

ASTR 1P01/02:
Introduction to Astronomy I/II
Brock University, Fall 2022 / Winter 2023
Prof. Barak Shoshany



About the Brock physics department

This course is part of the undergraduate physics curriculum at Brock University. For more information about physics at Brock, please visit [the physics department website](#) or the individual pages for [people](#), [research](#), [programs](#), and [courses](#). See also the Brock calendar entries for [ASTR 1P01](#) and [ASTR 1P02](#).

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Course overview



ASTR 1P01 and ASTR 1P02 are two parts of a comprehensive introduction to astronomy at the undergraduate level. In these courses we will learn about many fascinating and exciting topics in astronomy, including:

- The history of astronomy,
- The night sky,
- Light and telescopes,
- Orbits and gravity,
- The Earth, the Moon, and the Sun,
- The Solar System,
- Stars and galaxies,
- Black holes, curved spacetime, and general relativity,
- Dark matter and dark energy,
- Cosmology and the Big Bang, and
- Life beyond Earth.

The courses are offered twice a year:

- Fall/Winter term:
 - Fall (D2): ASTR 1P01, two sections: online and in-person.
 - Winter (D3): ASTR 1P02, two sections: online and in-person.
- Spring term:
 - First Half (D2): ASTR 1P01, online section only.
 - Second Half (D3): ASTR 1P02, online section only.

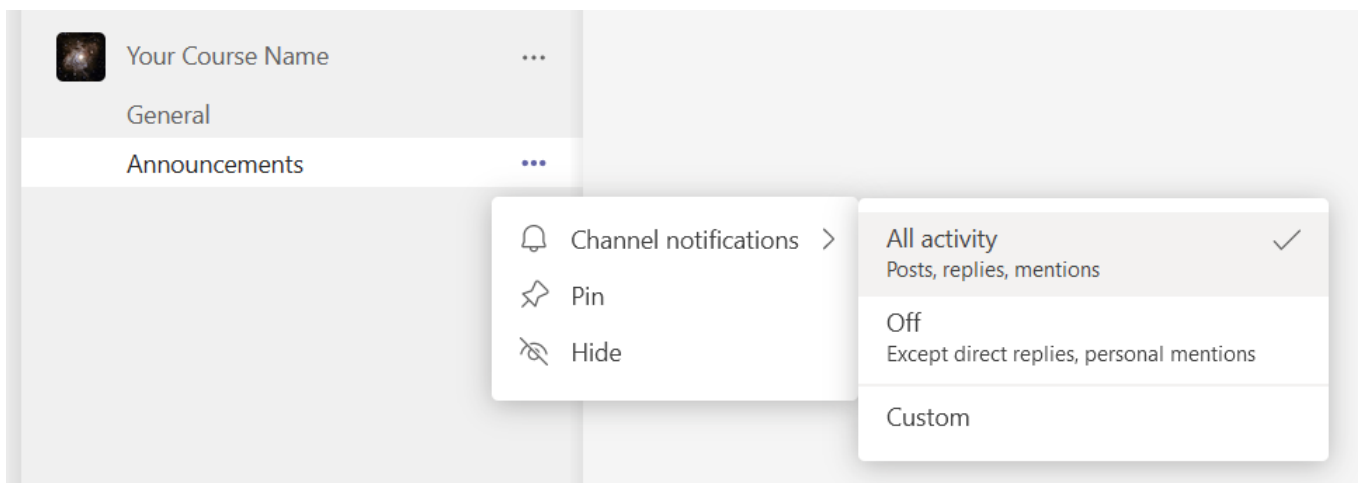
ASTR 1P02 is a direct continuation of ASTR 1P01, and relies on it for crucial background knowledge of many important concepts in astronomy. Therefore, students **must** take ASTR 1P01 before taking ASTR 1P02. However, they do not have to be taken consecutively in the same term. No exceptions will be made; if you did not take ASTR 1P01, you will **not** be able to take ASTR 1P02.

Please note that the online sections are asynchronous, meaning that there are no scheduled lectures. Students are expected to study the material on their own time, by watching the recorded lecture videos and reading the textbook. If you prefer to attend regularly scheduled lectures, please make sure to take the course in the Fall/Winter term and register for the in-person section.

The two courses, ASTR 1P01 and ASTR 1P02, are combined into a single course website (but not Teams site) for convenience, because ASTR 1P02 is a continuation of ASTR 1P01, and most students tend to take both courses consecutively.

Obviously, if you are only registered for one of the courses, then any information specific to the other course, such as lectures or tests, does not apply to you. If you are only enrolled in one of the courses, then you do not need to take the exams for the other course. **Please make sure you know which course(s) you are enrolled in.**

Important: Announcements from the professor, containing crucial information and ongoing updates about the course, will be posted throughout the term on [Microsoft Teams](#), in the "Announcements" channel. To make sure you get notified of these announcements, please go to the course Teams site, click on the three dots to the right of "Announcements", then go to "Channel notifications" and choose the option "All activity", as shown in this screenshot:



Please also bookmark the course Teams site in your browser, install Teams on your phone, and enable notifications on the phone app!

It is your responsibility to follow the announcements and read all of them thoroughly on a regular basis. No accommodations will be made for students who fail to satisfy the course requirements due to not reading the professor's announcements!

The official textbook for both ASTR 1P01 and 1P02 is [OpenStax Astronomy, 2nd edition](#). However, please note that **the professor's lectures are the main source of material** in both courses, and the exams will be based on the lectures, not the textbook. There may be some material that appears in the lectures but not in the textbook, and vice versa. The textbook is only meant to be a bonus study resource.

The professor for this course is [Dr. Barak Shoshany](#) (he/him). I did my BSc in mathematics and physics at [Tel Aviv University](#) in Israel and my MSc and PhD at [Perimeter Institute for Theoretical Physics](#) in Waterloo, Ontario. I then taught at the [University of Toronto](#) for a short time. I joined Brock University as Assistant Professor in September 2020, and I also teach scientific computing at [McMaster University](#).

I am a theoretical, mathematical, and computational physicist. My [research](#) focuses on the nature of time and causality in general relativity and quantum mechanics, as well as symbolic and high-performance scientific computing.

I am particularly interested in time travel; I [wrote a popular article about my research on The Conversation](#) and was even [interviewed about it on the TV show The Agenda](#). I'm always happy to talk about my research, and theoretical physics in general, so please feel free to ask me about it, both in and out of class!

When I'm not teaching or doing research, I love [composing music](#) (look for my album Travel Music About Time on all music streaming services!), playing video games, board games, and tabletop role-playing games, and posting science jokes and puns on my [Twitter account](#).

I love teaching astronomy to non-majors because it's a field of science that anyone can get excited about, and be amazed by, regardless of background. I hope I am able to make you as excited about it as I am! :)

About the TA


The teaching assistant for this course is **Paul Respicio** (he/him). Paul did his BSc in physics at Brock, and is currently a graduate student, working with Dr. Maureen Reedyk. His research is on the optical properties of layered compounds.

Taking astronomy in his first year at Brock was one of the reasons Paul ultimately decided to pursue further education in physics. He hopes this course will spark your curiosity for learning about the nature of things, and looks forward to assisting you in this course throughout the semester. Paul may be contacted at astr@brocku.ca.

Schedule and lectures

Both ASTR 1P01 and 1P02 have two sections: an in-person section (~500 students) and an online section (~2000 students). Please make sure you know which section you are in!

- The in-person section will attend the lectures in person at the **David S. Howes Theatre**, according to the schedule below. These lectures will not be broadcast online in real time, but they will be recorded and posted on YouTube within a week.
 - **Important: students must adhere to the COVID-19 guidelines listed below.**
 - Only students registered for the in-person section may attend the in-person lectures. Unfortunately, the size of the in-person section is limited by the number of seats in the theatre.

- The online section will watch the same recorded lectures online on YouTube. Every time a new lecture is uploaded, the link will be provided via a Teams announcement.
 - The lectures will be posted on [Prof. Shoshany's YouTube channel](#) . You may wish to subscribe to this channel and enable notifications so that you won't miss any lectures.
 - Although old lectures by another professor may be found on YouTube, only the new lectures by Prof. Shoshany are relevant for this course. Please make sure you only watch the correct lectures.

After each lecture, I will post the slides I used in that lecture, along with any other material, on Teams and [on this website](#). They will usually be posted by the end of the same day. There will be an announcement on Teams to let you know when the materials have been uploaded and where to find them.

Each course will have 12 weeks of 2 lectures each, for a total of 24 lectures and 36 hours. The lecture schedule is as follows:

ASTR 1P01

ASTR 1P01 will take place during the Fall 2022 term, from September 7 to December 6, 2022. For the in-person section, there will be two 1.5-hour lectures every week:

- Mondays 12:30-14:00,
- Wednesdays 12:30-14:00.

There will be no lectures on Reading Week, October 10-14, 2022.

ASTR 1P02

ASTR 1P02 will take place during the Winter 2023 term, from January 9 to April 7, 2023. For the in-person section, there will be two 1.5-hour lectures every week:

- Mondays 13:00-14:30,
- Wednesdays 13:00-14:30.

There will be no lectures on Reading Week, February 20-24, 2023.

Contact information



TL;DR: Please understand that it is absolutely impossible for the professor to answer individual emails from 2500 students. You are asked to never email or message the professor under any circumstances. Whatever your problem is, the professor will NOT be able to help you personally. Please post all non-personal questions on Teams and email all personal questions to the TA at astr@brocku.ca.

As this is a very large class (up to 2500 students each term!), **students must not contact the professor directly**. Instead, students should do as follows:

- All **non-personal** questions related to the course, whether about the material, textbook, logistics, exams, or anything else, should be posted publicly on [Microsoft Teams](#), in the General channel.
- All **personal** questions involving private information that cannot be posted publicly on Teams, such as grades, accommodations, missed exams, or medical issues, should be sent to the TA, **Paul**, at astr@brocku.ca.

If you email the TA, please make sure to do so from your **Brock email account**, not from your personal account, since otherwise they have no way to verify your identity. The TA will not be able to share or discuss any personal details with you if you contact them from your non-Brock email.

I kindly ask that you refrain from asking the professor or the TA non-personal questions via email or direct message. There are several reasons for this:

- Posting questions publicly on Teams allows other students to see the questions and benefit from our answers.
- Creating new posts on Teams encourages other students to add their own followup questions and triggers valuable discussions about the subject matter that would not have happened otherwise.
- There is a very large number of students in this course, and posting your non-personal questions publicly on Teams means the TA and I won't have to answer the same question multiple times.

I promise to answer all questions posted on Teams as soon as I can – emailing me or messaging me directly won't get you an answer any faster. Sending the same message twice (e.g. via both email and Teams) won't get you a faster reply either.

Important: In my experience, many of the questions asked by students throughout the term already have answers either on the course website or in Teams discussions and announcements. Therefore, before you ask a question, please check if perhaps it already has an answer on this website or on Teams – that way, you won't have to wait for a response.

To reiterate, **you should not contact the professor directly, whether by email or by direct message on Teams, under any circumstances!** There are only two places where your messages should go:

- Personal → astr@brocku.ca.
- Non-personal → Post publicly on Teams.

Whatever you want to ask me, you should ask the TA instead, and if they decide it requires my attention, they will contact me on your behalf. If you do contact me, I will simply send you an automatic reply instructing you to email astr@brocku.ca instead, and you will waste both your time and mine.

The TA is in charge of all the logistics of the course, and this will allow me to devote more time to answering your questions about the material on Teams and preparing the practice questions and the exams.

Lecture videos and slides



After each lecture, the videos, slides, and any additional material will be posted here. For your convenience, the lectures are also available as a [YouTube playlist](#). You may wish to subscribe to [my](#)

[YouTube channel](#) and click on the notification bell to be notified as soon as a new video is uploaded.

• **ASTR 1P01 (September 7 to December 6, 2022):**

- Lecture 0: Course logistics
 - Full lecture (September 7, 2022): [slides](#)
- Lecture 1: Introduction
 - Part 1 (September 7, 2022): [slides](#), [video](#)
 - Part 2 (September 12, 2022): [slides](#), [video](#)
 - Part 3 (September 14, 2022): [slides](#), [video](#)
 - Full lecture (all parts): [slides](#)
- Lecture 2: Looking up to the sky
 - Part 1 (September 19, 2022): [slides](#), [video](#)
 - Part 2 (September 21, 2022): [slides](#), [video](#)
 - Full lecture (all parts): [slides](#)
- Lecture 3: Ancient astronomy
 - Part 1 (September 21, 2022): [slides](#), [video](#)
 - Part 2 (September 26, 2022): [slides](#), [video](#)
 - Part 3 (September 28, 2022): [slides](#), [video](#)
 - Full lecture (all parts): [slides](#)
- Lecture 4: Astrology
 - Part 1 (September 28, 2022): [slides](#), [video](#)
 - Part 2 (October 3, 2022): [slides](#), [video](#)
 - Full lecture (all parts): [slides](#)
- Lecture 5: Modern astronomy
 - Part 1 (October 5, 2022): [slides](#), [video](#)
 - Part 2 (October 17, 2022): [slides](#), [video](#)
 - Part 3 (October 19, 2022): [slides](#), [video](#)
 - Full lecture (all parts): [slides](#)
- Lecture 6: Newtonian mechanics & gravity
 - Part 1 (October 24, 2022): [slides](#), [video](#)
 - Part 2 (October 31, 2022): [slides](#), [video](#)
 - Full lecture (all parts): [slides](#)
- Lecture 7: Astronomical phenomena on Earth
 - Part 1 (November 2, 2022): [slides](#), [video](#)
 - Part 2 (November 7, 2022): [slides](#), [video](#)
 - Part 3 (November 9, 2022): [slides](#), video available soon
 - Full lecture (all parts): [slides](#)
- Lecture 8: The solar system
 - Part 1 (November 16, 2022): [slides](#)

Useful software

Interested students may find the following applications useful. They are **100% free** and available for Windows, Linux, macOS, Android, and iOS. Using them is optional, but might help you understand the material better.

- [Stellarium](#): Shows you the sky as seen from any place on Earth at any point in time. You can zoom in or click on individual astronomical objects for more information. You can also highlight the constellations. If using it during the day, press "A" to turn off the atmosphere. Stellarium can also run [directly in your web browser](#), but that version has fewer features.
- [Celestia](#): Allows you to travel to different objects in the solar system, such as planets, moons, and asteroids, and shows you their orbits and positions at different times. You can also find eclipses, and travel to other stars in the galaxy.

There are also several apps that you can use in the field for astronomical observations. [Sky Map](#) is available for Android phones only, while SkyView is available both for [Android](#) and [iPhone](#). Simply point your phone to the sky, and the app will tell you exactly what you're seeing in real time!

Advanced students may be interested in [Gaia Sky](#), a billion-star map of the Milky Way Galaxy, which also works in VR (on Windows and Linux only).

Tips for watching the lectures ^

Each in-person lecture will be recorded and made available online on YouTube within a few days. Students in the online section will watch the lectures online instead of attending them in person. Students in the in-person section should attend in person, but may use the recorded lectures to revise the material, or if they were unable to attend a lecture in person. Here are some tips for watching the lectures efficiently:

- You don't have to watch the lectures in real time. Take advantage of the fact that they are recorded, so if at any time you feel that you do not understand a portion of the lecture, you can rewind and re-watch that part, or even pause the lecture and look up additional information in another browser tab.
- You can change the playback speed in the video settings, which are accessible via the gear icon on the bottom right. Make it slower if I'm speaking too fast, or make it faster if I'm speaking too slow. You can also press `<` (`Shift` + `,`) or `>` (`Shift` + `.`) on the keyboard to slow down or speed up.
- The videos have subtitles. You can enable them in the video settings, or by pressing `C`.
- Some other YouTube keyboard shortcuts you may find useful include: `Spacebar` to play/pause, `←`/`→` to seek backward/forward 5 seconds, `F` to activate full screen, and `Shift` + `P` or `Shift` + `N` to go to the previous or next video in the playlist. You can find a full list of keyboard shortcuts [here](#).

Exams ^

There will be 3 online exams in each of the two courses. There are no assignments other than the exams. Both the online and in-person sections will take the same online exams; there will not be any in-person exams. The exams will take place on [Brightspace](#). Please see [below](#) for instructions on how to take the exams.

Each exam will be given at a precise day and time, as indicated below, and you will not be able to re-take it if you miss it, unless you **have legitimate reasons**. Please make sure to add the exams to your calendar **right now**, so that you don't forget them and fail the course!

Each exam will open at exactly the indicated time, and close after exactly the indicated duration. For example, if the exam starts at 09:00 and has a duration of 50 minutes, then it will only be open from 09:00 until 09:50. (If you have **extra time accommodations**, then the duration will be extended for you accordingly.) The exam will **not** be open at any other day or time. This means that everyone in the class takes each exam at the exact same time; you cannot choose when to take the exam.

Please note that all times are given in Eastern Time (i.e. local time in St. Catharines). If you live in a different time zone, it is your responsibility to figure out when to start the exam in your local time. If you miss the exam due to time zone confusion, you will not be able to take it at another time. You can easily convert to your local time zone by looking up e.g. "convert 9 AM Eastern Time to [your time zone]" on Google.

IMPORTANT: If you are only taking one of the two courses, you only need to submit the exams for the course you are taking! If you're not seeing the exam in the online exam system (to be announced), then you are most likely not actually registered for the course.

• **ASTR 1P01 (September 7 to December 6, 2022):**

- Exam 1:
 - Material: **Lectures 1-4** (every lecture up to and including the one delivered on Monday, October 3, 2022).
 - Time: Friday, October 7, 2022 at 19:00 (note: this means 7 PM).
 - Duration: 50 minutes.
 - Number of questions: 25 multiple-choice.
 - Weight in final course grade: 1/3.
- Exam 2:
 - Material: **From lecture 1 up to and including lecture 7 part 2** (every lecture up to and including the one delivered on Monday, November 7, 2022), with emphasis on lectures that were not covered in the previous exam.
 - Time: Friday, November 11, 2022 at 19:00 (note: this means 7 PM).
 - Duration: 50 minutes.
 - Number of questions: 25 multiple-choice.
 - Weight in final course grade: 1/3.
- Exam 3:
 - Material: All of the lectures delivered during the term, with emphasis on lectures that were not covered in the previous two exams.
 - Time: Monday, December 19, 2022 at 19:00 (note: this means 7 PM).
 - Duration: 50 minutes.
 - Number of questions: 25 multiple-choice.
 - Weight in final course grade: 1/3.

• **ASTR 1P02 (January 9 to April 7, 2023):**

- Exam 1:
 - Material: TBD.
 - Time: TBD; the exams are scheduled by the university, and I will announce them as soon as I receive the schedule.
 - Duration: 50 minutes.
 - Number of questions: 25 multiple-choice.

- Weight in final course grade: 1/3.
- Exam 2:
 - Material: TBD.
 - Time: TBD; the exams are scheduled by the university, and I will announce them as soon as I receive the schedule.
 - Duration: 50 minutes.
 - Number of questions: 25 multiple-choice.
 - Weight in final course grade: 1/3.
- Exam 3:
 - Material: TBD.
 - Time: TBD; the exams are scheduled by the university, and I will announce them as soon as I receive the schedule.
 - Duration: 50 minutes.
 - Number of questions: 25 multiple-choice.
 - Weight in final course grade: 1/3.

Exam preparation ^

The exams are timed, and can only be taken once. Do not take any exam without proper preparation! The best way to prepare for each exam is to:

- Attend or watch all of the professor's lectures. The exams will be based solely on the material taught in the lectures. Both the text on the slides and the information I add verbally during the lectures will be relevant.
- Thoroughly read the appropriate chapters of the textbook. Note that the textbook is only for additional reading and practice; the exams will not be based on the textbook.
- Solve as many exercises from the textbook as possible.
- Take personal notes while reading the textbook. You can do this within the textbook itself - once you create an account on OpenStax, you can highlight any word or sentence and add your own notes in different colors.
- Summarize what you learned from each lecture and textbook chapter in your own words, as if you're explaining it to someone else - or better yet, find someone to actually explain it to!
- Participate in discussions of the material with other students and with the professor on Teams.
- Connect with your fellow classmates on Teams and form study groups that will meet (in person or online) on a regular basis and review the material together. You can use the channel "Student discussions" on Teams for this purpose.
- Solve all the practice questions that will be posted on Teams on a regular basis. Figuring out the answers to the practice questions on your own, instead of just memorizing or googling the solutions, is an extremely important part of the learning process, and will help you understand the material better.

Note that you can search the online textbook by typing in the text box which says "search this book" at the top of each page, and you can search the slides by pressing **Ctrl-F** (or **Cmd-F** on macOS) in your PDF reader. These search functions will also be very useful during the exam itself.

There may be questions in the exams which are not directly related to the practice questions, but for

which the answer can easily be found in or deduced from the lectures. There aren't going to be any trick questions or questions that rely on very obscure pieces of information.

You are encouraged to look up more information online on your own, however:

- Please only use **reliable sources** such as [Wikipedia](#), [Encyclopedia Britannica](#), [NASA](#), [Astronomy Stack Exchange](#), and university websites.
- Beware, there are many websites that contain incorrect and/or misleading information! If you're not sure if a particular website is reliable, please post a link on Teams and I will let you know whether it seems trustworthy.
- In case of discrepancy between my lectures and another resource, my lectures should be considered the authoritative source. However, if you believe there is a mistake in my lectures, please let me know on Teams.

Warning: Both ASTR 1P01 and ASTR 1P02 have been completely rewritten from scratch in spring 2022. Therefore, any material from previous years, such as lecture videos, lecture notes, or exams, will not be relevant for this year's course. In particular, exam questions from previous years will not appear in this year's exams. Students who rely on memorizing exams from previous years instead of properly studying the new course material will most likely fail the course.

Allowed material and academic integrity

During the exams, students are allowed to use the course website, the [textbook](#) (printed or online), their personal notes (on paper or on a website/app), and a calculator (physical or a website/app). Students are **not** allowed to use search engines or any websites/apps other than those listed in the previous sentence. Students are especially not allowed to discuss the questions with anyone else while taking the exam.

Students are expected to fully comply with [Brock University's academic integrity policy](#) as well as [the physics department's academic integrity policy](#). A variety of measures will be taken to detect cases of cheating in the online exams. If a student is found to have committed academic misconduct, disciplinary measures will be taken. Please see [this page](#) for more information about academic integrity.

Missed exams and extra time accommodations

Missed exams

If you miss an exam, you must email the TA within 7 days. Your email must explain exactly why you missed the exam, and include any necessary proof:

- If you missed the exam due to medical issues, you must attach a doctor's note.
- If you missed the exam due to technical issues, you must attach a screenshot, photo, or video of the computer's screen clearly demonstrating the issues you encountered.

If your proof is acceptable, you will be able to take an alternative exam at a later date. However, if you do not email the TA within 7 days, or if you cannot prove that you had a valid reason for missing the

exam, **your grade in the exam will be zero.** There will be absolutely no exceptions to this rule!

It's easy to forget exams, especially if you're in the online-only section, so please make sure to add reminders for each exam to your calendar. Forgetting to do an exam will not count as a valid reason for missing it, and your grade will be zero with no option of improving it!

If you are late to an exam, you will not get any extra time, so please make sure to be on the online exam system (to be announced) at least 10 minutes before the beginning of the exam.

Accommodations

Extra time accommodations in the online exams are not applied automatically; they need to be applied manually by the professor for each student. **If you have extra time accommodations, please email your Approved Accommodations Summary letter (as a PDF file) as soon as possible to the TA at astr@brocku.ca.**

Please make sure that you appear on the OASIS portal, and that you have a valid Approved Accommodations Summary letter, before emailing the TA. If you don't know what these things mean, please ask your case manager at Student Accessibility Services.

Any email concerning your extra time accommodations must have your Approved Accommodations Summary letter attached to it. Please do not email the TA until you obtain this letter. Also, as explained **above, please do not email the professor directly under any circumstances.**

How to take the online exams



The exams in this course will take place on [Brightspace](#). Please note that **Brightspace will be used only for the tests.** Everything else, such as announcements and discussions, will take place on Teams.

To take a test, please follow the steps below. Note that using Brightspace isn't as complicated as these steps make it seem! I wrote very detailed instructions just to make sure you know what to do in any possible situation.

- 1. IMPORTANT: Make sure to follow all the instructions under **how to avoid technical issues in the online exams** before you start the test!**
2. Log into [Brightspace](#) using your Brock credentials.
3. Click on the course name under "My Courses" in the homepage.
 - If you cannot find it, click the link "View All Courses".
4. On the course page, click on the "Quizzes" icon in the navigation bar on top. Ignore everything else.
5. Click on the name of the test you need to take.
 - If you do not see the test on the list, then it has not been made visible yet. The test will become visible close to the day of the test.
 - If you do not see it on the list on the day of the test, please email the TA at astr@brocku.ca

immediately for help.

6. Read the information displayed on the test introduction page carefully. Click on "Start Quiz" once you are ready.
 - **IMPORTANT: The test will only be made available at the exact time specified in the test schedule, and will remain available for 10 more minutes.** After this 10 minute period expires, the test will be unavailable. If you do not see the "Start Quiz" link, that's probably because you're either too early or too late.
 - For example, if the test starts at 19:00, then the "Start Quiz" link will only be active between 19:00 and 19:10. If you do not click on the link by 19:10, you will not be able to take the test, and your grade will be zero.
 - If you were unable to click "Start Quiz" before the 10 minutes expired, and this was due to legitimate reasons (such as technical or medical issues), please email the TA at astr@brocku.ca immediately.
7. **A timer of 50 minutes will start once you click on "Start Quiz". The timer is displayed at the top of the page. Once the timer ends, no modifications (such as adding or changing answers) can be made.** Attempting any modifications will result in a message telling you to submit the test.
8. If you have extra time accommodations, the timer will increase accordingly.
 - Please note that the timer increases based on a 50-minute test, not a 60-minute test. Thus, if your accommodations say "30 minutes for every 60 minutes", you will only get 25 extra minutes in this 50-minute test ($50 \times 30 / 60 = 25$).
 - If you believe your extra time accommodations have not been granted, please take the test anyway, and let the TA know about the issue at astr@brocku.ca once you are done. If there was indeed an issue, your grade may be adjusted accordingly.
 - If you did not **let the TA know about your accommodations** beforehand, as you were supposed to, then you will not get the accommodations for this test.
9. In each question, choose the correct answers from the available choices.
 - There is no need to click any button to submit individual answers. Each answer is saved in the system as soon as you click on the circle next to it (as long as you are connected to the Internet).
 - Once you are done answering all the questions, if you still have time in the timer, go over all the questions again and check your answers.
10. If you accidentally close the test, or get disconnected, any answers you entered up to that point will be saved. **However, the timer will continue ticking.** Until your time is up, you can resume the test by logging back in, clicking on "Quizzes", clicking on the link to the test, and then choosing "Continue Quiz".
 - After the timer is up, you can still click on "Continue Quiz", but you will not be able to enter any new answers, only submit the test.
 - If you got disconnected for a long time and could not finish the test in time, please email the TA at astr@brocku.ca immediately, and include proof of your technical issues.
11. **IMPORTANT: The test will not count as submitted until you click the "Submit Quiz" button. If you do not submit the test, your grade will be zero, even if you answered all the questions.**
 - You must click on "Submit Quiz" even if the timer has already expired. The test will not submit automatically.
 - This is true even in the case where the timer expired while you were disconnected. You will

still need to choose "Continue Quiz" and then "Submit Quiz".

12. After clicking on "Submit Quiz", you will see a confirmation page. You will need to click on "Submit Quiz" again on this page. You can also go back if you changed your mind and the timer has not yet expired.
13. Once you confirmed the submission, there will be a final confirmation page which will say "Attempt 1" and give you the start and end times of your test. Click "Done" on this page.
14. **IMPORTANT: Your grade will not be available immediately.** The grades will be published only after everyone finishes the test, including students with extra time accommodations, and once I verify that there were no issues with any questions. It might take up to 3-4 hours for the grades to be available.
15. Once the grades are available, in the "Quizzes" page, under "Evaluation Status", there will be a new link named "Feedback: On Attempt". Click on this link to see your grade. It will tell you how many questions you got correct, both in number and percentage. If you click on "Attempt 1", you will see a list of the questions your got wrong, along with your answers and the correct answers.
 - The tests are graded automatically, so there should be no grading errors. However, if you believe any of your answers were graded incorrectly, please feel free to post about it on Teams.
 - **IMPORTANT: You only have one attempt to take the test. The system will say "Attempt 1", but there is no "Attempt 2".**

How to avoid technical issues in the online exams

To avoid technical issues during the online exams in this course, please make sure to closely follow these steps before you start each exam:

1. Make sure your operating system is up to date. If you need to install any updates, do so several hours before the exam (or the previous day), since it might take some time.
2. If your computer has an Ethernet port, connect your computer directly to the modem/router using an Ethernet cable, instead of using WiFi, which is less reliable.
3. Make sure that no other people (family, roommates, etc.) and/or devices (phones, tablets, etc.) are using the same Internet connection for the entire duration of the exam.
4. Restart your modem and/or router a few hours before the exam (or the previous day).
5. Restart your computer 30-60 minutes before the exam.
6. When your computer starts, do not open any programs other than your web browser.
7. Use only [Mozilla Firefox](#) (preferred), [Google Chrome](#), or the new [Microsoft Edge](#) (not the legacy Edge). Do not use Safari, Opera, Internet Explorer, or any other browsers.
8. Open the exam in a Private/Incognito window. Instructions for opening a Private/Incognito window may be found [here for Firefox](#), [here for Chrome](#), or [here for Edge](#). If you enabled any extensions in Private/Incognito mode, disable them first.
9. Make sure the web browser is the only open program on your computer for the entire duration of the exam.
10. If your computer is slow, it may be better to take the exam on another device, such as a phone or tablet.
11. It's a good idea to have a second device (including a second computer, if available) ready to use. If the first device crashes, you can log in from the second device and continue where you left off. Make sure to apply the previous steps to each device you intend to use.

COVID-19 guidelines

Your health and safety is very important to me! Since this course is delivered in person, all students must adhere to the following COVID-19 guidelines:

- **According to university policy, as of September 6, medical-grade masks are mandatory in all instructional spaces. This includes all lectures and exams for this course.**
 - Fabric face coverings such as buffs, gaiters and bandanas do not satisfy the masking requirements; you must wear a medical mask (and I recommend an N95 mask).
 - Please note that if any student is not wearing a mask in the classroom, the lecture or exam will be canceled unless the student puts on a mask or leaves the class.
 - If you have a medical exemption from wearing a mask, please send me a doctor's note before coming to class.
 - **As the course instructor, I reserve the right to maintain the mask requirements in my classroom even if the university decides to lift it later in the term.**
- **Vaccine boosters are highly recommended for all students.** If you did not receive a booster in the last 6 months, you are encouraged to [get one](#). While vaccines are not currently required by the university, they may become mandatory later in the term.

- **If you suspect that you are experiencing any COVID-19 symptoms, do not come to class.** If you miss a lecture, you can make up the missing material by watching the lecture videos (which will contain all the material needed for the exam), and if you miss an exam, you can **take it another time**.

For more information on university policies, please see [the COVID-19 FAQ](#). If you have any questions, comments, or concerns, please do not hesitate to post them on Teams!

What's next?



If you enjoyed this course, you may also be interested in my 2nd-year astronomy course, [ASTR 2P42: Astrophysics & Cosmology](#). This is a more advanced course, which delves much deeper into the material, including all the relevant math and physics. It therefore requires first-year physics and calculus as mandatory prerequisites. The course is open to students from all majors, as long as they have the proper background. Please see [the course website](#) for more information. I hope to see you there! :)