ASTR 310: Observational Astronomy
Fall 2022 Syllabus

August 30, 2022

1 Course Philosophy

Ancient cultures first began to understand the Universe with observations in visible light. For many people today, astronomy is someone looking through a telescope at distant stars. While few professional astronomers actually look through a telescope any more, images and spectra obtained with modern instrumentation are essential for exploring and understanding the Universe. This class is an introduction to optical observational techniques, including the closely-related infrared and ultraviolet techniques. Modern astronomy is above all a scientific discipline, and the course also covers relevant statistics, spherical trigonometry, time systems, catalogs, optics, the effects of the atmosphere, and optical instruments. In addition to covering these theoretical concepts, the class includes practical work using the University observatory's telescopes and electronic cameras.

1.1 Learning Goals

At the end of this course, the student will be able to...

- ...understand and contribute effectively to all parts of the process of a "research project": identifying a problem, deciding what observations can solve it, planning observations, taking observations, reducing data, analyzing data, interpreting data, writing results.
- ...explain how typical optical telescopes and CCDs work.
- ...compare capabilities of different optical systems of telescopes and CCDs.
- ...explain and utilize the fundamentals of modern observational photometry, astrometry, and spectroscopy.
- ...discuss the limitations of observational data and the data reduction process.
- ...utilize large data sets to formulate a question that can be answered using the data set and manipulate/search the data set to answer that question.
- ...communicate research results effectively, in scientific papers and talks.
- ...collaborate with other researchers productively.

1.2 Active Learning

"Tell me and I forget. Teach me and I remember. Involve me and I learn. " – Benjamin Franklin, 1706-1790.

Astronomy is a growing science where new discoveries are being made daily. In order to understand how astronomy works, it's crucial for you to actively engage in the scientific process: examining evidence to explain how things work and why things happen. When you figure out scientific concepts through your own effort and the application of what you learn in class, you will remember and understand them *much* better.

The following are key results from cognitive science and education research:

1. Learning is productive/constructive - learning requires mental effort.
2. Knowledge is associative, which means it is linked to prior mental models and formal structures.
3. Cognitive response is context dependent: what and how you learn depends on the educational setting.
4. Most people require some social interactions in order to learn effectively.

These results are captured in this quotation from How People Learn (National Research Council, National Academy Press, 1999): "Students enter your lecture hall with preconceptions about how the world works. If their initial understanding is not engaged, they may fail to grasp the new concepts and information that are taught, or they may learn them for the purposes of a test but revert to their preconceptions outside the classroom."

The traditional course model has students listening to a lecture where facts and concepts are ostensibly learned. Many students try to understand the material by simply memorizing facts from lecture and the textbook without understanding the underlying concepts and principles. **THIS IS NOT LEARNING.** In a traditional course, students have little opportunity to actively engage in learning the material in order to truly understand the concepts and their ramifications.

This course will be employing learning techniques that have been shown through research to be most effective.

- **Active learning:** You will engage in the course material by answering questions and doing activities in class.
- **Social learning:** You will discuss topics and concepts with classmates, which will solidify your understanding of the material and clear up questions.
- **Metacognitive learning:** You will analyze how you think and learn so you can improve your learning and study habits.

1.2.1 Distractions Detract from Learning

In order to learn most effectively, you need to focus on the course material while in class. Education research has found that students who try to do other tasks while in class (text on their phones, surf the web, read the newspaper, etc.) do not learn the material as well and earn lower course grades.

As much as possible, plan to participate in the online portions of the course from a place that is as quiet and distraction-free as you can find. Plan to focus your full attention on the class and do not plan to complete other activities during this time.

1.2.2 A Safe Learning Environment

The campus and the online community of the university is meant to be a safe place to learn, free from harassment and intimidation of any kind. If you have experienced any form of harassment as a member of the university community, you should contact the Office of Civil Rights & Sexual Misconduct (www.umd.edu/Sexual_Misconduct) on campus. Please be aware that faculty (and Teaching Assistants) are required by law to report any instance of misconduct brought to their attention. For confidential assistance, contact CARE (www.health.umd.edu/care).

1.3 COVID-19 Safety Precautions

The University has provided guidance about the wearing of masks for students, faculty, and staff; this guidance may change over time as warranted by the current status of the pandemic. If the university requires the use of face coverings, then they will be required in this course. Students who do not comply with university requirements will be given a warning and/or will be asked to leave the room immediately. Students who have additional issues with COVID-19 safety requirements after a first warning will be referred to the Office of Student Conduct for failure to comply with a directive of University officials.

1.4 Course Structure

This is not a traditional lecture course.

The learning procedure for this course will be as follows:

1. **BEFORE LECTURE,** you will complete your preparation on your own. You will be assigned reading from the textbook or other sources, which you are required to complete before class. This is where you will learn the basic facts, vocabulary, equations, and other information you need to begin understanding a particular topic.

2. **BEFORE LECTURE,** you will take a pre-lecture quiz to test your comprehension of the pre-lecture material, whether it is a video, textbook reading, or other assignment.

3. During the synchronous Zoom lecture periods, you will participate in various active, social, and metacognitive learning activities to deepen your understanding of the material, strengthen your grasp of the underlying concepts, and clear up any problems, misunderstandings, and confusion.

4. **DURING LECTURE,** you will participate in some type of conceptual activity, either individual or in a group, that will allow you to test your understanding of the day's material and will be turned in for class credit.

You will be split into teams of about 4 students during this course - you will work with your team in lecture and outside of class in order to help yourself and your team members learn the material more effectively and complete the course projects. In lecture, the active learning will also include concept tests, which are not graded. *You are expected to participate with your team in lecture.*

You will also be required to complete two projects with your team. Each team member must contribute meaningfully to the project, following the guidelines listed in the section below on the projects. Each team will develop guidelines to guide their team's behavior and work process. Team evaluations will be conducted to ensure that all team members are contributing in a satisfactory manner. **For each of the team projects, I may adjust an individual student's score if I feel these evaluations justify the adjustment.**

1.5 Mutual Expectations

I believe that it is essential that we, as members of a learning community, agree upon what is expected of each other. As a course instructor, my role is to design and manage a learning environment that is rigorous, engaging, and employs evidence-based teaching practices. As a student, your role is to take *personal responsibility* for your learning and actively engage in all aspects of the course. This leads to the mutual expectations that we have of each other in our respective roles.

You, as a student, have the right to expect that:

- All work is evaluated by reasonable, objective, and transparent criteria intended to assess learning.
- All students are treated with equality, professionalism, and respect.
- I will be prepared and on-time for every class meeting and scheduled appointment.
- I will maintain a classroom conducive to active learning, discussion, and critical thinking.
- I will be available to assist with coursework and offer referrals to other resources upon request.
- I will read and respond to your emails within 24 hours on weekdays.
- I will do my best to answer any questions that you have, and if I don't know the answer, I'll do my best to work with you so that we can find it (in other words, I won't just make stuff up.)

I, as an instructor, have the right to expect you will:

- Devote the necessary time and energy to master the course material. Note: according to University of Maryland guidelines, you should budget an average of 2 out-of-class hours per week for each hour in-class. If your schedule does not currently permit you to satisfy these requirements, I advise you to take the course at another time.
- Be *prepared* and *on-time* for every class meeting, having completed the assigned work before class.
- Save newspapers, puzzles, texting, IM, email, Facebook, etc., for outside of class.
- Sleep in your bed, in someone else's bed, in the hall, on a park bench...but not in class.
- Take responsibility for getting anything you might have missed from a fellow classmate.
- Monitor your email and ELMS messages at least once every 24 hours.
- Adhere to all course and university policies, deadlines, requirements, and grading criteria.
- Conduct yourself in a professional manner, including in your written communication. Here's a guide for writing emails to instructors or TAs: *http://ter.ps/email*
- Seek assistance when you need it and see that your questions are answered to your satisfaction.

2 Practical Information

ASTR 310 Observational Astronomy is a 4-credit GenEd Distributive Studies Scholarship in Practice course. It is intended for Astronomy majors. The prerequisites are ASTR 121 and PHYS 171 or 161. ASTR 310 lectures meet on Tuesdays and Thursdays from 2:00 - 3:15pm in ATL 1114. Lab sections meet on Mondays in ATL 0224; you are required to be registered for and attend either the 9:00 - 10:50am or 1:00 - 2:50pm section.

2.1 Contact Information and Office Hours

Role	Person	Email	Location	Office Hours
instructor	Dr. Melissa Hayes-Gehrke (she/her)	mhayesge@umd.edu	ATL 1114	Tue 10 - 11am, Wed 3 - 4pm
TA	Ms. Lacey Allee-Press (she/her)	laceyap@umd.edu	ATL 1243	TBA
TA	Mr. Orion Guiffreda (he/him)	oriogui@umd.edu	ATL 1243	TBA
obs. asst.	Ms. Rachel Weller (she/her)	rweller1@umd.edu	-	-

When you email us, please make sure to put "ASTR 310" in the subject line to ensure that we do not discard your email as spam. Please feel free to email your TA or me to arrange appointments at other times to discuss the class.

2.2 Lab Sections

If you are taking ASTR 310, you **MUST** attend a lab section. Make sure that you are registered for one of the following sections. **Lab sections begin on Monday, Sep. 12, 2022.**

Section	Day	Time	Room	TA
0101	Monday	9 - 10:50am	ATL 0224	Lacey Allee-Press
0102	Monday	1 - 2:50pm	ATL 0224	Orion Guiffreda

2.3 Class Website

The course website will be on ELMS with the Canvas system; students can login to their course(s) by going to https://myelms.umd.edu/ . A University ID and password are required to access ELMS courses. Information on changing or resetting your password is available from https://identity.umd.edu/password/changepassword .

When you login to ELMS, under the "Courses" menu you will see a link for the ASTR 310 website. This website has all course handouts and information, including the syllabus and exam solutions. All course announcements will be posted here. You will also be able to view your grades (and no one else's).

2.3.1 What If I Need to Contact You?

If I have to contact you, I will do so by messaging you through the class website on ELMS or by emailing your TERPmail or UMD email account. **MAKE SURE TO CHECK YOUR ELMS MESSAGES and EMAIL FREQUENTLY**. You can set up ELMS to email your messages. You can also set up your UMD email account to forward to another account by visiting: http://www.testudo.umd.edu/apps/saddr/ . **I am not responsible if you miss crucial information that was messaged to you concerning this course.**

2.4 Textbook

The required textbook is Observational Astronomy by D. Scott Birney, Guillermo Gonzalez, and David Oesper, 2nd edition - *be sure to get the 2nd edition!* ISBN 978-0-521-85370-5. Most of the assigned reading for the course will come from this textbook. The electronic version is acceptable.

3 Grading

The table below shows the breakdown of the course grade. For details on each part, see the subsections below.

Work	Percentage of Course Grade
pre-lecture quizzes (20 of 23)	10%
in-class activities (approx. 20)	10%
lab activities, observing & analysis logbook (14 of 15)	10%
projects (2)	40%
challenges (2 of 3)	20%
final exam	10%

Letter Grade	Minimum Course Grade Percentage
A+	97.5%
A	92.5%
A-	90%
B+	87.5%
B	82.5%
B-	80%
C+	77.5%
C	72.5%
C-	70%
D+	67.5%
D	60%
D-	52.5%

I expect that an average student in this class will earn a B, about 85%. If the exams or assignments prove more difficult than expected, the minimum grade percentages for each letter grade may be lowered; they will never be raised.

No extra credit will be given in this class. If you do not feel you are doing as well as you could be on the assignments, arrange to meet with your TA or me to discuss them before they are due. Don't wait until the end of the semester!

3.1 Pre-lecture Quizzes

The pre-lecture quizzes are intended to aid you in critically reading the textbook or other reading or watching a pre-lecture video. I suggest that you go through the reading or video by itself first, and then go through the material again while you complete the pre-lecture quiz.

There will be 23 pre-lecture quizzes for the course. (The following lectures will **NOT** have pre-lecture reading/videos nor pre-lecture quizzes: 1, 5, 15, 23, 27, 28.) Pre-lecture quizzes will be based on the pre-lecture reading/video material. Your 20 highest pre-lecture quiz scores will count toward your course grade. All quizzes are weighted the same in their contribution to the course grade, regardless of the individual quiz point values.

The Pre-lecture Quizzes will be done on the class's website on ELMS: https://myelms.umd.edu/ . Go to this website and log in. Under "Courses", click on the ASTR 310 link. Then, on the menu on the left side, choose "Modules". You will see modules for each of the course lectures; within each lecture's module is the pre-lecture reading assignment (or pre-lecture video) and Pre-lecture Quiz.

The Pre-lecture Quizzes are not timed, but the quiz must be submitted prior to the due date: 2:00pm on the day of the lecture. **You can only submit the quiz once.** You can start a quiz and save your answers for later without submitting it, but if you forget to submit your saved answers, they will not count.

What if you miss a quiz? Your 3 lowest or missing ones will be dropped, so you if you miss a quiz, it will count as one of those.

- If you save your answers and forget to submit them, you may not submit them later after the due date.
- *You are responsible for planning ahead to insure that you have a reliable internet connection to submit the quiz.* The failure of an internet connection at the last moment is **NOT** an excuse and you will receive a zero for that quiz.
- If you are too sick to use the computer and complete the quiz, then you will receive a zero, and it will count as one of your dropped quizzes. (If you have an illness that causes you to miss more than one consecutive quiz, please see the "Absences" section for what to do.)

3.2 In-Class Activities

3.2.1 Nearpod

The lecture time will consist of small-group and whole-class discussion about the concepts relating to the day's topic. You will be asking to participate in various polling, diagramming, and mathematical questions during class.

We will be using the free app Nearpod in class in order to facilitate the above activities. You will be required to use this during class on your laptop, tablet, or smartphone. None of the answers or work that you submit to Nearpod will be graded; in fact, you are not required to sign in with your real name.

After class, the Nearpod slides will be posted on ELMS.

3.2.2 Writing Activities

During the lecture period, you will complete approximately 20 in-class activities that will be graded. Some activities will be done individually, and some will be done with your team.

The in-class activities will require you to utilize exploratory writing to answer a rather open-ended question about the material presented that day or to work out a problem or draw a diagram. The in-class activities will be completed in class and handed in at the end of class.

The purpose of the in-class activities is to improve your writing skills and to stimulate thinking about issues, questions, and problems raised by the class material. You will achieve the best score on the in-class activities by showing that you are thinking carefully about the relevant concepts and expressing your thinking clearly in writing.

The in-class activities will be graded on a scale of 1 - 5 following the guidelines below. With these guidelines, **I expect the average student to receive a 4** with a score of 5 indicating an above-average response.

- **5:** The writer understands the concept well. The writer discusses course material relevant to the question in easily-understood prose. There are no major errors in the use of astronomical terms. The response is easily readable with no major grammatical or other errors, although there may be a few small errors. The response is long enough to completely answer the question in a satisfactory way (usually a paragraph).
- **4:** The writer understands the concept reasonably well, but compared to a 5 response, there are some inaccuracies or vagueness in the discussion. Or the material in the response may be quite good, but be far too short to answer the question satisfactorily. Or, there may be a few major grammatical/writing errors or many smaller errors (such as punctuation and misspelling).
- **3:** The writer has some misunderstandings about the concepts discussed in the response; however, the writer has demonstrated considerable thought and effort in trying to understand the material. Or the response could have been a 4, except for a large number of typos, many social messaging abbreviations, or sections of the response that were incomprehensible.

- **2:** The writer has not addressed the question directly, but has written a "data dump" of material from the class. The response consists of true but unconnected facts, definitions, and statements from the lecture.
- **1:** A 2, but where the facts presented have numerous inaccuracies. Or a response that is completely incomprehensible.

The scores of your in-class activities will be summed to determine your grade for this portion of the course grade. Assuming that 20 activities are completed during the semester, the total scores required to achieve each letter grade are listed below. If more or fewer activities are completed, the point levels will be adjusted.

Sum of In-Class Activity Scores	Letter Grade	Score Used in Calculation of Course Grade
87 pts	A+	100%
84 pts	A+	97.5%
80 pts	A	92.5%
73 pts	A-	90%
71 pts	B+	87.5%
65 pts	B	82.5%
62 pts	B-	80%
59 pts	C+	77.5%
54 pts	C	72.5%
51 pts	C-	70%
48 pts	D+	67.5%
43 pts	D	60%
34 pts	D-	52.5%
23 pts	F	40%
14 pts	F	27%
4 pts	F	15%

Note that you do not have to complete all of the in-class activities to receive a high grade, nor do you have to complete all of them with a score of 5. For example, you may receive an A- by receiving a score of 5 on 15 activities, or by receiving a score of 4 on 19 activities.

What if you miss an in-class activity? As noted above, you do not have to complete every activity in order to receive a good grade. If you miss one, you receive a zero on it. (If you have an illness that causes you to miss more than one consecutive lecture and in-class activity, please see the "Absences" section for what to do.)

3.3 Projects

Detailed guides for each project will be handed out in class.

Both projects will be completed by teams of 4 (or 5) students. Team members may split up the workload for each project as they wish, but all team members are responsible for knowing how all aspects of the project were completed and why. Please see below about grading.

3.3.1 Project 1

The first project will require the use of the Astronomy Department's Observatory. All students are expected to attend at least one night of successful observing and data acquisition; arrangements will be made with the observatory director for transportation, if needed. You should expect to be at the Observatory for at least four hours and possibly more. Keep in mind that it gets colder than you might expect, so dress warmly!

The goals of the first project are:

- To image a nebula or galaxy through two different filters
- To measure the size and brightness of the object through each filter and compare them
- To create or adapt Python code to conduct your analysis
- To write a scientific paper detailing your results
- To give a talk about your results

3.3.2 Project 2

The second project will require the use of the database associated with the Zwicky Transient Facility (ZTF). This is a survey program that some Astronomy Department members are associated with through their research collaborations. You will explore and utilize the variable star data within the ZTF database and potentially other databases.

The goals of the second project are:

- To learn how to navigate and select data from the ZTF database
- To write a proposal describing a question that can be answered utilizing the database
- To explore the characteristics of variable stars in the database
- To write a scientific paper detailing your results
- To give a talk on your results

3.3.3 Project Stages

Each project has several stages, which are described below, along with their due dates.

1. **Proposal:** *Due Thursday, Sep. 15, 2022 for Project 1, and Thursday, Sep. 29, 2022 for Project 2.* You will propose a specific target to observe (Project 1) or problem to test using ZTF data (Project 2). Based on your prior knowledge, you will make a hypothesis. This will be graded primarily on completion and effort. It is also an opportunity for me to provide assistance to get your projects started on the right track.

2. **Analysis Plan and Rough Draft of Introduction:** *Due Thursday, Oct. 20, 2022 for both projects.* Separate documents will be submitted for each project. The analysis plan is a description PRIOR to beginning your analysis of how you plan to analyze your data in order to be able to test the hypothesis for that project. The rough draft of the introduction should adapt the scientific justification section of each project proposal into the final paper's introduction section. This will be graded primarily on completion and effort. There will also be peer editing of these documents, *due Tuesday, Oct. 25, 2022 for both projects.*

3. **Rough Draft of Introduction, Data, and Analysis Sections:** *Due Tuesday, Nov. 8, 2022 for both projects.* Separate documents will be submitted for each project. This is a rough draft of only the introduction, data/observations, and analysis sections of the final paper for each project. This will be graded primarily on completion and effort. There will also be peer editing of these documents, *due Monday, Nov. 14, 2022 for both projects.*

4. **Full Rough Draft:** *Due on Tuesday, Nov. 22, 2022 for both projects.* Separate documents will be submitted for each project. You will turn in a rough draft of your final paper for comments and suggestions. It must be complete and include results and discussion of results, otherwise it will not receive full credit.

5. **In-Class Presentation:** *Project 1 on Thursday, Dec. 1, 2022 and Project 2 on Tuesday, Dec. 6, 2022.* Your team will give a short talk in class about your project and results. A grading rubric will be given.

6. **Oral Exam:** *In lab on Monday, Dec. 12, 2022.* Each person will be given a private oral exam with me that concerns both projects and results. A grading rubric will be given.

7. **Final Draft:** *Due on Thursday, Dec. 8, 2022 for both projects.* Separate documents will be submitted for each project. You will turn in a scientific paper detailing your project from beginning to end. A detailed grading rubric will be given.

3.3.4 Project Grading

There is a lot of work involved with two course projects. While each team member is responsible for understanding the concepts and process for both projects, I expect the work for the projects to be divided among the team members. The following describes how the grades will be weighted for each team member.

There will be 4 (or 5) students on each team. Two team members will be "primary researchers" for Project 1 and "secondary researchers" for Project 2, and vice versa. If we call team members A, B, C, and D, then we can say that team members A and B are primary researchers for Project 1 and secondary researchers for Project 2, and team members C and D are primary researchers for Project 2 and secondary researchers for Project 1. *Teams must inform me no later than Tuesday, Oct. 4, 2022 about which team members are going to be primary and secondary researchers on each project.*

This is how the overall project grade would be determined for team members A and B:

Stage	Weight in Overall Project Grade	Components
Proposals	10%	50% Project 1, 50% Project 2
Analysis Plan & Rough Draft Introduction	5%	75% Project 1, 25% Project 2
Rough Draft of Intro, Data, Analysis	10%	75% Project 1, 25% Project 2
Full Rough Draft	10%	75% Project 1, 25% Project 2
Final Draft	30%	75% Project 1, 25% Project 2
Oral Presentation	15%	100% Project 2 (will not present Project 1)
Peer Editing	5%	100% peer editing Project 2, 50% for each occurrence
Oral Exam	15%	both projects are fair game

Please notice that even though team members A and B are only secondary researchers on Project 2, they will be solely responsible for giving the oral presentation on the project and responding to questions. Team members A and B should also be prepared for questions about both projects during the oral exam.

This is how the overall project grade would be determined for team members C and D:

Stage	Weight in Overall Project Grade	Components
Proposals	10%	50% Project 1, 50% Project 2
Analysis Plan & Rough Draft Introduction	5%	25% Project 1, 75% Project 2
Rough Draft of Intro, Data, Analysis	10%	25% Project 1, 75% Project 2
Full Rough Draft	10%	25% Project 1, 75% Project 2
Final Draft	30%	25% Project 1, 75% Project 2
Oral Presentation	15%	100% Project 1 (will not present Project 2)
Peer Editing	5%	100% peer editing Project 1, 50% for each occurrence
Oral Exam	15%	both projects are fair game

Please notice that even though team members C and D are only secondary researchers on Project 1, they will be solely responsible for giving the oral presentation on the project and responding to questions. Team members C and D should also be prepared for questions about both projects during the oral exam.

3.4 Lab Activities and Observing & Data Analysis Logbook

The laboratory section will be utilized for a mixture of activities.

Toward the beginning of the semester, you will be working on activities that will guide you in learning observing concepts, data analysis techniques, and computer tools. These activities will generally be organized in the form of worksheets, rather than formal "labs". There will be approximately six of these activities, which will be graded.

The lab worksheets will be distributed to each student in lab. Each student will copy-past the appropriate section of the lab into their logbook (see section below) and then respond/answer as appropriate. The TAs will access the logbook in order to leave comments and grade the activity.

As you acquire data for the first project at the Observatory and for the second project from the database, the laboratory section time will be increasingly utilized for data analysis and project work. This work will not be "graded", but you are expected to attend all lab sections - see the subsection below concerning your logbook. Occasionally, peer editing, review, and discussion activities will be organized to assist you in your project work.

3.4.1 Observing & Data Analysis Logbook

A good scientist knows to keep a detailed log of all data gathering and data analysis. This is so that he/she can look back later to re-trace his/her steps of observation and analysis to ensure that everything was done correctly, and to try to figure out the cause of any problems that have occurred.

Each team member will keep a log of his/her observing and his/her lab and data analysis activities. The observing and data logs should be complete enough so that another student in the class reading the logs could repeat all of the steps that you took. You are required to use OneNote software (see below).

You should have an entry in your logbook for each lab meeting, i.e., Week 1, Week 2, etc. When there is a specific lab activity, you will copy-paste the instructions and questions into your logbook and then enter your responses. The laboratory TA will inspect your logbook and possibly make comments - this is proof of your participation in the day's activities. You should, of course, also have notes in your logbook about what you did that day, beyond answering the lab activity. You should also have additional entries for any data analysis or telescopic observing that you did outside of the laboratory times.

Your Observing & Data Analysis Logbook is one of the supporting items you may bring to the oral exams for your projects. The more complete, organized, and readable your logbook is, the more helpful it will be to you during the oral exams.

OneNote How-To As mentioned above, you will be using the OneNote software to complete your labs and your logbook during your lab sessions. OneNote is available to all students through TerpWare and can be used directly in your browser, without the need to download an app (similar to Google Docs).

To get access to your TerpWare Office 365 account, go to http://portal.office.com. You will be redirected to a Microsoft login window. Login with your @umd.edu (NOT @terpmail.umd.edu), and with your directory password. You might have to complete the two factor authentication, so make sure you are prepared to do so. You can either download the applications from there, or you can use OneNote directly in your browser.

Once you are in OneNote, create a new notebook and title it something like "FirstName LastName - ASTR 310 Logbook". Once you have done so, share your notebook with your lab TA by clicking on "Share", choosing the "Anyone with the link can view" option, and emailing the link to your lab TA.

Please complete this before your first lab session (Sep. 12, 2022) in order to familiarize yourself with the software.

3.4.2 Grading

For the lab meetings when an activity is required, your grade will be a combination of grading the activity and participation. For the lab meetings when no specific activity is required, your lab grade will be based on participation. In order to "participate", you must be present in the lab for most of the time, at the TAs' discretion. There are 14 lab meetings for each section; your lowest or missing lab grade will be dropped.

The logbook counts as a 15th lab activity. It will not be dropped from your grade. A grading rubric for the logbook will be posted on ELMS.

3.5 Challenges

There will be three "Challenges" - essentially take-home exams - during the course. For each Challenge, there will be a baseline problem to solve or analysis to complete. The "Challenge" will be an additional evaluation of your result; if your result meets the challenge, then there may be an additional reward To Be Determined.

Detailed instructions regarding the grading and academic integrity guidelines for each Challenge will be given in class and on ELMS prior to each Challenge. *Each Challenge will utilize the skills and analysis techniques that you will be learning in class and using for the projects. The in-class material, Challenges, and projects are all related!*

The Challenges will be available on ELMS starting on the dates and times listed below. Once a student downloads a Challenge, they will have 48 hours until their answers must be uploaded, or they will receive a zero. If a student downloads the Challenge less than 48 hours prior to the ultimate deadline, then they only have the time remaining before the ultimate deadline to complete the Challenge. The ultimate deadline for submitting each Challenge is also listed below.

Challenge	Date Available	Time Available	Date Due	Time Due
Challenge 1	Monday, Oct. 3, 2022	3:00pm	Sunday, Oct. 9, 2022	11:59pm
Challenge 2	Monday, Oct. 24, 2022	3:00pm	Sunday, Oct. 30, 2022	11:59pm
Challenge 3	Monday, Nov. 14, 2022	3:00pm	Sunday, Nov. 20, 2022	11:59pm

The top two Challenge scores will be used toward the calculation of each student's course grade. However, each student must complete all three Challenges at a sincere effort level. If one Challenge is skipped (without arrangement with me due to extreme circumstances or illness), then all three Challenge grades will be used in the course grade calculation - that is, the zero will be included. The Challenges count toward 20% of the course grade.

3.6 Final Exam

The Final Exam for this course is on Saturday, Dec. 17, 2022, from 10:30am - 12:30pm. **Do not be late for the exam – you will not receive extra time.**

The Final Exam will be cumulative, but it will be more like a Challenge than a traditional final exam. Details about the Final Exam format and allowed devices and resources will be given in class toward the end of the semester.

If you are ill on the day of an exam and cannot attend the exam, you or someone else must contact me BEFORE THE EXAM IS FINISHED. If you are entitled to a makeup exam, it may be in another format of my choice. See the "Absences" section of the syllabus for more.

4 Absences and Accommodations

The University Attendance and Assessment Policy will be strictly followed in this class. This policy can be found online at "Course Related Policies" (http://www.ugst.umd.edu/courserelatedpolicies.html). According to these policies, the instructor is obligated to allow makeup work or provide alternate arrangements **only** for **excused** absences.

An excused absence is an absence that results from "illness of the student, or illness of a dependent as defined by Board of Regents policy on family and medical leave; religious observance (where the nature of the observance prevents the student from being present during the class period); participation in University activities at the request of University authorities; and compelling circumstance beyond the student's control." [Taken from the UM Attendance and Assessment Policy.] Note that a "compelling circumstance" is essentially an emergency.

- Examples of a "compelling circumstance": a death in the immediate family, a required court appearance
- Some examples of incidents that are **NOT** emergencies: running out of gas for your car, your bike tire being flat, the bus being late, bad traffic on the highway, your printer breaking. These are circumstances for which you need to plan ahead and allow yourself extra time daily to arrive on campus, just in case. If you experience one of these delays and it causes you to miss a pre-lecture quiz deadline, remember that 3 quizzes are dropped from the calculation of your grade.

As "Course Related Policies" describes, if you know ahead of time you're going to be absent for an excused reason, you need to notify me and make arrangements to make up work ahead of time. If you're unexpectedly absent for an excused reason, you need to notify me as soon afterward as possible. **PLEASE NOTE:** you may only submit one self-signed excuse due to illness per semester - for additional or extended medical absences, you must provide documentation from a doctor or the University Health Center. If you are absent for reasons other than illness, then you must provide documentation upon request.

My class policy is that if you're unexpectedly absent from lecture or lab for an excused reason, you must make up any missed work within 1 week of your return to classes, unless the TA or I make other arrangements.

If you know ahead of time that you must miss class for an unexcused reason (such as a wedding or personal travel), please let me know as soon as possible BEFORE your event, and I will try to be

flexible to arrange alternative assignments or makeup work. I will not allow makeups for unexcused reasons after the fact.

4.1 Student Accommodations

If you have a documented disability, you must work with the Accessibility and Disability Services' online portal to provide me with a copy of the University documentation by Monday, Sep. 12, 2022. Once you send me the documentation through ADS, we can discuss the accommodation you are permitted.

5 Academic Integrity

The process of scientific inquiry and education depends on the integrity of all participants. The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit http://www.studenthonorcouncil.umd.edu/whatis.html.

5.1 Copyright

My lectures and course materials, including powerpoint presentations, tests, outlines, and similar materials, are protected by copyright. I am the exclusive owner of copyright in those materials I create. You may take notes and make copies of course materials for your own use. You may not and may not allow others to reproduce or distribute course materials publicly, whether or not a fee is charged, without my express written consent.

5.2 Working Together

I encourage students in the class to discuss the material, including the pre-lecture quizzes, in-class activities, and lab activities. This means you **should**:

- Talk about the question and where you might find the answer.
- Talk about the concepts and details in the question.
- Work on example math problems on scratch paper or chalkboard.

These things are encouraged. However, be very careful that when you answer questions, you do so **independently.** That means that there are things you **should not do**:

- Give another student an answer to a pre-lecture quiz question.
- Develop exact sentences and paragraphs for your in-class activities or lab activities with another student.
- Work out complete math problems for another student.
- Cut-and-paste or hand-copy work from one student to another, **even if you worked out the answer together**.
- Copy text or wording directly from the textbook or other sources without quoting it and providing the source.

The list above is non-inclusive.

You must write your work up independently so that I and the TA know that you understand the problem. If you have identical work to that of another classmate, even if you worked on it jointly, you will be responsible for an act of **academic dishonesty** and the work of all students involved will be referred to the Student Honor Council. I have referred past incidents to the Honor Council and **all** of the students involved have been found responsible and been given XFs for the course.

5.3 Plagiarism

The Student Honor Council defines plagiarism as "intentionally or knowingly representing the words or areas of another as one's own in academic exercise." This means that if you copy material from another source, such as a textbook, a website, or another student, without giving credit to your source, you have plagiarized and are guilty of academic dishonesty.

When you are writing up your projects, be careful to avoid plagiarizing a textbook or a website. When you quote a phrase from a textbook or another source, make sure to indicate it is a quote and give your source.

Plagiarism is not tolerated in this class! If you plagiarize a significant amount of a project, your work will be sent to the Student Honor Council for evaluation and possible penalty – the typical penalty for such an offense is an XF for the class.

5.4 Writing in Your Own Words

The bottom line is that in order for me and the TA to evaluate how well you understand the material on an assignment, you must write it in your own words. If you quote the majority of your answers from a textbook or other sources, **even if you properly attribute the material**, you will not receive full credit for the problem because we do not know that **you** understand it. Ultimately, writing the work in your own words will enhance your comprehension of the material, which will only help you on the exams.

6 Schedule and Due Dates

The reading lists the source, chapter and sometimes pages that should be read **before** class and the pre-lecture quiz. (Guidance for finding the correct parts of the electronic version of the textbook are provide on ELMS within the module for each lecture.) If "video" is listed, then there is a pre-lecture video on ELMS for the day. *An asterisk indicates additional reading listed on ELMS for the day.*

Lecture	Date		Topic	Reading	Due
1	8/30	T	Course introduction; review magnitudes and color	Birney Ch. 5	
2	9/1	Th	Coordinate systems	Birney Ch. 1; pp. 66-72	
3	9/6	T	Time and local sidereal time	Birney Ch. 2, pp. 59-61, *	
4	9/8	Th	Discussion of first project	*	
5	9/13	T	**OBSERVATORY TOUR**		
6	9/15	Th	Variable Stars	Birney pp. 251-256, *	1ST PROPOSAL
7	9/20	T	Discussion of second project	*	
8	9/22	Th	Large datasets; analysis pipelines; ZTF	*	
9	9/27	T	CCD characteristics	Birney pp. 159-162, 165-168, 177, *	
10	9/29	Th	Image calibration	Birney Ch. 9	2ND PROPOSAL
11	10/4	T	Telescope characteristics	Birney pp. 101-105, 107-110	
12	10/6	Th	Photometry	Birney pp. 183-196	
13	10/11	T	Atmospheric effects on brightness and position; differential photometry	Birney Ch. 7, pp. 183, 198-201	
14	10/13	Th	Discussion of paper-writing	*	
15	10/18	T	In-class paper-editing		
16	10/21	Th	Statistics and usefulness	*	ANALYSIS PLAN + INTRO
17	10/25	T	Uncertainties; fitting	*	
18	10/27	Th	Period-finding techniques	Birney Ch. 14, *	PEER EDITING
19	11/1	T	Astrometry; catalogs; paper references	Birney pp. 209-212, Birney Ch. 3	
20	11/3	Th	Spectrographs; calibrating spectra	Birney pp. 215-233	
21	11/8	T	Analyzing spectra	*	ROUGH DRAFT INTRO, DATA, ANALYSIS
22	11/10	Th	Analyzing spectra		
23	11/15	T	In-class paper-editing, abstracts		
24	11/17	Th	Adaptive optics; scientific talks	*	
25	11/22	T	Determining and comparing capabilities of entire photometric or spectroscopic systems	*	FULL ROUGH DRAFT DUE
	11/24	Th	**THANKSGIVING BREAK**		
26	11/29	T	Space telescopes	*	
27	12/1	Th	**IN-CLASS PRESENTATION OF PROJECT 1**		
28	12/6	T	**IN-CLASS PRESENTATION OF PROJECT 2**		
29	12/8	Th	Getting telescope time	*	FINAL DRAFT
	12/17	Sat	**FINAL EXAM, 10:30am - 12:30pm**		