

**MSE 2101: LIFE IN THE UNIVERSE****Vintage: Fall 2023**

**Instructor:** Prof. Dr Andrej Prša  
(pronounced Awn-dray PUR-shuh)  
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**OFFICE HOURS**

Mon 11am – noon

Wed 11am – noon

Fri 11am – noon

other times by appointment

*In this class we value each person as part of a learning community for their insights, perspectives and opinions, irrespective of gender, gender identity, race, sexual orientation, disability, spiritual values, political beliefs or nationality. We celebrate diversity and highlight its principal role in enriching our academic, professional and personal lives.*

**Course time and location:**Mon/Wed/Fri 9:30-10:20, M341 (3<sup>rd</sup> floor Mendel)**Course homepage:**<http://aprsa.villanova.edu/?q=litu>**Course textbook:****J. Bennett and S. Shostak: *Life in the Universe, 4<sup>th</sup> Edition***

Please refer to the webpage above for most up-to-date information on the course. Test dates, past tests in pdf form and all other information will be made there available in due time.

This course satisfies one semester of the 2-semester Natural Science requirement for students in the College of Liberal Arts and Sciences, under the provisions of the Mendel Science Experience (MSE). Students must also be enrolled in the concurrent laboratory course *Astronomy Laboratory*.

**Course content in a nutshell:**

Are we alone? This simple question has profound implications on our view of both ourselves and of the whole Universe. At this time, there is exactly one place in the Universe where we know biological life has developed: here on Earth. However, modern astronomy has shown us that there is an uncountable number of places in the Universe where physical conditions may well be similar to our own. We will begin with a review of history of science – what the ancient Greeks changed to kickstart the scientific method. We will then review the formation of our Solar System in general and Earth in particular, from the geology point of view. We will continue with discussing life on Earth, describing the properties which distinguish the living from the non-living, the environmental requirements of life as we know it, and the evolution of terrestrial life. With this background, we will investigate the possibilities of life in our own astronomical neighborhood – the Solar System – focusing on the most likely locations, including Mars and the moons of Jupiter. Next, we will look at the bigger picture and consider the possibilities of life among the stars. Our Milky Way galaxy contains over 200 billion stars, a large fraction of which are now believed to have planetary systems, and the observable Universe contains billions of galaxies. Could there (not) be life out there somewhere? We will examine the general stellar and galactic conditions that lead to planetary habitability and discuss the ways in which life outside the Solar System might be detected. We will also discuss the search for intelligent life and the possibilities of life migrating from one stellar system to another.

## Know your professor:

Who am I and why I might be qualified to teach this course? I am a professor of Astrophysics, with ~20 years of professional experience teaching and doing research in the fields of computational astrophysics, stellar physics and exoplanetary astronomy. I am a member of the *Kepler* Science Working Group – a NASA mission dedicated to discovering planets around other stars. I am also involved in the Transiting Exoplanet Survey Satellite (*TESS*), galactic astrometry mission *Gaia*, and the Large Synoptic Survey Telescope (*LSST*). I hail from Slovenia, a small Alpine country in Europe. When teaching, I put foremost emphasis on critical thinking, causal deductive reasoning and scientific thought, and illustrate the power of science across history, geology, biology, physics and astronomy.

## Course work and grading:

Your final grade will reflect the scores you earn on **quizzes, tests and the final**.

- Every week (Monday – but that's up for discussion) there will be an in-class quiz. Every quiz has 10 questions, with additional two questions for extra credit. Each quiz question is worth 10 points, 100 points total + 20 points for extra credit;
- there will be two 45-min essay-type tests during the semester. These tests will have 5 questions, with an additional question for extra credit. Each question is worth 100 points, 500 points total + 100 points for extra credit;
- at the end of the semester there will be a **cumulative** final. The final will have 5 questions, with an additional question for extra credit. Each question is worth 200 points, 1000 points total + 200 points for extra credit;
- occasionally there may be other opportunities given for extra credit, such as an in-depth presentation of research topics and homeworks. Please see me to find out more about these opportunities. This option is primarily geared to students in danger of failing the class.

If you do the math, you'll see that quizzes carry 1/3 of the grade, tests carry 1/3 of the grade, and the final carries 1/3 of the grade. Grading will be done according to the following breakdown:

0-56%	F	68-72%	C-	84-88%	B
56-60%	D-	72-76%	C	88-92%	B+
60-64%	D	76-80%	C+	92-96%	A-
64-68%	D+	80-84%	B-	96-100%	A

## Attendance:

I will never insist on your presence in lecture. There will be no attendance sheets and no penalties for missing the lecture. You never need to provide me with any evidence for missing any lectures. You are all adults and I will treat you as such. You take full responsibility for your actions.

That said... regular attendance is essential for uninterrupted understanding of course material. Since this course covers a significant amount of content in a not-so-significant amount of time, each missed class will hurt. Really hurt. The topics are not trivial and continuous work is required to remain on top of things.

Please do not miss quizzes and tests. If you must miss a quiz or a test, you must inform me of that in advance, and you must have a formal note excusing your absence. Health center visits and subsequent “call us and we’ll confirm that he/she was here” do not count as a valid excuse. Provided that you follow these rules, I will excuse you from a missed quiz (i.e. there are no make-ups for the quizzes), and I will provide you with a make-up opportunity for the test or the final.

Test dates will be scheduled by majority vote. I will provide you with a 2-week window and I will go with the date that the majority of the class agrees works best for everyone. Once the date is set, we will stick to that date.

### **The use of masks in class:**

I do not require the use of masks in class, but I do urge everyone who is more comfortable by wearing a mask to do so.

### **The etiquette for using laptops and cell phones in class:**

The use of laptop computers or cell phones in class is strictly prohibited. You will be publicly flogged with a wet noodle if caught using cell phones in class for texting, facebooking or web surfing. Laptops *can* be used as an approved accommodation *if* the supporting paperwork is available and filed with the Learning Support Services.

### **Academic integrity and Special needs:**

Finally, here goes the standard fingerprint: any violation of the Code of ethics will be grounds for failing the course. Any cheating, copying, duplication of work, etc, will get you into trouble. If you have any concerns, come talk to me and we will figure it all out.

It is the policy of Villanova University to make reasonable academic accommodations for qualified individuals with special needs. If you are a person with a special need please contact me after class or during office hours and make arrangements to register with the Learning Support Services by contacting 610-519-5176 or by emailing [learning.support.services@villanova.edu](mailto:learning.support.services@villanova.edu). as soon as possible. Students approved for accommodations should use ClockWork to register and book tests.

### **Epilogue:**

Please remember that the syllabus is a formal contract between you (the student) and me (the professor). I will give it my all to help you succeed, but you need to do the work. Please do not wait until it is too late to address any issues. Be proactive, work hard, and make this a truly fun learning experience! I promise that the material is both exciting and mind-boggling, so let’s enjoy it together! :)