groups of three and will receive a group grade. Each group member is responsible for all parts of the lab, though each will have a different role, leader, recorder, or checker, with additional responsibilities. Lab reports are due at the end of the Thursday synchronous session.

Participation

Attendance is key to learning in this class and is at the heart of the design of this course. In an active learning classroom, you learn from what you DO as well as what you read and hear. You learn from your individual effort, from interacting with your classmates and from your instructor. You need to contribute to the class and your group, ask thoughtful questions, and actively participate in group and individual activities. Participation is graded on the following scale:

100% - exceptional engagement and thoughtful work throughout the course
83% - satisfactory participation, some thoughtful contributions to class
70% - partial participation, some time spent off-task or disengaged
60% - significant lack of participation or engagement, frequent absence
0% - Lack of attendance, disruption of learning environment, persistent disengagement

Journals

Most weeks there will be a journal prompt designed to help you reflect on and understand the course material. You will share some of these with your classmates and will be expected to submit your 3 favorite entries as part of your end-of-semester portfolio.

Project

There will be one major project this semester, a group project exploring the nature of a particular exoplanet through a creative or informative presentation. Details about these projects will be posted on Blackboard.

Portfolio

The portfolio is a collection of work that demonstrates your learning in this class. Keep track of your work, including lab reports, small in-class assignments and your project. You will select examples based on a rubric that will be supplied on Blackboard. The portfolio should reflect mastery based on the learning goals for Mason's core natural science classes, as well as a deepening understanding of exoplanets and our current understanding of how planetary systems come to be.