ASTR 103 - Astronomy

Section 001, Spring 2023

TR, 12:00pm-1:15pm
Enterprise Hall, Room 80

Instructor Information

Instructor: Dr. Jason P. Lee, Ph.D.
Office: Planetary Hall, Room 327
Office hours: Discord/Zoom: M-R anytime 9am-5pm. By appointment only for in-person meeting.
Email: je@gmu.edu
Course Site: Blackboard - *CHECK FOR IMPORTANT ANNOUNCEMENTS*

General Information

Course Goals

This course is part of the core curriculum for natural science and covers astronomy from the Solar System through stars, galaxies, and the birth, evolution, and fate of the Universe. As a survey course it will hit the high points to give you a good background for understanding what the science of astronomy entails, what is known and what is still unknown, along with a taste of current happenings in a variety of fields studied by astronomers.

Because it is a core course in natural science it is also important that you understand astronomy as an example of how scientists do their work and what distinguishes scientific study from other ways of looking at the work. Below are the goals of core natural science classes at George Mason University. Because there is no lab requirement for this 3-credit lecture course, Astronomy 103 is designed to meet the first four requirements. The fifth requirement, which has to do with getting a chance to practice scientific inquiry, happens in the laboratory course (i.e. ASTR 112 or ASTR 114).

Course Description and General Education Course Statement

The Learning Outcomes of Astronomy 103: "Astronomy" are:

1. Understand how scientific inquiry is based on investigation of evidence from the natural world, and that scientific knowledge and understanding:
    - evolves based on new evidence
    - 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 changes (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, and d) interpreting results.

Astronomy 103 is a Mason Core Course in Natural Sciences Overview. **Note:** ASTR 103 with ASTR 112 or ASTR 114 can be used to fulfill a 4-credit lab science requirement. Not for physics majors.

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 Diversity Statement

An emphasis upon diversity and inclusion throughout the campus community is essential to achieve these goals. Diversity is broadly defined to include such characteristics as, but not limited to, race, ethnicity, gender, religion, age, disability, and sexual orientation. Diversity also entails different viewpoints, philosophies, and perspectives. Attention to these aspects of diversity will help promote a culture of inclusion and belonging, and an environment where diverse opinions, backgrounds, and practices can be voiced, heard, and respected.

The reflection of Mason's commitment to diversity and inclusion goes beyond policies and procedures to focus on behavior at the individual group and organizational level. The implementation of this commitment to diversity and inclusion is found in all settings, including individual work units and groups, student organizations and groups, and classroom settings; it is also found with the delivery of services and activities, including, but not limited to, curriculum, teaching, events, advising, research, service, and community outreach.

Course Information

Credit Hours: 3

Readings: Readings for the course are from the primary class text Fraknoi, Morrison, & Wolff, "Astronomy", 2nd ed., OpenStax, 2022, which can be downloaded or viewed online for free here. Any supplemental material will be provided by me on the main Blackboard course site. The schedule for specific chapters is given in Table 1[1]. It is recommended that you read the material BEFORE the lecture in which the material is discussed so you can ask questions on material you don't understand.

Lectures: The lectures are designed to supplement the course text, to explain difficult concepts, and to stimulate interest/discussion. They will follow the book **but material not in the book may be covered during the lectures. Likewise, material not in lectures, but in the book, may appear on exams**. You will be responsible for material in the lectures **and** text. Copies of my notes *may* be distributed periodically to allow you to prepare for exams, listen, and participate in class.

Exams and Grading: Two (2) midterm and one (1) final exams will be given. All exams consist of multiple-choice questions based on material covered in lectures and readings (and any other Blackboard ANNOUNCEMENTS material I make available to you). ASTR 103 is not an analytical course, therefore your grade is based mostly on general knowledge. Here are some important notes:

- Each midterm will constitute 30% of your grade; nothing is dropped. NO MAKEUP TESTS will be given (except for University approved reasons such as documented illness and/or sporting events for those on GMU teams).

[1]This schedule can change at anytime during the semester. I will notify you on Blackboard of any updates.

Table 1: **Tentative Class Schedule**

Week	Date	Lecture	Reading
		Part I: Introduction to Astronomy	
1	T, 1/24	Class Introduction	—
2	R, 1/26 T, 1/31	Astronomy: An Overview	Ch.1 Ch.4
	R, 2/2	History of Astronomy	Ch.2-3
3	T, 2/7 R, 2/9	Observational Astronomy	Ch.5-6
4	T, 2/14 R, 2/16	Planetary Science: A General Overview	Ch.7, Ch.8-14 (brief)
5	T, 2/21	Exam 1 Review	Ch.1-7, Ch.8-14 (brief)
	R, 2/23	**Exam 1**	
		Part II: The Sun & Other Stars	
6	T, 2/28 R, 3/2	The Sun, Our Extraordinary Ordinary Star	Ch.15-16
7	T, 3/7 R, 3/9	Characterizations of Stars	Ch.17-20
8		**SPRING BREAK - NO LECTURE**	
9	T, 3/21 R, 3/23	The Life and Death of Stars	Ch.21-23
10	T, 3/28	Exam 2 Review	Ch.15-23
	R, 3/30	**Exam 2**	
		Part III: Galaxies & General Relativity	
11	T, 4/4	The Milky Way: Our Home	Ch.25
	R, 4/6	Galaxies: A Survey	Ch.26
12	T, 4/11 R, 4/13	Black Holes: Matters of Gravity	Ch.24
		Part IV: Extragalactic Astronomy	
13	T, 4/18 R, 4/20	Quasars and Active Galaxies	Ch.27-28
14	T, 4/25 R, 4/27	Cosmology	Ch.29
15	T, 5/2	Astrobiology	Ch.30
	R, 5/4	Final Exam Review	Ch.1-7, Ch.8-14 (brief), Ch.15-30
16	**R, 5/11**	**Final Exam, 10:30am-1:15pm**	

Letter Grade	Numerical Scale	Letter Grade	Numerical Scale
A+	96 – 100%	C+	72 – 75.99%
A	92 – 95.99%	C	68 – 71.99%
A-	88 – 91.99%	C-	64 - 67.99%
B+	84 – 87.99%	D	60 – 63.99%
B	80 – 83.99%	F	BELOW 60%
B-	76 – 79.99%		

Figure 1: Tentative Grading Scale

- A comprehensive final exam covering all the material from the course will count for 40% of your grade and is on **Thursday, May 11th at 10:30am-1:15pm**. If you have a university sanctioned reason for needing to reschedule this exam, please let the instructor know as soon as possible.
- The tentative grading scale can be seen in Figure 1
- There will be a review period (during class) prior to all exams devoted to review and questions you may have.
- Calculator will not be necessary nor needed for all exams. No electronic devices are permitted during exams.
- Research has shown that learning is facilitated by doing, and that students test better and have reduced anxiety with the aid of "cheat-sheets". In this course, students are permitted to use ONE Blue Book for an exam as a cheat-sheet. These can be bought at the GMU bookstore for $0.60 or here. During an exam you are ONLY allowed a pen/pencil, your GMU ID and ONE Blue Book. **NOTE: you will submit this Blue Book with your exam every time.**
- **NOTE:** I may offer an extra credit assignment worth an additional 10%; details to follow in Blackboard.

Office Hours: I am normally flexible when it comes to being on campus for office hours in-person (as I rarely am these days), but I am readily available and can be contacted on Discord/Zoom (or email if you prefer). The Discord link will be provided on Blackboard; the Zoom link is available when necessary. If you'd like to schedule an appointment to discuss matters in-person, just let me know via email or Discord and we can make arrangements.

Course Policies and Services

Electronic Devices (such as laptops, cell phones, etc.)

Please be respectful of your peers and your instructor and do not engage in activities that are unrelated to class. Such disruptions show a lack of professionalism.

Course Materials and Student Privacy

- All course materials posted to Blackboard or other course site are private to this class; by federal law, any materials that identify specific students (via their name, voice, or image) must not be shared with anyone not enrolled in this class.
- Video recordings – whether made by instructors or students – of class meetings that include audio, visual, or textual information from other students are private and must not be shared outside the class.

Disability Services

George Mason University is committed to providing equitable access to learning opportunities for all students by upholding the laws that ensure equal treatment of people with disabilities. If you are seeking accommodations for this class, please first visit http://ds.gmu.edu/ for detailed information about the Disability Services registration process. Then please discuss your approved accommodations with the professor. Disability Services is located in Student Union Building (SUB I), Suite 2500. Email: ods@gmu.edu | Phone: (703) 993-2474

Interpersonal Violence

As a faculty member and designated "Responsible Employee", I am required to report all disclosures of sexual assault, interpersonal violence, and stalking to Mason's Title IX Coordinator per university policy 1412. If you wish to speak with someone confidentially, please contact the *Student Support and Advocacy Center* (730-380-1434) or *Counseling and Psychological Services* (703-993-2380). You may also seek assistance from Mason's *Title IX Coordinator* (703-993-8730 | titleix@gmu.edu)

Email and Communication

- Students must use their MasonLive/GMU email account to receive important University information, including communications related to this class. I will not respond to messages from or send messages to a non-Mason email address.
- It is your responsibility to stay current with all information either communicated through email or posted to the Blackboard page. Please check you GMU email and the course pages regularly.
- Email sent to the instructor is normally checked during business hours and a response sent out within one business day. If you do not receive a reply within that timeframe, please follow-up with a reminder email. Instantaneous responses, responses to emails past 10 PM, or during the weekends should not be expected.
- **All emails need to include your name and the course in which you are enrolled**. Additionally, the email needs to include a greeting and be written in a professional manner. Emails that do not conform to these requirements may be ignored at the instructor's discretion.

Additional Services and Support

George Mason has a wide variety of support services for students. Please visit the following website for information about on-campus resources: click here.

Attendance and Absences

- From GMU Policy Statement 22: "Class attendance is the responsibility of the student. The student is expected to attend all classes. A student who finds it necessary to miss class assumes responsibility for making up examinations, obtaining lecture notes, and otherwise compensating for what may have been missed. The course instructor will determine the validity of a student's reason(s) for absences and will assist those students who have valid reasons." permitted.

Limit on Course Repeats

There is a limit of three graded attempts for this course. A "W" does not count as a graded attempt. Please see AP. 1.3.4 in the University Catalog and consult with your academic adviser if you have any questions.

GMU Code of Student Conduct

Students are expected to follow the George Mason University rules of student honor. As noted in the catalog: "George Mason University shares in the tradition of an honor system that has existed in Virginia since 1842. The Honor Code is an integral part of university life. On the application for admission, students sign a statement agreeing to conform to and uphold the Honor Code. Therefore, students are responsible for understanding the provisions of the code. In the spirit of the code, a student's word is a declaration of good faith acceptable as truth in all academic matters. Therefore, cheating and attempted cheating, plagiarism, lying, and stealing of academic work and related materials constitute Honor Code violations. To maintain an academic community according to these standards, students and faculty must report all alleged violations of the Honor Code to the Honor Committee. Any student who has knowledge of, but does not report, an Honor Code violation may be accused of lying under the Honor Code." (Source)

Unauthorized/Excessive Assistance

The student may not give or get any unauthorized or excessive assistance in the preparation of any work.

Declaration

Online submission of, or placing one's name on an exam, assignment, or any course document is a statement of academic honor that the student has not received or given inappropriate assistance in completing it and that the student has complied with the Academic Honesty Policy in that work.

Consequences

An instructor may impose a sanction on the student that varies depending upon the instructor's evaluation of the nature and gravity of the offense. Possible sanctions include but are not limited to, the following: (1) Require the student to redo the assignment; (2) Require the student to complete another assignment; (3) Assign a grade of zero to the assignment; (4) Assign a final grade of "F" for the course. A student may appeal these decisions according to the Academic Grievance Procedure (See the relevant section in the GMU Code of Student Conduct.). Multiple violations of this policy will result in a referral to the Conduct Review Board for possible additional sanctions.

Academic Dates and Deadlines

Students must be aware of important dates during the semester. These dates are available here.

Smoking and Tobacco Products

- George Mason University is committed to providing a safe, healthful, and pleasant learning and working environment for Mason students, faculty, and staff. The purpose of this policy is to address the use of all tobacco products and electronic cigarettes, as well as ensure compliance with the Virginia Indoor Clean Air Act and Virginia Executive Order 41. Virginia Executive Order 41 states that smoking is not permitted within buildings, facilities, enclosed structures, or vehicles owned, leased or rented by the University.

    1. Executive Order 41 applies to parking garages, covered walkways, temporary enclosed structures, trailers, and tents, as well as structures placed on state- owned property by contractors or vendors.
    2. Smoking is not permitted outdoors within 25' of any building or facility entrance/exit (including parking garages, loading docks, etc.), outdoor air intake, operable window, or covered walkway. Smokers are requested to use ash urns to dispose of their smoking material waste and should not litter on state-owned property with smoking material waste.

3. Smoking locations should not impede traffic flow in or out of buildings and should be in a location where smoke cannot drift into office, class or living spaces.
4. Faculty, staff, student and visitor smokers are required to comply with Office of Housing and Residence Life policies and guidelines as they relate to smoking.

- The use of electronic cigarettes (e-cigs) also known as vaping will follow the same guidelines as the use of all tobacco products.

The Mason Core

This is a Mason Core course. As such, it is designed to complement work in a student's chosen area of study. It will serve as a means of discovery for students, providing a foundation for learning, connecting to potential new areas of interest and building tools for success in whatever field a student pursues. Learning outcomes are guided by the qualities every student should develop as they move toward graduating with a George Mason degree. Through a combination of courses, the Mason Core program helps students to become:

- **Critical and Creative Scholars** - Students who have a love of and capacity for learning. Their understanding of fundamental principles in a variety of disciplines, and their mastery of quantitative and communication tools, enables them to think creatively and productively. They are inquisitive, open-minded, capable, informed, and able to integrate diverse bodies of knowledge and perspectives.

- **Self-Reflective Learners** - Students who develop the capacity to think well. They can identify and articulate individual beliefs, strengths and weaknesses, critically reflect on these beliefs and integrate this understanding into their daily living.

- **Ethical, Inquiry-Based Citizens** - Students who are tolerant and understanding. They can conceptualize and communicate about problems of local, national and global significance, using research and evaluative perspectives to contribute to the common good.

- **Thinkers and Problem-Solvers -** Students who are able to discover and understand natural, physical, and social phenomena; who can articulate their application to real world challenges; and who approach problem solving from various vantage points. They can demonstrate capability for inquiry, reason, and imagination and see connections in historical, literary and artistic fields.

- **Natural Science** - The Mason Core natural sciences courses engage student 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.