ASTR 315
Astronomy in Practice
Spring 2023 Syllabus

January 26, 2023

1 Course Philosophy

In *ASTR 315 Astronomy in Practice*, you will contribute to the body of astronomical knowledge of asteroids by studying a specific asteroid and determining its rotation period. You will begin by learning why this contribution is useful to our knowledge of the populations of asteroids. You will learn about the origin and typical characteristics of asteroids. Then you will begin learning and practicing the skills needed in order to locate asteroids in the sky, direct a telescope (via the internet) to the asteroid, and use the telescope and instruments to record measurements of the asteroid.

In order to make sense of your asteroid observations, you will learn how to analyze the observations, make photometric measurements, assess the quality of the data, and search the data for realistic rotation periods. You will determine if your asteroid has a measurable rotation period, or if its rotation period is too long for you to measure with your data. The end product of this project will be a short written paper about your results that will be submitted for publication in the *Minor Planet Bulletin*, the standard professional journal for such results.

ASTR 315 is a GenEd Scholarship in Practice course, which means that it has a specific goal in your educational experience at the University of Maryland. A Scholarship in Practice course is intended to give students an authentic experience in what it means to be a professional in a specific discipline by actually working toward and producing results of the sort that professionals would produce. Thus, in this course, you will make real observations of asteroids using professional-quality telescopes and equipment, analyze the data in the same manner an astronomer would, and publish your results. There are very few university courses in the world that offer this opportunity!

1.1 Goals

Why are you taking ASTR 315? Most likely you want to fulfill one of the University's GenEd requirements. However, if you take full advantage of this class, you can learn not only a lot about asteroids, but also skills that will help you in any future career you choose.

To this end, I hope you will realize a number of learning outcomes, which you might think of as "goals", by the time you finish ASTR 315 this semester. These goals include, but are not limited to, astronomical knowledge.

Below are the Scholarship in Practice course learning outcomes, with each of them tailored specifically for ASTR 315 in bold:

- Demonstrate an ability to select, critically evaluate, and apply relevant areas of scholarship.
  - **To understand how astronomers determine the characteristics of asteroids, students will...**

    - **Learn about the principles of gravity, orbits, motion, and light.**
    - **Study the techniques used in making telescopic observations.**
    - **Put those techniques into practice by planning and carrying out their own observations.**
    - **Demonstrate their understanding of the scientific principles by analyzing their observations to obtain genuinely new astronomical results.**

- Articulate the processes required to bring about a successful outcome from planning, modeling and preparing, to critiquing, revising, and perfecting.

  - **Through in-class exercises, students will demonstrate their understanding of the concepts and tasks required for their course project. Through intermediate project reports, the students will describe the procedures that their group is following, and they will also be able to observe the progress of other groups in order to revise their own performance. In a final report, students will articulate their understanding of the full scientific process of planning, observations, and analysis.**

- Demonstrate an ability to collaborate in order to bring about a successful outcome.

  - **Students will learn to collaborate by working in small groups during class and on their course project. During the semester, each group will work together to prepare written reports and/or oral presentations on their project, and each group will also produce a final written report which describes their methods and results.**

- Produce an original analysis, project, creative work, performance, or other scholarly work that reflects a body of knowledge relevant to the course.

  - **Students will write a paper based on their results for publication in a professional venue (such as the peer-reviewed *Minor Planet Bulletin*), thereby increasing the body of astronomical knowledge.**

The following goals are abilities that you have now to some degree that your enthusiastic participation in ASTR 315 will strengthen. These abilities will be useful to you in any career you choose. In particular, since many people now change careers several times, the ability to learn new skills is crucial - ASTR 315 can help you learn how to do this.

General goals:

- The ability to think critically and logically about information you encounter.
- How to learn about unfamiliar concepts and ways of thinking.
- How to communicate your knowledge to others.
- How to work effectively with others.

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. This will improve your grades.

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 long 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.

1.3 Course Structure

This is not a traditional lecture course.

The learning procedure for this course will be as follows:

1. **BEFORE LECTURE,** you will watch a pre-lecture video I have created using slides, images, and animations. 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.
3. During lecture, 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 complete a Certification to help yourself process and understand the material you just learned.

In your lab section, you will be split into teams of about 6 students - you will work with your team in lecture and lab in order to help yourself and your team members learn the material more effectively. In lecture, the active learning will also include concept tests, which are not graded. *You are expected to participate with your team in class discussion and lab, or you may lose participation credit (see the section on grading later in the syllabus).*

You will also be required to complete a project with your team. Each team member must contribute meaningfully to the project. Each team will develop guidelines to guide their team's behavior, work process, and to outline procedures for "firing" a team member. *A team member who is fired from a team for the team project will receive a zero for that project unless he/she is able to convince another team to "hire" him/her.* In addition, I will repeatedly ask each team member to evaluate how well the team is working together and in what way each team member is contributing. **For the team project and individual portions, I may adjust an individual student's score if I feel these evaluations justify the adjustment.**

1.4 Nearpod

During the lecture periods, each student will be expected to participate using an app called "Nearpod". Nearpod can be accessed through a mobile device (i.e., smart phone or tablet) or via a web browser on a laptop. The app/website access is free and does not require registration.

Through Nearpod, the class will share in information and activities based on the day's pre-lecture quiz material. The multiple-choice questions and other activities **will not be graded**; however, I expect you to sign in with your real name so that I may count your participation credit (please see section "Class Participation" below).

After class, the Nearpod slides for the day will be exported to a PDF and posted on the ASTR 315 ELMS website.

1.4.1 Distraction by Devices

Obviously you need to use your electronic device to access Nearpod for class use. Other in-class use of electronic devices for activities unrelated to the course is **strongly discouraged**. Excessive use that indicates that you are not participating or that distracts other students will prompt me to ask you to leave class and give you zero class participation credit for the day.

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 budge an average of 3 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.

1.6 Math in This Course

ASTR 315 is a Natural Sciences lab course and Scholarship in Practice course, which requires it to have "quantitative reasoning": math. The math used in the class is at the level you were capable of when you entered the university; however, I realize that your last math class may have been some time ago.

The math we will be using is as follows:

- We will be using scientific notation throughout the course. You can brush up on this on the website Scientific Notation at http://janus.astro.umd.edu/cgi-bin/astro/scinote.pl .
- We will be using units and doing unit conversions during the course. You can review SI units at http://physics.nist.gov/cuu/Units/index.html .
- We will be using mathematical equations to calculate physical quantities. Occasionally, we will be re-arranging these equations using algebra. For a review of this idea, visit http://www.purplemath.com/modules/solvelit.htm .
- We will be using logarithms.
- We will be interpreting graphs.

On the class website on ELMS, under the menu "Pages" is a document with examples of the different kinds of math problems you will be doing in ASTR 315. If you have problems with these math problems or math problems from the course, please visit your TA or me for help!

2 Practical Information

ASTR 315 Astronomy in Practice is a 4-credit GenEd Natural Science Lab course and Scholarship in Practice course. It may be counted in your transcript as a Natural Science Lab (DSNL) *or* a Scholarship in Practice course (DSSP), but not as both. There are no pre-requisites for this class; this class is aimed at non-science majors. ASTR 315 meets Tuesdays and Thursdays from 2:00 - 3:15pm in ESJ 2309.

2.1 Contact Information and Office Hours

Person	Email	Office	Office Hours
Dr. Melissa N. Hayes-Gehrke (she/her)	mhayesge@umd.edu	PSC 1208C	Tue 10-11am, Wed 3-4pm
Ms. Lacey Allee-Press (she/her)	laceyap@umd.edu	ATL 1243	TBA
Ms. Hannah Suresh (she/her)	hsuresh1@umd.edu	ATL 1243	TBA

When you email us, please make sure to put "ASTR 315" 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 Class Website

The course website will be on ELMS with the new 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://ldap.umd.edu/cgi-bin/chpwd .

When you login to ELMS, under the "Courses" menu you will see a link for the ASTR 315 website. This website has all course handouts and information, including the syllabus and exam solutions. You will also be able to view your grades (and no one else's).

2.2.1 What If I Need to Contact You?

If I have to contact you to discuss any aspect of the class, I will do so by messaging you through one of the following methods:

- The ELMS/Canvas messaging system
- Your UMD email
- Slack: We will set up a course Slack for short and quick communications between your team members, with me and/or the TAs, and to the class as a whole. Details will follow in class.

You are responsible for checking each of these communications methods frequently. I am not responsible if you miss crucial information that was sent to you concerning this course.

2.3 Lab Sections

If you are taking ASTR 315, you **MUST** attend a lab section. Make sure that you are registered for one of the following sections. **Lab sections begin on Friday, Jan. 27, 2023.** If you added the course after this time, consult the Absences section (under "planned excused absences") for what to do.

Section	Day	Time	Room	TA
0101	Friday	11:00am - 12:50pm	ATL 0224	Lacey Allee-Press
0102	Monday	9:00 - 10:50am	ATL 0224	Hannah Suresh

The lab sections are intended to help you learn the skills needed in order to complete the asteroid observing project. You will be actively learning the material through discussion with your team and other students in the class, as well as by working with the lab computers. During the lab section, you may learn computer skills, practice data analysis, practice math problems, or discuss concepts from the class.

Your grade for each lab section will be based on attendance and participation. In each lab section, you will sign in on an attendance sheet. You must attend **AND** participate for the majority of the time. In addition, during each lab meeting, there will be an activity, task, or information that you will be required to record in your Course Logbook. Your TA will sign off on your completion of this material in each lab. (For more details on the Course Logbook, see the "Project" section below.)

The TA will evaluate the level of your participation by doing a rough grading of your participation, activity and logbook entry on an "excellent", "satisfactory", and "unsatisfactory" scale. The TA will use their discretion for judging attendance and participation, and *their decision is final and will be supported by me.*

There are 14 lab sessions. Your lowest two lab session scores will be dropped. The remaining scores make up 15% of your course grade. If you add the class after the first one or two lab sessions, then those missing scores are the ones that will be dropped from your grade.

2.4 Textbook

There is no required textbook. Reading assignments may be given from online sources.

2.5 COVID-19 Safety Precautions

The University has provided guidance about the wearing of masks for students, faculty, and staff. As of the beginning of the semester, masks are not required in classrooms, but you are welcome and encouraged to wear one if you wish.

The University's guidance about COVID-19 safety may change as the pandemic situation changes and new scientific evidence is established. If the guidance changes, students will be required to follow the new guidance.

3 Grading

On all material in the course, credit will only be given for those responses that answer the question asked; partial credit may be given. Credit will not be given simply for effort. If you include material irrelevant to the question asked, you may have points deducted, even if the extra material was correct and the answer to the question was correct.

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

Work	Percentage of Course Grade
class participation (26 of 29)	5%
Pre-lecture Quizzes (15 of 20)	15%
Certifications	10%
Labs (12 of 14)	15%
Project	35%
midterm	10%
final exam	10%

Note: once your grade is calculated following the table above, any Contract Deduction you received will be subtracted from your grade. (See subsection "ASTR 315 Contract" below.)

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. 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 ASTR 315 Contract

You must correctly complete the ASTR 315 Contract questions; a sheet about these questions will be handed out in the first lecture. The ASTR 315 syllabus is a contract between student and instructor which lists the guidelines, rules, and conditions for the class. The Contract requires you to answer some simple questions about the administration and grading of the class, which you can answer by reading the syllabus.

You must complete the ASTR 315 Contract Questions correctly by the beginning of lecture (2:00 pm) on Tuesday, Feb. 14, 2023, in order to NOT receive a deduction in your course grade. After a one-day grace period, you will receive a deduction of 2.5% to your course grade per calendar day that you do not complete the contract questions correctly.

Here is an example tabulation of the amount that will be **DEDUCTED** from your course grade if you do not correctly answer the ASTR 315 Contract Questions **BEFORE** the following dates and times:

Before Date and Time	Days After Due Date	Deduction	Result to Your Grade
Tuesday, Feb. 14, 2:00pm	0	0%	No effect
Wednesday, Feb. 15, 2:00pm	1	0%	No effect
Tuesday, Feb. 21, 2:00pm	7	15%	Better than B impossible
Monday, Feb. 27, 2:00pm	13	30%	Better than C- impossible
Sunday, Mar. 5, 2:00pm	19	45%	Better than D- impossible
Monday, Mar. 6, 2:00pm	20	47.5%	IMPOSSIBLE TO PASS COURSE

The ASTR 315 Contract questions are administered as a quiz on the class's website on ELMS: https://myelms.umd.edu/ . Go to this website and log in. Under "Courses", click on the ASTR 315 link. Then, on the menu on the left side, choose "Assignments". You will see an item called "ASTR 315 Contract Questions". Click on that to begin the quiz.

If you answer some questions incorrectly, you may re-do the quiz as many times as necessary in order to get them all right. The date that you last took the quiz and your score is recorded automatically in the gradebook on the website. At a later time, the deduction you will receive to your course grade (as described above) will be computed based on when you correctly completed the questions. This deduction will be entered in a column in the gradebook called "Contract Deduction".

3.2 Pre-lecture Quizzes

There will be 20 Pre-lecture Quizzes for the course. (The following lectures will **NOT** have pre-lecture videos nor Pre-lecture Quizzes: 1, 10, 15, 18, 24, 25, 26, 27, 28.) Pre-lecture Quizzes will be based on the pre-lecture video material. Your 15 highest Pre-lecture Quiz scores will count toward your course grade. All of the quizzes are weighted the same amount toward your course grade, even if the individual quizzes have different point values. (In other words, it is your percentage score on the quiz that matters.)

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 315 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 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 period. **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.

When you take the quiz, you will not receive feedback about whether your answers are correct or incorrect. This is to discourage cheating. The answers will become available in a separate file on ELMS at a later date. (No answers will be available before the last day to add a course, Feb. 2, 2022.)

What if you miss a quiz? Your five lowest or missing ones will be dropped, so 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.)

3.3 Certifications

There will be 24 Certifications for the course; all lectures that have Pre-lecture Quizzes also have Certifications. In addition, the days of Status Reports have special Certifications described below.

The typical Certifications will require you to use the information and skills you have learned in the current pre-lecture video and in class to answer a question, solve a problem, draw a diagram, or complete another short activity. If you complete a Certification at an excellent level, then you have mastered the skills and information covered that day. The Certifications will be completed in class and handed in at the end of the class.

You will have the opportunity to revise and improve some of your past Certifications, or to complete ones that you have missed. The table below lists which Certifications may be revised (or completed if missed) and when the revised versions are due. You may revise (or complete if missing) ONE Certification in each date range.

Certification That May Be Revised	Due Date (in class)
Certifications 2 - 6	Feb. 23, 2023
Certifications 7 - 13	Mar. 28, 2023
Certifications 14 - 19	Apr. 18, 2023
Certifications 20 - 23	May 4, 2023

On the days of Status Reports, each student will be critiquing the oral reports given by the teams. The method of the critiquing will be discussed in class. Sincere completion of the constructive criticism will count as a Certification for the day.

The Certifications will be graded on a scale of 1 - 5, with the guidelines below on how the Concept Questions will be graded. With these guidelines, **I expect the average student to receive a 3 or 4** with a score of 5 indicating an above-average, excellent answer.

- **5:** The writer understands the concept well. The writer discusses course material relevant to the question in easily-understood and well-written prose. There are no major errors in the use of astronomical terms. The answer is easily readable (although it is permissible to have a small number spelling or grammatical errors). The answer 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 answer, there are some inaccuracies or vagueness in the discussion. Or the material in the answer may be quite good, but there are significant problems with the writing. Or the material in the answer may be quite good, but be far too short to answer the question satisfactorily.

- **3:** The writer has some misunderstandings about the concepts discussed in the answer; however, the writer has demonstrated considerable thought and effort in trying to understand the material. Or the answer could have been a 4 answer, except for a large number of typos, many social messaging abbreviations, or sections of the answer that were incomprehensible.

- **2:** The writer has not addressed the question directly, but has written a "data dump" of material from the class. The answer consists of true but unconnected facts, definitions, and statements from the lecture.

- **1:** A 2 answer, but where the facts presented have numerous inaccuracies. Or an answer that is completely incomprehensible.

The scores of your Certifications will be summed to determine your grade for this portion of the course grade. The total scores required to achieve each letter grade are listed below.

Sum of Certification Scores	Letter Grade	Score Used in Calculation of Course Grade
100 pts	A+	100%
97 pts	A+	97.5%
91 pts	A	92.5%
86 pts	A-	90%
83 pts	B+	87.5%
78 pts	B	82.5%
75 pts	B-	80%
72 pts	C+	77.5%
67 pts	C	72.5%
64 pts	C-	70%
61 pts	D+	67.5%
56 pts	D	60%
47 pts	D-	52.5%
36 pts	F	40%
27 pts	F	27%
17 pts	F	15%

Note that you do not have to complete all of the Certifications 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 18 Certifications, or by receiving a score of 4 on 22 of them.

What if you miss a Certification? As noted above, you do not have to complete every Certification 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 Certification, please see the "Absences" section for what to do.)

3.4 Project

Each team in the class will observe an asteroid for several nights using telescopes controlled via the internet. Once each team has completed their observations, each team will analyze its results and produce a lightcurve for the asteroid it observed. Each team will use the lightcurve to determine the rotation period of the asteroid, if possible. Each team will write up its results in a short paper to be submitted to the *Minor Planet Bulletin*.

3.4.1 Schedule

The Project has a number of due dates, as shown below.

Item	Due Date
Status Report 1: Asteroid Selection	in class on Tuesday, Feb. 28, 2023
Status Report 2: Observing Plan	in class on Tuesday, Apr. 4, 2023
Observing Begins	Thursday, Apr. 13, 2023
Status Report 3: Data & Analysis	in class on Tuesday, Apr. 25, 2023
Observing Ends	Tuesday, Apr. 26, 2023
Status Report 4: Results	in class on Tuesday, May 9, 2023
Talk at AstroTerps	Monday, May 8, 2023 at 6:30pm
Paper (hardcopy and computer file)	in class on Thursday, May 11, 2023
Course Logbook	at final exam on Wednesday, May 17, 2023

3.4.2 Grading

The Project counts toward 35% of your course grade. Each component of the Project has a specific weight in the Project grade, as shown below. Each team will have 6 students.

Component	Team Participants	Weight in Project Grade
Status Report 1	all team members	20%
Status Report 2	3 team members as "authors"; 3 team members as "editors"	12% for "author" report and 3% for "editor" report
Status Report 3	team members reverse roles from Status Report 2	
Status Report 4	2 team members "authors"; other 4 "editors"	25% for "author' item, and 5% each for other 2 items
AstroTerps Talk	different 2 team members "authors"; other 4 "editors"	
Final Paper	different 2 team members "authors"; other 4 "editors"	
Participation in Observing	all individuals	10%
Participation in Team Evaluations	all individuals	10%
Course Logbook	all individuals	10%

For an assignment for which you are in an "author" role, that means that you are one of the team members primarily responsible for researching, organizing, and writing that assignment, in coordination with any other team members in an "author" role. For an assignment for which you are in an "editor" role, that means that you should assist the "authors" in revising and proofreading as needed to make the assignment high-quality. As an "editor", your grade will be partly based on the score for that assignment, so you need to pro-actively make sure you are involved if you have concerns about the quality of the assignment.

The Status Reports are considered Major Scheduled Grading Events; see the "Absences" section for an explanation of this.

3.4.3 Observing

The members of each team will be required to observe the team's asteroid for several nights. The initial observing nights will be between Apr. 13 and Apr. 26, 2023; more nights may be added if some nights are lost due to weather. In lab section, your team will work out an observing schedule. Two teams will be observing each asteroid; but only one of these team members must be present for observing at each time.

3.4.4 Course 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 data analysis activities. Each student's logbook will be kept in a Google doc in a Google Drive folder provided by the lab TA. The logbook should contain not only your notes, but also relevant equations, figures, and images that can be copy-pasted into it. The logbooks will be "turned in" and graded at the end of the course.

In each lab section, specific information will be required to be recorded in the logbook. Each student should be recording substantial information beyond this about the observing and data

analysis done by his/her team. The course logbooks should be complete enough so that another student in the class reading the logbook could repeat all of the steps that you took.

You are welcome to also use your logbook to record notes while watching the pre-lecture videos, participating in class, or working on class assignments. Make sure to date each entry and briefly describe what you're doing.

A rubric describing how the logbook will be graded will be given out in class.

3.4.5 Status Reports

At four stages during the Project, each team will give a Status Report on their Project. Each Status Report will consist of a written report and an oral report to the class. The table above described which team members will be responsible for each Status Report. Each Status Report is considered a Major Scheduled Grading Event; see the "Absences" section for an explanation.

Status Report Topics Each Status Report will focus on a specific topic. A brief summary of each topic is given here; a more detailed discussion will occur in class.

- Status Report 1 (Tuesday, Feb. 28): *Asteroid selection.* Each team will submit three candidate asteroids to observe from the distributed list. For each asteroid, the team will report the rising and setting times of the asteroid. The team will report whether the Moon will interfere with the observation of each asteroid. The team will discuss the known information on each asteroid, and why each was selected as a candidate.
- Status Report 2 (Tuesday, Apr. 4): *Observing plan.* Each team will report on their observing plans for filters and exposure times and why they were selected. The team will report on which coordinates will be used to observe its asteroid.
- Status Report 3 (Tuesday, Apr. 25): *Data & analysis.* Each team will report about their data collection: how many images did it collect? Were any images discarded? Were the comparison stars selected adequate? Each team will display its asteroid lightcurve so far.
- Status Report 4 (Tuesday, May 9): *Results.* Each team will report the possible rotation periods it found for its asteroid. Which rotation period appears to be the most accurate, and why?

Written Status Report The written Status Reports do not have a minimum or maximum length, as long as the required information is discussed appropriately. The formatting of the written Status Reports should include:

- A cover page with the team name, the names of each team member, and the date of the Status Report
- Reasonable margins, font size, and spacing so that it can be read easily and comments can be given
- Brief introductory and summary paragraphs at the beginning and end
- Images, figures, diagrams, etc., may be included as appropriate; be certain to cite the sources of such materials
- If any outside sources of material are used, they should be cited in-text and a bibliography should be given at the end using MLA format.

A description of the content of each Status Report will be given out in class.

Oral Status Reports Each team will give an oral Status Report in class for the Status Reports (the written report is also due). Each "author" team member should speak during the Status Report. The presentations may take no longer than 5 minutes. In the oral Status Report, the team should describe the content of their written Status Report in a dynamic and interesting way. The presentation should be prepared in Google slides, and it should be shared with Dr. Hayes-Gehrke (mhayesge@umd.edu) by 2:00pm on the date of the presentation.

Grading Prior to the due dates of the Status Reports, a grading rubric for both the written and oral Status Reports will be given out.

Status Report Critiques During the oral Status Reports, other students in the class will be critiquing the oral presentations. These critiques will be given (anonymously) to the presenting teams so that they may improve their future presentations.

Participation in Team Evaluations One of the teamwork skills you will be developing in this class is the ability to give constructive feedback about how your teammates are working with your team and to receive constructive feedback about your own performance with your team. You will be required to provide feedback about yourself and your team members at several points throughout the semester. Your *sincere* participation in these team evaluations will receive full credit; the content of your evaluation and feedback will NOT be graded for "correctness".

Five team evaluations are planned. Your sincere participation in all five will receive 100% for this component of the project grade; participation in four of five will receive $4/5 = 80\%$, and so on. See the Absences section below if you miss a team evaluation opportunity.

Team Evaluation Event	Evaluation Occurs Between Dates
Email Check	Feb. 16 - 20
Status Report 1 due	Feb. 28 - Mar. 3
Status Report 2 due	Apr. 4 - 7
Status Report 3 due	Apr. 25 - 28
Status Report 4 due	May 9 - 12

You will receive instructions in class about how to complete the team evaluations.

3.4.6 Paper and AstroTerps Talk

The Project will culminate in a final paper that will be prepared by each team following the *Minor Planet Bulletin* format so that it will be suitable for publication in that journal. The format will be discussed in class. The paper will include a brief description of the observing procedures and data analysis and a more detailed discussion of the results for the team's asteroid.

A grading rubric for the final paper will be distributed prior to the due date.

Each paper will be submitted in hardcopy and as a computer file to me. Before it is submitted to the *Minor Planet Bulletin*, I may make edits to each paper.

Some members of the class (see the table above about distribution of duties to team members) will create, organize, and give a talk about the class results to the AstroTerps, the university's undergraduate astronomy club, on May 8, 2023. Details about this will be discussed in class. A grading rubric for the talk will be distributed prior to the talk; it will be similar to the grading rubrics for the oral presentations of the Status Reports.

3.5 Class Participation

Class participation is crucial for your understanding of the material in the classes and for your success in the course. I will assume that if you are attending class that you are participating in class; consequently I will be recording your attendance at each lecture.

At the beginning of each class, you should login to Nearpod to access the class activities; please use enough of your real name that I can identify you. My records for each Nearpod class session will be used to determine your attendance and participation; you should be present in the classroom and logged in to Nearpod for the majority of the class time. At my discretion, if I feel that you are "gaming" the system, I may deduct from your class participation points.

It is **UNACCEPTABLE** for you to login to Nearpod for a friend in order to give him/her class participation if he/she is not present and to do so is an act of academic dishonesty.

If you have joined the class after the first day of class, make sure to notify me and pick up a "late add" sheet that will fill you in on what you missed and what you need to make up.

Your presence or absence in each lecture will be listed in the gradebook on the class website, under the lecture number for each day. A score of "100" means you were present and participated, while a score of "0" or "-" means you were not.

3.6 Exams

Test	Date	Time
Midterm	Thursday, Mar. 16, 2023	in class
Final Exam	Wednesday, May 17, 2023	10:30am - 12:30pm

You may use a scientific calculator on the exams. You **may not** use any other type of device, such as a cell phone, computer, or tablet. A list of equations used in the class, as well as astronomical unit conversions, will be provided on the exam.

Do not be late for the exams – you will not receive extra time. Traffic problems are not an excuse.

All examinations will be held in ESJ 2309. The midterm exam, Status Report oral presentation dates, and final exam are Major Scheduled Grading Events; see the "Absences" section for an explanation.

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.

If the University is officially closed on the day of a midterm exam, the exam will be held in the next regularly scheduled lecture.

If you find a mistake in the grading of the exam or wish to have the grading of a problem re-checked, you must do so prior to the next exam. After that time, no further changes will be made to the prior exam's grade. I will retain the final examination for each student for one year after the final examination has been given.

3.6.1 Team Exams

The midterm exam and the final exam will have both an individual and group component. Approximately 2/3 of the exam time will be allotted for each student to complete the exam individually, and approximately 1/3 of the exam time will be allotted for student teams to complete the same exam. Exact details will be announced in class prior to the exams.

Each student's "box score" for an exam, which is the score that counts toward his/her course grade, will be a combination of his/her score on the individual exam as well as the team exam. The box score will be weighted so that 75% is based on the individual exam and 25% is based on the team exam. However, if the score on the team exam is lower than that student's score on the

individual exam, then the group exam will not be included, and the box score for that student will be 100% of the score on the individual exam.

4 Absences and Accommodations

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

If you miss an class that has a Major Scheduled Grading Event, then you must get a specific, dated excuse from the University Health Center or another medical professional. The University Health Center is required to provide such excuses if you inform them you are missing a Major Scheduled Grading Event; these excuses are NOT the ones that are self-written by students. The Major Scheduled Grading Events in this course are: the Status Reports' oral presentations, the midterms, and the final exam.

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 serious car accident involving yourself or a family member, your house burning down.
- 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 five quizzes are dropped from the calculation of your grade.

4.1 What to Do If You Have an Excused Absence

- **Planned Excused Absences.**
  - **If you must be absent FROM LECTURE for a university-approved athletic event (or other university activity) or religious observance...** you must contact me *at least 1 week in advance* to make appropriate arrangements to complete the Certification within one week of your absence. You must arrange with your team to complete any contributions to the Project due that day before your absence.
  - **If you must be absent FROM LAB SECTION for a university-approved athletic event (or other university activity) or religious observance...** you must contact the TA for your lab section *at least 1 week in advance*. Your TA will make arrangements will you to complete work to make up your absence. *You must make up missed lab section work within one week of your return unless your TA makes extended arrangements!* If you register for the class after the first lab section is held, the missed lab section counts as your dropped score.
  - **If you are unable to be online to complete a PRE-LECTURE QUIZ...** you must submit the Pre-lecture Quiz before you leave. If you will have an extended absence, contact me *at least 1 week before you leave.* When you contact me before you leave,

we will make arrangements for you to complete the Pre-lecture Quiz at a later date, if necessary.

- **Unplanned Excused Absences.**

  PLEASE NOTE: starting in Fall 2016, 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 miss an STATUS REPORT oral presentation or EXAMINATION because of illness or a compelling circumstance...** you or another person must contact me by email (mhayesge@umd.edu), ELMS message, or Slack **BEFORE THE LECTURE PERIOD IS FINISHED** - if you are too ill to get out of bed, get a friend or relative to contact me. These are Major Scheduled Grading Events as described by University policy - see the description at the beginning of this section. If you have a "compelling circumstance", you must be prepared to document it. Once you have contacted me, in the case of a missed examination, you must take a makeup examination as soon as possible, but no later than one week after you return to your normal class schedule. A makeup examination may be in an alternate format of my choice.
  - **If you miss a LECTURE (no exam or Status Report) because of illness or a compelling circumstance...** you must contact me by email (mhayesge@umd.edu), ELMS message, or Slack **within 48 hours** - if you are too ill to get out of bed, get a friend or relative to contact me. You must be prepared to document how your absence fell under the University's excused absence policy, or see me and fill out an excused absence form (you may only do this ONCE). Since it is not required to do all Certifications, there will be no make up for the one you miss, except as described in the "Certifications" section.
  - **If you miss a LAB SECTION because of illness or a compelling circumstance...** you must contact your TA **within 48 hours**. Your TA will make arrangements for you to complete makeup work. You may only provide a self-signed excuse for an absence ONCE. *You must make up missed lab section work within one week of your return to classes unless your TA makes extended arrangements!*
  - **If you are unable to be online to complete a PRE-LECTURE QUIZ...** the quiz you miss will count as one of your dropped scores.

    Your internet connection being "down" is not an emergency!
  - **If you are unable to be online to complete a TEAM EVALUATION...** you or another person must contact me by email (mhayesge@umd.edu), ELMS message, or Slack **BEFORE THE TEAM EVALUATION PERIOD IS FINISHED** - if you are too ill to get out of bed, get a friend or relative to contact me. These are Major Scheduled Grading Events as described by University policy, so you are required to have a University Health Center excuse or another official medical excuse to present to me upon your return to lass. If you have a "compelling circumstance", you must be prepared to document it.
  - **If you have an extended illness causing you to miss more than one lecture and/or lab in a row,** you must notify me as soon as you are able. For such an extended illness, University policy states that you must provide an excuse from the University Health Center or other medical provider. You must present this excuse to me in person within one week of returning to your normal class schedule so that we can make special arrangements for making up the work missed.

4.2 What to Do If You Have an Unexcused Absence

- **Unplanned Unexcused Absences.** Examples of reasons for unexcused absences: traffic problems, oversleeping, forgetting the assignment was due, missing the bus.
  - **If you miss a regular LECTURE (no exam or Status Report oral presentation)** for an "unexcused" reason, you may not be counted as present, nor may you make up the Certification, except as described in the "Certifications" section.
  - **If you miss a LAB SECTION** for an "unexcused" reason, you may not make it up. You may miss two lab sections with no penalty.
  - **If you miss a PRE-LECTURE QUIZ or TEAM EVALUATION online** for an "unexcused" reason, you may not make it up.
  - **If you miss a MIDTERM EXAM or STATUS REPORT oral presentation** for an "unexcused" reason, you may not make it up.
- **Planned Unexcused Absences.** I realize that important events may occur at inconvenient times. Examples of important events that are not "compelling circumstances": participating in a wedding, attending a major political event, going to a job interview.
  - If you have an important event that will occur during **lab section**, contact your TA at least **one week** ahead to time. At your TA's discretion, you may make arrangements following the "planned excused absence" policy described above to make up the work you will miss. **No student may do this more than once.**
  - If you have an important event that will occur during a **PRE-LECTURE QUIZ or TEAM EVALUATION** due date, then you must submit it early.
  - If you have an important event that will occur during **on the date of a midterm exam**, contact me **at least 2 weeks in advance** and explain to me the nature of the event. **At my discretion**, I may allow you to take an examination **EARLY**. I may require documentation of your participation in the event (for example, a program with you listed as a participant). **No student may take an exam early more than once, and I am under no obligation to allow ANY student to take an exam early.**
  - You may not be counted as present for the lecture(s) you will miss. You may not make up the Certification, except as follows the re-do policy under "Certifications".

  If you have a number of such important events during the semester and will consequently miss a lot of class time, you will not do well in this class, and you should reconsider taking it.

4.3 Student Accommodations

If you have a documented disability, the Accessibility and Disability Services (ADS) will contact me electronically. It is your responsibility to arrange to meet with me (you may drop into my office hours) by Tuesday, Feb. 7, 2023 to discuss how your academic accommodations will be implemented.

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 https://studentconduct.umd.edu/you/students

5.1 Copyright

My lectures and course materials, including 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 and Certifications. 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 the Pre-lecture Quizzes, 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 or Certification.
- Develop exact sentences and paragraphs for your Certifications 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 pre-lecture videos without quoting it and providing the source.
- Use an AI tool or app to write your answers and then copy them.

You must write your work up independently so that I and the TAs 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 Group Chats

I am aware that there will likely be a group chat established for this course, either for all class members or within individual teams. In addition, the course will have a Slack chat that you are all encouraged to use. I 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 use in cases when electronic devices are allowed in the course.	To use during exams or at other times when electronic devices are not allowed.
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 notify the instructor of any conduct or remarks on the group chat that go against the university's Code of Academic Integrity or Non-Discrimination Policy.	To use to complete an in-class assignment when you are not in class, such as clicker questions or pop quizzes.
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.
To coordinate with other course members on a groupwork assignment.	

The university's Code of Academic Integrity (https://president.umd.edu/sites/president.umd.edu/files/documents/policies/III-100A.pdf) 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.

The university's Non-Discrimination Policy https://ocrsm.umd.edu/discrimination/non-discrimination-policy-and-procedures 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."

As you use a group chat and/or the Slack for this course, keep in mind that *it is unacceptable to have another person do your own work*, 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.

5.4 Plagiarism

The Code of Academic Integrity 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 Project and Status Reports, 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.

6 Schedule and Due Dates

The schedule of topics and due dates is on the next page. "STATUS" is the written Status Report. "CERT" is when the Certification re-dos are due - see the "Certifications" section. "Paper" is the final Project paper and computer file.

Lecture	Date		Topic	Due
1	1/26	Th	Course introduction	
2	1/31	T	Why learn about asteroids?	
3	2/2	Th	Where is the Earth in the universe?	
4	2/7	T	When can we see an asteroid? part 1	
5	2/9	Th	When can we see an asteroid? part 2	
6	2/14	T	When can we see an asteroid? part 3	
7	2/16	Th	When can we see an asteroid? part 4	
8	2/21	T	Basics of light	
9	2/23	Th	How telescopes work	CERT
10	2/28	T	**STATUS REPORT 1**	STATUS 1
11	3/2	Th	How CCDs work	
12	3/7	T	Asteroid characteristics	
13	3/9	Th	Asteroid lightcurves	
14	3/14	T	Using telescopes	
15	3/16	Th	**MIDTERM**	
			SPRING BREAK	
16	3/28	T	Noise in data	CERT
17	3/30	Th	Aperture photometry	
18	4/4	T	**STATUS REPORT 2**	STATUS 2
19	4/6	Th	Differential photometry	
20	4/11	T	Searching for rotation periods	
21	4/13	Th	Basics of gravity	
22	4/18	T	Formation of the solar system	CERT
23	4/20	Th	Writing up results	
24	4/25	T	**STATUS REPORT 3**	STATUS 3
25	4/27	Th	**DATA ANALYSIS IN LAB (ATL 0224)**	
26	5/2	T	**DATA ANALYSIS IN LAB (ATL 0224)**	
27	5/4	Th	**DATA ANALYSIS IN LAB (ATL 0224)**	CERT
28	5/9	T	**STATUS REPORT 4**	STATUS 4
29	5/11	Th	Future asteroid search programs and exploration	PAPER
	5/17	W	**FINAL EXAM**, 10:30am - 12:30pm	