

## ASTR101 *Introduction to Astronomy*

Spring 2023 [4 credits]

Instructor: Prof. Sylvain Veilleux  
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Email: [veilleux@umd.edu](mailto:veilleux@umd.edu)

Office: PSC 1109  
Office Hours: By appointment  
Lectures: Tue & Thu 11:00am-12:15pm (PHY 1412)

ALL e-mails MUST have "ASTR101" in the "Subject" or they may be missed.

### Teaching Assistants (TA) Emails:

Haoying Dai: [dhy@umd.edu](mailto:dhy@umd.edu)  
Brian Davenport: [bdav@umd.edu](mailto:bdav@umd.edu)  
Anthony Fabbri: [afabbri@umd.edu](mailto:afabbri@umd.edu)  
Jerome Seebeck: [jseebeck@umd.edu](mailto:jseebeck@umd.edu)  
Vicente Villanueva Llanos: [vvillanu@umd.edu](mailto:vvillanu@umd.edu)  
Thanushi Withanage: [thanushi@umd.edu](mailto:thanushi@umd.edu)  
Samyak Mehta (homeworks only): [smetha17@umd.edu](mailto:smetha17@umd.edu)

### Discussion Sections (ATL 2400; please verify them in testudo):

0101/0102 Tue 3:30-4:20 pm: Jerome Seebeck  
0103/0104 Wed 10:00-10:50 am: Anthony Fabbri  
0105/0106 Wed 11:00-11:50 am: Vicente Villanueva / Thanushi Withanage  
0107/0108 Wed 12:00-12:50 pm: Brian Davenport  
0109/0110 Wed 2:00-2:50 pm: Haoying Dai

### Lab Sections (ATL 0254; please verify them in testudo):

0101 Tue 5:30-7:30 pm: Jerome Seebeck  
0102 Wed 8:30-10:30 am: Jerome Seebeck  
0103 Wed 11:00-1:00 pm: Anthony Fabbri  
0104 Thu 8:30-10:30 am: Anthony Fabbri  
0105 Wed 6:00-8:00 pm: Vicente Villanueva  
0106 Fri 1:00-3:00 pm: Thanushi Withanage  
0107 Wed 1:00-3:00 pm: Brian Davenport  
0108 Fri 9:00-11:00 am: Brian Davenport  
0109 Thu 6:00-8:00 pm: Haoying Dai  
0110 Thu 3:30-5:30 pm: Haoying Dai

Office hours (you can attend any TA office hours no matter your discussion section. Samyak will answer questions about the homeworks, but not the lab/discussions):

Haoying Dai: Mon 10 am – 12 pm  
Brian Davenport: Wed 9:00-11:00 am  
Anthony Fabbri: Wed 1:00-3:00 pm  
Jerome Seebeck: Mon 1:00-3:00 pm  
Vicente Villanueva Llanos: Tue 3:00 – 4:00 pm  
Thanushi Withanage: Fri 12:00-1:00 pm  
Samyak Mehta (homeworks only): Mon 12:00-1:00 pm

### Course Description:

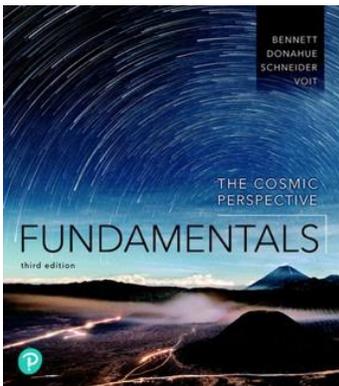
Welcome to Astronomy 101! You are about to embark on an ambitious project - to survey our known Universe in one short semester. We hope that you'll find this course enjoyable and walk away with a better knowledge and understanding of the universe that we live in. With that goal in mind, the course attempts to focus on major concepts in astronomy and where possible tie those concepts into issues relevant to your life. For example, global warming, an important worldwide issue for the 21st century, is also central to understanding the differences between the environments of Venus, Mars, and Earth. At a more philosophical level, understanding how our Universe works and how planets, stars, and galaxies are formed gives us a better perspective on our place in the Universe and how special planet Earth is to our continued survival.

Most of you have chosen this course to fulfill your science requirement (see GENED Requirements below). GENED courses are designed to ensure that you will take a look at several different academic disciplines and the way they create and analyze knowledge about the world. We will introduce you to ideas and issues that are central to a major intellectual discipline and involve you actively in the learning process. Please take advantage of the opportunities this course offers!

### Core Requirements:

This course (ASTR 101) is a 4 credit GenEd Natural Science lab course. ASTR100 (General Astronomy) is a 3 credit GenEd Natural Science course without a laboratory component. Note that you cannot get credit for both ASTR100 and ASTR101. Make sure you have chosen the correct course.

### Textbook Recommended:



*The Cosmic Perspective Fundamentals (3<sup>rd</sup> Edition)* by Bennett, Donahue, Schneider, Voit  
ISBN 978-0-13-388956-7

Either paper or e-text are fine; Mastering is not necessary (you can get the e-text from the editor, Pearson). This is the textbook to support and help you understand the lectures. Buying it is not absolutely required, but it is highly recommended.

**ASTR 101 Lab (Spring 2023 Edition):** The materials for the labs will be on ELMS.

### Course Website:

The course website is on the Enterprise Learning Management System (ELMS) that is used by the University. The URL is <https://elms.umd.edu/>. Once there, you will need to login with your University Directory ID and password. If you do not know your Directory ID, or you forget your password, there are instructions on the website about what to do. ***This syllabus,***

***all your assignments, lecture slides, and recordings (a few days before each lecture except the first one), and grades will be posted there.***

Lectures, Discussions, and Labs:

All lectures will be held in PHY 1412 on Tuesdays/Thursdays at 11 am. Throughout the semester, we will be using a variety of *active learning techniques*, which have been demonstrated to be much more effective teaching methods for introductory science classes than traditional lecturing alone. For ASTR 101, the process will work as follows: Except for the first lecture, the slides and a pre-recording of each lecture will be made available to you several days *before* the lecture. You will be asked to look over the slides and/or watch the video and complete a short questionnaire *before* the lecture to verify that you have reviewed the material. At the beginning of each lecture, I will provide you with an opportunity to indicate areas of confusion that you would like to see addressed in lecture. During each lecture, I will review the material with an emphasis on areas you found most challenging, demonstrate a few key concepts in class, and ask you multiple-choice questions designed to evaluate your conceptual understanding. You can respond to these questions using your multiple-choice clickers that you must register at the start of the semester (see Clicker Technology below). Your responses will allow me to decide in real time whether we should spend more time discussing the topic at hand, or if we should move on to the next one. Discussions and labs will be held at their respective times, and it is mandatory to attend them. Activities (quizzes, reports) submitted by people who did not attend the sessions will not be graded unless a justification for missing the session is provided.

Clicker Technology:

Your in-class participation grade will be established through your responses to clicker questions during class. In ASTR 101, we will be using the *PointSolutions* (formerly *TurningPoint*) clicker system. You can use your smartphone (or laptop) as your clicker at no cost to you by creating a *PointSolutions* account and registering your device in their Mobil Response system. Alternatively, if you have a *TurningPoint* RF-LCD clicker device you may use that, or you may purchase one as an “Add On” at the UMD Book Center or the Turning Technologies online store. See [this website](#) for instructions for students and how to register. To receive credit for in-class participation, you MUST register your clicker via ELMS.

Clickers should be registered by Tuesday February 7<sup>th</sup>, or your in-class participation grade may be impacted. **You must be present during lecture to receive credit for clicker questions.** Submitting clicker responses where you are not present is considered cheating and will be reported, as will copying someone else’s answer. Alerting students not present that clicker questions are being asked is considered facilitating academic dishonesty and will also be reported.

Course Expectations:

The University of Maryland has a set of [Uniform Course Policies](#). Please read it if you are not familiar with it.

Materials are Copyrighted: It is **illegal to upload any of the course materials** to websites that store homeworks, lectures, or exams.

Attendance and Participation: To succeed in this course, **I expect you to attend all the lectures, labs, and discussion sections.** As mentioned above, attendance to the labs and discussions is mandatory (unless you get special authorization from the TA): work turned in by people who did not attend will not be graded. Attendance to the lectures is also highly recommended. Homeworks and exams are based on the material covered in the slides, lectures, labs, and discussion sections. Experience shows that students who do the reading assignments, attend the lectures, take notes, and pay attention inevitably earn better grades than students who do not. To encourage preparation to the lectures and regular following of the lectures, students will get points for completing a questionnaire before each lecture and answering multiple-choice questions during the lecture.

Lectures: **The first lecture is on Thursday January 26<sup>th</sup> at 11.00 am. All lectures will be in PHY 1412.** All lectures except the first one will be pre-recorded and the video recording and slides will be posted approximately well *before* the lecture. You will earn reading assignment points for correctly answering 8 multiple-choice questions by your second try of a quiz, which will be made available at the same time as the lecture material. During the lectures, I will also ask you short multiple-choice questions which will allow you to earn in-class participation points. **Reading assignments and class participations represent 20% of your course grade**, so it is important to go over the material before the lectures, complete the quizzes in time, and attend and participate in the lectures.

Discussion Sections: See the schedule of classes in testudo or the beginning of this document for the time of your discussion section 0101 to 0110. **Discussion sections will start on Tuesday January 31<sup>st</sup> (i.e. no discussion during the first week of classes).** The discussions are conducted by your TA. The sections provide a smaller and more informal environment for further developing the material taught in class and for answering questions that arise, as well as performing activities that will be part of the course grade. On each discussion there will be a quiz to complete.

Labs: Labs are 2-hour long and involve hands-on experiments and computer simulations. Your work will be in a group: groups will be put together during the first lab meeting. **Labs will start on Tuesday January 31<sup>st</sup> (i.e. no labs during the first week of classes).** As with the discussions, attendance to lab sections is mandatory.

**Activities in discussions and labs account for 35% of your course grade**, so attendance and participation in these activities are important.

Homework Assignments: Homework is due on the lecture date indicated. The assignments this semester will be done on ELMS and need to be submitted before the assigned time. If there is a valid reason why homework could not be completed during the assigned window, document it and contact me *and* your TA *and* grader. Homework that is not turned in by the deadline will receive a zero. I will drop your worst homework when computing your grade: meaning, if you miss one homework that will not affect your overall grade.

We must be able to read and understand your homework for you to receive full credit. **Show your calculations and any numerical problems and justify all written answers,**

otherwise your grade will be lower than it could be. Do not copy from the book or a website: that is plagiarism and is a case of academic dishonesty. Do not copy from your friend – that is cheating and will end at the Honor Council. You may discuss homework with a friend, but each person must turn in their own work. **Phrase all answers using YOUR OWN WORDS.** Even if you work together with somebody else, no two papers can be identical – your work should reflect your unique thoughts. The university’s [honor code](#) will be enforced. Make sure that you read and understand these policies in the UG Catalog. Graded homework will be returned in section. **Homework solutions will be posted on ELMS after the due date to aid in studying for the exams.**

*Missing lectures/discussion/lab sections:* Sometimes it is unavoidable to miss filling the lecture reading quiz, or your discussion or lab section for a number legitimate of reasons. We will automatically drop the 4 lowest grades in the Reading Assignments and In-class activities, the 2 lowest grades in the Discussions and the 2 lowest grades in the Labs. This is a generous allowance, and it means **you only need to document/ask for permission for absences beyond that number.** Your first absences will be automatically charged to your allowance. Absences beyond the standard allowance should be documented to both me and your TA. We follow the University of Maryland [Policy on Excused Absences](#).

*Office hours:* There will be regular office hours held by the TAs and our grader (see above). In my case, please email me ahead of time to set a commonly agreed time.

*Academic Accommodation/Religious Observances:* Students who have a religious observance conflicting with class times during the semester should notify me by February 14<sup>th</sup>. Students with a documented disability who wish to discuss academic accommodations should contact me as soon as possible, in any case by February 14<sup>th</sup>.

*Grading:*

Grades are based on a point scale with different assignments weighted as shown in the table below. The points are distributed across a variety of exercises so that no single component will dominate your grade. However, this also means that it is imperative that you complete all assignments. Zeros on multiple homeworks, discussions, or labs will set you back in a big way!

Reading assignments	10%
In-class activities	10%
Discussions	10%
Labs	25%
Homeworks	10%
Midterm exam	10%
Final exam	25%

*Exams:* You will be asked to sign on exams the honor pledge: “I pledge on my honor that I have not given or received any unauthorized assistance on this examination.” Exams will consist of a combination of multiple-choice questions and questions that require a more extensive written response.

Midterm Exam: There will be one midterm exam held on **Tuesday, March 14<sup>th</sup>**. It will focus on the corresponding part the course as indicated in the lecture list, to check how well you have learned the material.

Final Exam: According to University rules, **the final exam for this course will be held in the morning of Saturday, May 13<sup>th</sup>**. This exam is cumulative (i.e., it covers all the course), however there will be a greater emphasis on material not already covered in the midterm.

Missed Exams: If you are not able to take an exam due to illness or an emergency (or a legitimate reason as outlined in the University of Maryland [Policy on Excused Absences](#) and summarized in [Uniform Course Policies](#)) and you wish to take a make-up exam, you must:

- 1) If at all possible contact both me and your TA by email **before** you miss the regularly scheduled exam and
- 2) document the reason for the absence by submitting a valid **written** excuse for your absence **within 1 week (midterm) / 1 day (final)** after the regularly-scheduled exam.

We follow the University of Maryland [Policy on Excused Absences](#). See the “missing exams” section for further information on how to document legitimate absences: **all absences to exams have to be fully justified**. Your written excuse is a document. Submission of fraudulent documentation is a very serious offense and will be punished as outlined in the [Student Conduct](#) website.

Make-up exams will be given within one week after you submit the valid written excuse unless there is an extraordinary force-majeure reason. The make-up exams may consist entirely of essays, problems, and short answer questions with no multiple choice questions.

Final Grades: Letter grades will be assigned based upon your cumulative score; there will be no letter grades for individual exams or assignments. The grading scale shown below is how your grade will be determined from your point total in the class. Depending on the class average, there may be adjustment made to the **final** letter grades (i.e., curving). However, any adjustment will be to lower the percentage ranges given below, never to raise them: i.e., it will make it easier to get a given letter grade.

**Grading scale used for final grades:**

I will use +/- grades. The ranges below include A+, A, A-, B+, B, B-, etc.

A	100 – 90%
B	< 90 – 80%
C	< 80 – 70 %
D	< 70 – 55 %
F	< 55 %

Communication Etiquette: **Use “ASTR101” in the header of all emails, to me or to the TAs**. Emails are easy to generate, but answering them from 200 students takes significant effort. Before firing an email, consider: 1) is this something that may be answered in the syllabus or other course material?, and 2) is this not better suited to a question in person during discussions, labs, or office hours? If it is a question that may be of general interest or

perhaps answerable by other students, you may think of using the “Discussions” tab on ELMS. Electronic comments or email on grades will generally not be answered, please talk to your TA during your discussion section.

Academic Integrity: The University of Maryland, College Park has a nationally recognized [Code of Academic Integrity](#). It states that academic dishonesty includes any of the following acts:

1. **Cheating**: attempting to gain an unfair advantage and/or intentionally using or attempting to use unauthorized materials, information, or study aids in any academic course or exercise.
2. **Fabrication**: falsification or invention of any information or citation in any academic course or exercise.
3. **Facilitating Academic Dishonesty**: intentionally or knowingly helping or attempting to help another to violate any provision of this Code.
4. **Plagiarism**: intentionally or knowingly representing the words or ideas of another as one’s own in any academic course or exercise.

This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student **you are responsible for upholding those standards** for this course. It is very important for you to be aware of the definition and consequences of cheating, fabrication, facilitation, and plagiarism including self-plagiarism. For more information on the *Code of Academic Integrity* or the Student Honor Council, please visit [Student Conduct](#). In particular, be aware that copying text (such as from a textbook, or a website) without proper attribution is plagiarism and it will be treated as such. Also note that copying your report or homework responses from a fellow student is also cheating. I am required to refer cheating students to the Honor Council, and I will do so. The penalties for cheating are draconian: you can end up with a special XF grade in your transcript that not only fails you but marks you as a cheater. It is not worthwhile: **do not cheat**.

Group Chats: We are aware that there will likely be a group chat established for this course. We encourage the use of a group chat for discussion of the course material and concepts, as long as that discussion follows the acceptability guidelines listed below. All of the rules in this course syllabus also apply to any postings in a group chat or other social media venue.

Acceptable in Group Chats	Unacceptable in Group Chats
To discuss the concepts and ideas in the course, on homework assignments, and in other course assignments.	To give out an answer to a homework question, clicker question, or other assignment.
To discuss the mathematical equations in the course, how they work, and to do examples.	To give out numerical answers and exact math work to math problems on a homework assignment or other course assignment.
To report to the instructor any conduct or remarks on the group chat that go against the university’s	To use to complete an in-class assignment when you are not in class, such as clicker questions or pop quizzes.

Code of Academic Integrity or Non-Discrimination Policy.	
To ask about the mechanics of the course, such as when a due date is or where the class is being held.	To facilitate (help) others cheat, such as by passing on answers to assignments or quizzes, or telling others when in-class activities are occurring (i.e., clicker questions or pop quizzes).
To coordinate with other course members on a group work assignment.	To actively exclude another student in the course.

As you use a group chat for this course, keep in mind that *it is unacceptable to have another person do your own work*. You must write up your own answers in your own words, unless the assignment is a designated group activity. If others post information on the group chat, you should verify that it is correct and complete so that it helps your understanding rather than hinders it. You should never copy the work of another person or other source without quoting it, citing it, and providing a full reference, because otherwise that is plagiarism.

*Safe Learning Environment.* The [University's Non-Discrimination Policy](#) prohibits discrimination on grounds of race, color, sex, gender identity or expression, sexual orientation, marital status, age, national origin, political affiliation, physical or mental disability, religion, protected veteran status, genetic information, personal appearance, or any other legally protected class. This applies to discrimination, harassment or retaliation “that adversely impacts the education...of a member of the University community regardless of where the conduct occurred.”

*UMD Peer Counseling and Crisis Intervention Hotline:* 301-314-HELP = 301-314-4357

## Lecture Schedule

1. Jan. 26	Introduction, The Cosmic Scale	Ch. 1; Appendix C
2. Jan. 31	Seasons and the Changing Sky	Ch. 2.1
3. Feb. 2	Lunar Phases and Eclipses	Ch. 2.2
4. Feb. 7	Scientific Method, Geocentric Universe	Ch. 3.2, 2.3, 3.1
5. Feb. 9	Heliocentric Universe, Kepler's Laws, Galileo	Ch. 3.1
6. Feb. 14	Newton's Laws of Motion and Theory of Gravity	Ch. 3.1, 3.3 [HW#1 Due]
7. Feb. 16	The Solar System and its Origin	Ch. 4
8. Feb. 21	Earth	Ch. 5.1, 5.2, 5.3
9. Feb. 23	Earth + Moon system and Mercury	Ch. 5.2
10. Feb. 28	Venus and Mars	Ch. 5.2
11. Mar. 2	The Jovian Planets	Ch. 6.1 [HW#2 Due]
12. Mar. 7	Dwarf Planets, Comets, Asteroids, and Impacts	Ch. 6.2, 6.3
13. Mar. 9	Light, Atoms, Spectra, Doppler effect	pp. 79, 152, 132, 116
Mar. 13	<b>Review</b> (6:00-7:30 pm; Zoom link to be announced)	
Mar. 14	<b>Midterm Exam</b>	Ch. 1-6; Appendix C
14. Mar. 16	Telescopes, Effects of Earth's Atmosphere	pp. 42, 80, 81
Mar. 21	<b>Spring Break</b>	
Mar. 23	<b>Spring Break</b>	
15. Mar. 28	Exoplanets	Ch. 7
16. Mar. 30	Our Star: the Sun	Ch. 8.1 [HW#3 Due]
17. Apr. 4	Properties of Other Stars	Ch. 8.2, 8.3
18. Apr. 6	A Star's Life: Early & Late Stages	Ch. 9.1, 9.2
19. Apr. 11	End States of High-Mass Stars	Ch. 10.1, 10.3 [HW#4 Due]
20. Apr. 13	Our Galaxy: The Milky Way Galaxy	Ch. 11.1, 9.3
21. Apr. 18	Properties of Normal Galaxies	Ch. 11.2
22. Apr. 20	Active Galaxies, Supermassive Black Holes	Ch. 11.3 [HW#5 Due]
23. Apr. 25	Galaxy Clustering, Dark Matter	Ch. 14.1, 14.2
24. Apr. 27	Expansion of the Universe, Big Bang	Ch. 12, 13
25. May 2	Fate of the Universe, Dark Energy	Ch. 14.2, 14.3
26. May 4	Great Unanswered Questions	Ch. 13, 14, +
27. May 9	Search for Life in the Universe	Ch. 15.2 [HW #6 Due]
May 11	<b>Review</b> (in class)	
May 13	<b>Final Exam</b>	All of the above

## *Discussion Schedule*

<b>Week</b>	<b>Dates</b>	<b>Class Topic(s)</b>	<b>Discussion (on ELMS)</b>
<b>1</b>	1/25-27	Introduction, scale	No Discussion
<b>2</b>	1/30-2/3	Seasons, Moon phases, eclipses	Seasons
<b>3</b>	2/6-10	Scientific method, geocentric Universe, Kepler	Moon phases
<b>4</b>	2/13-17	Newton, Solar System origin	Kepler's laws
<b>5</b>	2/20-24	Earth, Earth + Moon, Mercury	Solar System origin, gravity
<b>6</b>	2/27-3/3	Other terrestrial planets, Jovian planets	Earth's surface, path of Sun, ecliptic
<b>7</b>	3/6-10	Asteroids, comets, impacts, light, atoms, spectra, Doppler	Greenhouse
<b>8</b>	3/13-17	<b>Midterm</b> , telescopes, Earth's atmosphere	Spectra, light, and atoms
<b>9</b>	3/20-24	<b>Spring Break</b>	No discussion
<b>10</b>	3/27-31	Exoplanets, our Sun	Exoplanets
<b>11</b>	4/3-7	Other stars, stellar evolution	Analyzing spectra, H-R diag.
<b>12</b>	4/10-14	Stellar evolution, Milky Way	Stellar lifetimes, evolution
<b>13</b>	4/17-21	Other galaxies, active galaxies	Milky Way, galaxy classification
<b>14</b>	4/24-28	Dark matter, birth and expansion of the Universe	Hubble's law, The Big Bang
<b>15</b>	5/1-5	Fate of the Universe, unanswered questions	Dark matter
<b>16</b>	5/8-12	Search for life in the Universe	No Discussion

## *Lab Schedule*

<b>Week</b>	<b>Dates</b>	<b>Class Topic(s)</b>	<b>Lab Topic</b>
<b>1</b>	1/25-27	Introduction, scale	No lab
<b>2</b>	1/30-2/3	Seasons, Moon phases, eclipses	Math in the Solar System
<b>3</b>	2/6-10	Scientific method, geocentric Universe, Kepler	Moon Phases
<b>4</b>	2/13-17	Newton, Solar System origin	Jupiter's Moons
<b>5</b>	2/20-24	Earth, Earth + Moon, Mercury	Planetary Surfaces
<b>6</b>	2/27-3/3	Other terrestrial planets, Jovian planets	Sky Motions in Stellarium
<b>7</b>	3/6-10	Asteroids, comets, impacts, light, atoms, spectra, Doppler	Spectroscopy
<b>8</b>	3/13-17	<b>Midterm</b> , telescopes, Earth's atmospheres	No lab
<b>9</b>	3/20-24	<b>Spring Break</b>	No lab
<b>10</b>	3/27-3/31	Exoplanets, Our Sun	Exoplanets
<b>11</b>	4/3-7	Other stars, stellar evolution	Stellar Spectra
<b>12</b>	4/10-14	Stellar evolution, Milky Way	Parallax
<b>13</b>	4/17-21	Other galaxies, active galaxies	Galaxy Classification
<b>14</b>	4/24-28	Dark matter, birth and expansion of the Universe	Hubble's Law
<b>15</b>	5/1-5	Fate of the Universe, unanswered questions	No lab
<b>16</b>	5/8-12	Search for life in the Universe	No lab