ASTR 196: Astronomical Problem Solving

Fall 2018 – Section 001
Thursdays from 12:30 to 1:45 pm

Syllabus

I. Contact and User Information

Professor Dr. Don McCarthy

Email: dmccarthy@as.arizona.edu
Phone: (520) 621-4079
Twitter: @stellarDon
Office: Steward Observatory, room N404. Ride the main elevator up to the fourth floor and walk straight ahead.

Office hours: Wed. 12:30-1:45 pm and by appointment. Do not hesitate to contact me!
Study session: combined classes Wed. 2-4 pm (Bookstore 2nd-floor conference room)

Links and Tutoring

Class Web site: http://lavinia.as.arizona.edu/~dmccarthy/ASTR196/index.html
ATOMM: Astronomy Tutoring Offered for Majors, by Majors
Monday through Friday (1-2:30 pm; 3rd floor library in Steward Observatory)
http://uaastroclub.org/resources/astronomy/atomm/

II. Course Overview

ASTR 196 is a weekly, one-unit seminar in problem-solving and critical thinking available to freshmen planning to major in astronomy. It is designed to introduce these students to astrophysics and the types thought processes they will need in order to succeed in their future courses and careers. Based on topics involving astronomical and natural phenomena, this course emphasizes basic reasoning and numerical skills using pre-calculus mathematics. Expected learning outcomes include mastery of techniques for analyzing questions, formulating logical solutions, physical intuition, the scientific method, and the use of numerical techniques, both mental and electronic.

Time and location: Thursdays from 12:30-1:45 pm in room 206 of Harshbarger building. There may be occasional exceptions to be announced beforehand in class and on our Web site. Classes will begin promptly. If you arrive late, please enter quietly. Food and drinks are not allowed in the classroom.

Textbook: The book entitled *"How to Solve It"* (Polya, 1945) is recommended but not required.

Expectations: Each student is expected to come prepared for every scheduled class. As a general rule, students should invest ~3 hours per week in preparation, preferably starting several days ahead of the due date. During class students are expected to participate actively in problem-solving discussions with their peers. Since each class will build on the previous one, if you miss a class, you can get behind so quickly that it may be very difficult to catch up, and you will also miss important quizzes, discussions, collaborative work, etc. Throughout the semester students are expected to write clear sentences and paragraphs using good English grammar.

Your personal Messier object:
On the first day of class you will be assigned a Messier object as your code name for all submitted materials and for posting of grades. **To protect your privacy, never write your personal name or**

student ID number on any assignments in this course. Instead, use the number of your Messier object.

III. Homework, TBD Grades, Optional Project, and Exams

Weekly homework assignments are a major component (60%) of this course and will emphasize skills in logical thinking, physical intuition, numeracy, writing, and basic astronomy. Students will take turns presenting their solutions during class. The following **rules** apply to homework assignments:

1. Electronic submissions are not accepted.

2. All submissions must exhibit excellent clarity with legible handwriting and clear, well-organized arithmetic solutions and logic.

3. Homework is due at the start of class on the specified date. Permission to submit late must be granted by Dr. McCarthy in advance of the deadline. A **late-penalty** of 20% may be assessed. Assignments will not be accepted more than one week late.

4. You must always **SHOW** or explain **HOW** you reached a solution by clearly recording the intermediate, logical steps in a calculation or describing your solution logically in words. Simply listing an answer is not acceptable and will not receive any points.

5. Some problems require your opinion to be clearly stated. In these cases, your grade will be determined more by your reasoning and writing performance than by the exact answer.

6. Teamwork Policy: You may START an assignment in a team. However, after deciding HOW to approach a problem, **you must then make all your own derivations, measurements, graphs, and tables and always use your own wording to interpret and express conclusions.** Homework solutions that appear identical are a violation of the Code of Academic Integrity and will receive a grade of zero plus potential expulsion from the course and University.

"TBD" grades: Sometimes students misread a question, get started in the wrong direction, or make a simple mistake leading to the wrong conclusion. Such assignments will receive a "TBD" grade (i.e., "to be determined"), allowing you to get back on track if you meet with Dr. McCarthy within one week to discuss your work and arrange to improve it.

Daily quizzes will be given to promote understanding, self-assessment, attention, participation, and teamwork. Quizzes may consist of several questions spread throughout each class.

Optional project: In lieu of the final exam each student may undertake a substantial project that will comprise 20% of the final grade. This project can take many different forms but should involve creative problem-solving work, not a library "research paper." The topic must be approved in advance by Dr. McCarthy by October 4, and then summarized in a brief proposal.

There will be two exams: A mid-term (October 4) and a final (December 7, from 1-3 pm). You may bring a handwritten, double-sided page of notes ("crib sheet") to consult during the exam. Exams will emphasize understanding, not memorization. Here are links to the University's Final Exam Regulations and Schedule:
https://www.registrar.arizona.edu/courses/final-examination- regulations-and-information
http://www.registrar.arizona.edu/schedules/finals.htm

IV. Grading

Course Grade: The course grade will be calculated from the following categories with the indicated percentage weights.

Weekly homework (60%)
Participation: Attendance, quizzes, office hours, study sessions, etc. (20%)
Final exam or project (20%)

"Participation" includes attending class regularly, completing assignments, in-class quizzes, asking relevant questions during class, seeking help during study sessions and office hours, helping to lead discussions, etc.

Final course grades will be assigned as follows: A (90-100%); B (80-89%); C (70-79%); D (60-69%); E (<60%). Borderline grades, such as B+, will be rounded to the next letter grade only if the student has participated actively throughout the semester.

Honors Credit: Students wishing to contract this course for Honors Credit should email Dr. McCarthy to set up an appointment to discuss the terms of the contact. Information on Honors Contracts can be found at http://www.honors.arizona.edu/faculty-and- advisors/contracts.

Incomplete (I) or withdrawal (W) Grades: Requests must be made in accordance with University policies, which are available as follows:
http://catalog.arizona.edu/policy/grades-and- grading-system#incomplete
http://catalog.arizona.edu/policy/grades-and- grading-system#Withdrawal

V. Class Schedule

Aug	23, 30
Sep	6, 13, 20, 27
Oct	4, 11, 18, 25
Nov	1, 8, 15, 29
Dec	7 (final exam)

VI. Course Policies

Academic Integrity

Dr. McCarthy and the Department of Astronomy adhere to the University's Code of Academic Integrity. The Dean of Students' Web site below describes the Code and resources that are available to you for improving your work. Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Such violations of the Code can be penalized by expulsion from the University and negative reports in your official records. **If you are having difficulty in this course, PLEASE just ask for help instead of sacrificing your future.**
http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity

Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent. Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA e-mail to sell or buy these copyrighted materials are subject to Code of

Conduct Violations for misuse of student e-mail addresses. This conduct may also constitute copyright infringement.

Teamwork Policy: You may **start** an assignment in a team. However, once you decide HOW to approach a problem, **you must then make all your own measurements and use your own wording** to interpret and express conclusions. Any assignments that appear identical will be awarded "zero" points and can lead to expulsion from the class and the University. At a minimum, such violations of the Code will lead to an Academic Integrity investigation with the Dean of Students Office.

Attendance and Absences:
Participating in the course and attending lectures and other course events are vital to the learning process. As such, attendance is required at all lectures and discussion section meetings. Students who miss class due to illness or emergency are required to bring documentation from their health-care provider or other relevant, professional third parties. Failure to submit third-party documentation will result in unexcused absences.

You are required to attend each class in accordance with University policy:
http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable:
http://policy.arizona.edu/human-resources/religious- accommodation-policy

Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored:
https://deanofstudents.arizona.edu/absences

Holidays: All holidays observed by organized religions will be honored for those students who show affiliation with that particular religion. All absences pre-approved by the Dean of Students will also be accepted. http://www.registrar.arizona.edu/calendar-religious-holidays

Behavior: To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand and not on extraneous activities (e.g., texting, chatting, reading a newspaper, making phone calls, web surfing, etc.).

Dr. McCarthy promises to be respectful of all students. He expects you will do the same as stated in the Student Code of Conduct and other University guidelines concerning disruptive and threatening behavior.
https://deanofstudents.arizona.edu/student-code-conduct-student-faqs
http://policy.arizona.edu/education-and-student-affairs/disruptive-behavior-instructional-setting

The University's Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself.
http://policy.arizona.edu/education-and- student-affairs/threatening- behavior-students

Special accommodations: Our goal in this classroom is that learning experiences be as accessible as possible. If you anticipate, or experience, barriers related to the format or requirements of this course, please meet with Dr. McCarthy so that we can discuss ways to ensure your full participation in the course. If you determine that disability-related accommodations are necessary, please register with

Disability Resources (520-621-3268; https://drc.arizona.edu/) and notify me of your eligibility for reasonable accommodations. We can then plan how best to coordinate your accommodations.

Nondiscrimination and Anti-harrassment:
Dr. McCarthy is committed to creating and maintaining an environment free of discrimination as described in the University's policy at the link posted below. Our classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. He also wants to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.
http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy

VII. Subject to Change Statement

Required language: Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.