

Course Description:

This course is an overview of modern astrophysics beyond our Solar System and planets. We will learn about the **stars, galaxies and the Universe**, their origin, structure, evolution and fate. The questions to be addressed include: What are stars? How do stars evolve? What will happen to the Sun? What are galaxies? How do they organize themselves? What is the Big Bang model of the Universe?

The course is suitable for both science and non-science students.

Our Class Meetings: Tuesday and Thursday 10-11am online. Go to quercus under the zoom tab.

Instructor: Prof. Diana Valencia (she/her/hers)
diana.valencia@utoronto.ca
416 208 2986

Office Hours Location: Virtual, same link as the class
Office Hours: Tuesday from 11 to 12pm, or by appointment

Tutorials: Tutorials are in place for your benefit and the Teaching Assistants are here to help you learn and be successful in the course. Use this resource to the fullest extent possible. Tutorials are designed to help you consolidate concepts and practice your skills. Your TA is your main contact person for the course, get to know them. Tutorials start on Thursday January 19th 2022.

Teaching Assistants:

Nathan Winsor - [Head TA] nathan.winsor@utoronto.ca
Jennifer Scora - jennifer.scora@mail.utoronto.ca
Bo Peng - bobobo.peng@mail.utoronto.ca
Mykhaylo Plotnykov - mykhaylo.plotnykov@mail.utoronto.ca
Casey Leung - casey.leung@mail.utoronto.ca

Community Agreement

This course aims to offer a joyful and meaningful learning experience to every participant. We will build that rich experience together by devoting our strongest effort to the class. Your curiosity will be challenged and supported. Please be prepared to take an active, engaged, patient, and generous role in your own learning and that of your classmates.

Prerequisites

None in terms of classes. However, you will need basic mathematical skills such as arithmetic (addition, subtraction, multiplication, division, logarithms), and be able to interpret basic graphs.

Delivery:

This course will be delivered synchronously via zoom. I expect students to attend the lectures. If for some reason you are not able, the lectures will be recorded. Check at the end of the day. However, there will be questions asked during class throughout the term and these will be graded (see more below). The recording is done automatically by zoom and takes a few hours to be available.

Student Learning Outcomes:

By the end of this course, students should be able to:

1. Understand the properties of stars, galaxies and the Universe and the observations behind these.
2. Logically follow the steps of knowledge based on theory and observations that allow astronomers to understand how stars and galaxies are formed and evolved.
3. Appreciate the scales involved in astronomy, the limit of our knowledge, the most outstanding questions and the way astronomy knowledge moves forward.

As a general rule, students at the end of this course will understand the why and how behind what we know of stars, galaxies and if time permits, the universe.

Course Readings and Materials

Book:

OpenStax Astronomy

This is a free online book that is kept up-to-date.

<https://openstax.org/details/books/astronomy>

Course Overview

(we'll try to cover all topics listed time permitting)

- * Light, matter and gravity: Ch 17
- * Observed properties of Stars: motion, brightness, masses, radii, spectra, H-R diagram: Ch 18, Ch 19
- * Star's structure and evolution: Ch 21, Ch 22
- * Star's death: Supernova, Neutron Stars and Black Holes: Ch 23
- * The Milky Way: Ch 25
- * Galaxies and Large scale structure of the universe: Ch 26
- * Expanding universe, the Hubble Constant, The Big Bang Theory: Ch 29

Other Resources:

Basic: ASTRO 2st Canadian Edition by Shohini Ghose, Vesna Milosevic-Zdjelar, L. Arthur Read

More Advanced: Universe, by Roger A. Freedman & William J. Kaufmann III

Course Policies and Expectations

1. Communication Policies

Piazza: This term we will be using Piazza for class discussion. The system is highly catered to getting you help fast and efficiently from classmates, the TA, and myself. Rather than emailing questions to the teaching staff, I encourage you to post your questions on Piazza. If you have any problems or feedback for the developers, email team@piazza.com

Find our class signup link at: <https://piazza.com/utoronto.ca/winter2023/asta02h3s20231>, as well as through quercus.

Email Policy: If Piazza doesn't work for your needs, you can always email me

- Please email me ("Prof. Diana" or "Prof. Valencia", or if you know or want to know Spanish "Profe Diana") directly at diana.valencia@utoronto.ca
- **Include "ASTA02" in your email's subject line and your name in the body of your email.**
- I will respond to all email inquires within 24 hours from Monday 9am to Friday 5pm. I will respond to emails sent after Friday at 5pm by 11 am Monday morning.
- Please check your official university email address daily (Mondays through Fridays) during our academic term.

2. Classroom Participation and Engagement:

- **Attendance:** Although attendance is not mandatory, I strongly encourage you to come to class and be on time. There are many things I teach in class that you will not find on the notes or book and the experience of learning together is invaluable. The expectation is that you are in your seat and ready to begin by 10:10am.
- **Discussions/Questions:** I welcome questions, please raise your hand at anytime during the class. As much as I appreciate multilingualism, to be inclusive to all, we will use English as the ONLY language in class. During group class work in tutorials, please be inclusive to others, ask questions, share your knowledge.
- **Note taking:** Research shows that longhand note taking is more effective (Muller and Oppenheimer, 2015) than laptop note taking. I strongly encourage you to take (handwritten) notes as I give the lecture. This will allow you to process the information better.

3. Grading Policies:

- Grading System:** The grading scale for this course is based on a points system. Therefore, grades will NOT be rounded up or down. **If you have concerns about your grade on an assignment, you have 5 days after the grade is posted in quercus to email me.** Therefore, do NOT wait until the end of the academic term if you have questions about your grade. In general, grades are only changed due to a miscalculation.
- Late Work Policy: No late work will be graded.** If you miss a deadline for the problem sets corresponding percentage lost will be added to your final exam. If you don't come to class and miss the in-class quizzes, you will lose the marks.

4. Academic Honesty

Students in this course are obligated to understand what constitutes plagiarism. UTSC demands high standards of integrity and ethical conduct. We will follow a strict adherence to the University's Code of Behaviour for Academic Matters. You can find it in <https://www.utsc.utoronto.ca/vpdean/academic-integrity-matters>

5. Accessibility Services, Accommodations, and Safety:

If you are with the AccessAbility office, please let me know as soon as possible, I will make every effort to accommodate your learning needs.

6. Flexibility Clause:

As this course's professor, I reserve the right to modify the course requirements, mode of delivery, and other related policies as circumstances may dictate with sufficient notification to all students. Given the COVID-19 crisis, I recognize that unanticipated emergencies may arise that require modifications to our class schedule and/or requirements. *I do not expect to invoke this clause*, but if I need to, you will be notified as soon as possible. Any change will be posted on our course quercus website and sent to your university email address.

7. I am here to help

Your educational growth and success are important to me. I want to see each student perform well in this class. Therefore, please know that I am here to support your learning and success! You are welcome to stop by my office hours or email me if you have any questions.

Course Requirements and Methods of Assessment

1. Course Requirement #1: Problem Sets

There will be problem sets assigned throughout the course. Problem sets are here for your benefit. The goal is to gain practice (especially in the quantitative aspects of this course) and understanding so that you can be successful in your term tests, final exam, and achieve the learning outcomes.

The only ground rule is that you may not consult solutions on the Internet and that the work you turn in must be your own. You are encouraged to discuss ideas with other students. If you have worked with another student, make sure you write her/his name as collaborator on the first page of the work you hand in.

After submitting your best answer for the problems, you will be given the solutions to the problem set. You will be tasked with grading your own solution, and submitting your analysis and grade of your problem set. The TAs will look at your grading and will give you a mark based on how you graded your work.

If you chose to not hand in a problem set, the percentage of the problem set will be added to the final exam.

2. Course Requirement #2: Midterms

We will have two in-person midterms. This is the opportunity for you to show all that you have learned at the time and also get detailed feedback so you can prepare for the final exam. If you don't show up to either or both midterms, the percentage will be added to the final exam.

3. Course Requirement #3: Class Quizzes

To support your learning, I will be asking questions during class for you to answer. These will be graded on a basis mostly of effort.

4. Course Requirement #4: Final Exam

At the end of the term you will have the opportunity to showcase all that you have learned in this course by solving problems that are similar to those you have solved throughout the course.

Showing your work: On the midterms and exams, make sure you show all the work that went into solving each question. This will allow the grader to follow your method, to know if you understand the material and where you are having difficulties. Don't be afraid to explain what you are doing. Your solution should look like an explanation to someone about how you solve the problem. It is not the grader's job to decipher your work, so make sure your work is neat, legible, complete and organized. A concluding statement is generally a good idea.

Assessments

1.	Problem Sets	15%
2.	a) Midterm 1	15%
2.	b) Midterm 2	15%
3.	Quizzes	10%
4.	Final Exam	40%

The last 5% will be given the highest between the Midterms or the Final Exam.

Our Grading Scale For Each Problem

Points	Meaning For Quantitative Problems	Meaning For Qualitative Problems
3	Problem is solved correctly and final solution is expressed without errors.	Question is fully answered without errors or gaps in explanation
2.5	Student has made a minor mistake (sign, factor, etc)	Question is mostly answered correctly but there is a minor misunderstanding or error
2	Student has mostly solved the problem but has missed a few final steps	Question is partially answered with a some elements correctly described but is missing a key part
1	Student has solved part of the problem	Question is only partially answered with few elements correctly described and is missing key parts
0	Student has not attempted the problem or has written gibberish	Student has not attempted the question or has written gibberish