Syllabus - Spring 2022

Astronomy 113

Section DL1, Asynchronous

Instructor: Dr. Joseph Pesce, Ph.D., *FRAS*
Office: 203 Planetary Hall
Phone: 703.993.1280
Office hours: By appointment only
Email: jpesce(at)gmu(dot)edu
Website: http://physics.gmu.edu/~pesce/astro113-spring22 - **CHECK FOR IMPORTANT ANNOUNCEMENTS**

Overview: The course introduces our current understanding of the universe. Focusing on stars and galaxies, it is designed to be thought provoking: What are stars and how do they form? How did the universe form and how will it end? What are the most distant objects in the universe and how do we know their distances and properties? These are a few of the questions addressed. In addition, since Astronomy is one of the few sciences for which we cannot *directly* access the subject of our studies, we will attempt to get an idea of how Astronomers understand the universe through indirect means. We will see that Astronomy is far from an arcane subject and is constantly changing as new observations allow us to understand the universe better, a universe of which we are an integral part.

Outline: The course is divided into three sections: I) The Sun and Other Stars; II) The Milky Way and other Galaxies; III) Quasars, Active Galaxies, and Cosmology.

More detailed information is provided below.

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** and **material not in lectures, may be in the book**; you will be responsible for material in the lectures **and** text.

Copies of my notes *are available on the website (slides and recordings)*:

http://physics.gmu.edu/~pesce/astro113-spring22

Readings: Readings for the course are from the primary class text, *Cosmic Perspective: Stars, Galaxies, & Cosmology* by Bennett, Donahue, Schneider, Voit. The schedule for specific chapters is given below. 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. Problems at the end of the chapters are not required but they will help you understand the material.

Structure of Class:

- **Lectures**: Are all on the course website: http://physics.gmu.edu/~pesce/astro113-spring22
- **Journal**: You will create a journal or log of your journey through the material. After viewing the lectures and reading the relevant chapters, write your reflections of the material, what you enjoyed, questions you have, items that aren't clear, etc. **The Journal is due to me, electronically (send to my email), on 15 April 2022 at 5pm ET.**
- **Participation**: There will be two "interaction" sessions for you to interact with me and ask to questions & discuss the material we have covered (this is where you journal comes handy). These will be on **23 Feb and 13 Apr at 8pm ET** on the course Blackboard site.
- **Paper**: A 2–3-page essay (double spaced) on an astronomical topic we covered is due on **15 April 2022 at 5pm ET**. Send to me in email. **The journal and paper can be in any format you prefer**.

Grading:

- Journal: **40%**
- Paper: **40%**
- Participation: **20%**

Policy notes:

- ***Webcams***: When we are in live, interactive sessions, please turn on your webcam at all times.
- ***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.
- ***Academic Integrity***: GMU is an Honor Code university; please see the Office for Academic Integrity for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously, and violations are treated gravely. What does academic integrity mean in this course? Essentially this: when you are responsible for a task, you will perform that task. When you rely on someone else's work in an aspect of the performance of that task, you will give full credit in the proper, accepted form. Another aspect of academic integrity is the free play of ideas. Vigorous discussion and debate are encouraged in this course, with the firm expectation that all aspects of the class will be conducted with civility and respect for differing ideas, perspectives, and traditions. When in doubt (of any kind) please ask for guidance and clarification.
- ***Disability Accommodations*****:** If you are a student with a disability and you need academic accommodations, please see me and contact the Office of Disability Services (ODS) at 993-2474, http://ods.gmu.edu. All academic accommodations must be arranged through the ODS.
- ***Privacy:*** In order to comply with student privacy laws, faculty and students need to use their GMU email accounts when corresponding with each other.

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.

Lectures: - SCHEDULE CAN CHANGE AT ANY TIME. DATE is when the recorded lecture is available

Lecture/Week	Date	Lecture	Text Reading
1	M, 01/24	Class Intro/Review; Nature of Light	Chap 1, 3, 4, 5
2	S, 01/30	Nature of Stars; Types & Masses of Stars	Chap 14 & 15
3	S, 02/06	The Sun and The ISM	Chap 15 & 16
5	S, 02/13	Star Formation	Chap 16
6	S, 02/20	Travels on the H-R Diagram	Chap 17
	W, 02/23	**Interaction session: Blackboard @ 8pm ET**	
7	S, 02/27	Stellar Deaths/Endpoints	Chap 18
9	S, 03/06	Distances & The Milky Way	Chap 19
10	S, 03/13	Galaxies & Clusters	Chap 20 & 21
11	S, 03/20	Black holes; Quasars & Active Galaxies	Chap 18 & 21
13	S, 03/27	Big Bang & Matter The Early Universe	Chap 22
14	S, 04/03	Fate of the Universe Life in the Universe	Chap 23 Chap 24
	W, 04/13	**Interaction session: Blackboard @ 8pm ET**	
	F, 04/15	**Journal Due; Paper Due – 5pm ET (email)**	

NOTE: Recorded Lectures are on the course website – see above.