

AST 309C - The Birth of Stars and Planets

Course Description and Syllabus - Fall 2017

Instructor: Dr. Keely Finkelstein
Dept. of Astronomy
Office: RLM 16.228
Email: keelyf@astro.as.utexas.edu

Unique Number: 47600
Lecture Time: MWF 11 - 11:50 AM
Lecture Location: PAI 3.02

Instructor Weekly Help Sessions: Monday 1 - 2pm, Wednesday 9:30 - 10:30 am, or by appt. in instructor office, RLM 16.228

Course Prerequisite: AST 309C has a prerequisite of AST 301 or an equivalent college-level introductory astronomy course. AST 309C along with AST 301 (or AST 307) count towards the Natural Science & Technology Part I core requirement.

Textbook: None required. Required reading will come from online reading assignments. Recommended - general introductory astronomy textbook (can make use of online general Astronomy Textbook - see Canvas page).
Other Required Materials: Scientific Calculator

Course Website: **Canvas website** for this course
<https://utexas.instructure.com/courses/1200230>

Course TAs:

Caprice Phillips

Email: clphillips@astro.as.utexas.edu

Help Hours: Thursday 3 - 4 PM

Office: RLM 15.310E

Wendi Liu

Email: wendi_liu@utexas.edu

Help Hours: Friday 2 - 3 PM

Help Hour location: CPE 4.148

Course Description:

AST 309C is a one semester class on the specific topic of star and planet formation. AST 301, 302, or 303 is a prerequisite for this course. This course will present a study of how stars and planets form. Stars form out of giant clouds of gas and dust, locked in a battle between gravity and pressure. Gravity eventually wins and stars and planets form in the resulting disk of material. This course will study this process including results

from state of the art extrasolar planet searches, discussing implications on the formation of our own solar system. We will use high school algebra in this class.

Course Level Learning Goals:

- Students understand science is a process.
- Students can make use of critical thinking and quantitative reasoning skills, and gain an understanding of the importance of them in the broader context of the scientific process and scientific theory.
- Students gain a broad understanding of the nature, scope, and evolution of the Universe, and where the Earth and Solar System fit in.
- Students understand and can describe how physical systems change and evolve with time.
- Students can make use of models and observations to explain processes related to star formation, planet formation, and solar systems.

Course Requirements:

In-Class Participation - this class will be structured with a combination of shorter lectures as well as interactive lessons and activities. These in-class participation activities are an important of the course, therefore attendance and participation is required, and they will count as a part of your grade. The interactive material and discussions will help to reinforce the concepts in the class, as well as assisting you in completing your homework assignments and preparing you for the exams. In-class participation, including Interactive Activities, and Lecture Tutorials, will make up 15% of your course grade.

Some of the in-class materials will be collected to establish your participation grade. These assignments or questionnaires will not be given letter grades or a numeric grade, rather you will be given credit for what you complete on an all or nothing basis. You will be allowed to drop one in-class assignment.

Homework - There will be periodic HW assignments (~ 1 due every two weeks) that will be assigned throughout the semester. You are encouraged to discuss the homework and work on it with other classmates, however each student must do their own work: write it up in your own words, and turn in your own work. **Late homework will lose one letter grade (10%) each day it is late, it can be turned in up to 5 days late for up to 50% credit.** Homework will make up 20% of your course grade, the lowest homework assignment will be dropped, except for HW #7 - Observing Assignment & Report. HW#7 will be assigned at the beginning of the semester and can be turned in at any point, this assignment cannot be dropped. HW #7 includes a campus observing component and written typed up report that must be submitted in person. All other HW assignments can be and should be submitted online through Canvas.

Reading assignments - There will be weekly assigned online modules, that ***will be required*** throughout the semester. These assignments will often consist of news articles, press releases, videos, or other online sources. These required online reading assignments will be followed by an online quiz to be taken through Canvas. These assignments will be due before the start of class, typically due Friday of each week. The online reading assignment quizzes will make up 20% of your course grade. Your lowest online quiz score will be dropped.

93 - 100	A	73 - 76.99	C
90 - 92.99	A-	70 - 72.99	C-
87 - 89.99	B+	67 - 69.99	D+
83 - 86.99	B	63 - 66.99	D
80 - 82.99	B-	60 - 62.99	D-
77 - 79.99	C+	< 59.99	F

Exams - There will be 4 in-class exams. These exams will emphasize the material discussed in lecture, on the HWs, and in-class discussions or lecture tutorials, as well material covered in the assigned online modules. All exams will be closed-book, closed-notes. You will be allowed to drop the lowest of your four mid-term exams. The exams will make up 45% of your course grade. There will be no make up exams.

Grades - Grades will be based on:

- | | |
|---------------------------------------|-----|
| 1.) Four mid-term exams (drop lowest) | 45% |
| 3.) Homework | 20% |
| 4.) In-class participation | 15% |
| 5.) Online reading quizzes | 20% |

Collaboration - The interactive component of this class is designed around student collaboration, with activities such as Voting/Peer Discussions, In-Class activities, and Lecture Tutorials. For some of the group in-class assignments your group will turn in one collective assignment and each member of the group will receive the same amount of participation credit. You are also encouraged to study and work on HW assignments with other students and to get help during office hours. *However, your work must be your own.* If you copy someone else's homework or let someone copy yours, both students will receive zero credit. Cases of cheating and plagiarism may also be reported to the Office of the Dean of Students.

Course Outline & Reading Assignments (subject to some changes):

Dates	Topics	Reading & HW Assign.
Week 1 - Aug. 30 / Sept. 1	Intro/Review / Review Star Clusters HR Diagrams	Module 1 due Friday 9/1
Week 2 - Sept. 6/8	Review Black Body Radiation / Intro to ISM	Module 2 due Friday 9/8
Week 3 - Sept. 11/13/15	Giant Molecular Clouds / (In)Stability of GMCs & Virial Theorem / Stages of Star Formation	HW 1 due Wed. 9/13 Module 3 due Friday 9/15

Dates	Topics	Reading & HW Assign.
Week 4 - Sept. 18/20/22	Protostars / Binary Stars & Brown Dwarfs / Review for Exam 1	Module 4 due Friday 9/22
Week 5 - Sept. 25/27/29	Exam 1 (Sept. 25th) / Initial Mass Function / Outflows & Jets in Protostars	HW 2 due Friday 9/29
Week 6 - Oct. 2/4/6	YSOs & Disks / Hayashi tracks / Clusters	
Week 7 - Oct. 9/11/13	HII regions & Massive Stars / Low-mass stars / Triggered SF	
Week 8 - Oct. 16/18/20	Young Sun Environment / Exam 2 Review / Exam 2 (Oct. 20th)	HW 3 due Monday 10/16
Week 9 - Oct. 23/25/27	Intro to Solar System Formation / Properties of young Solar Systems / Giant Planet Formation	
Week 10 - Oct. 30 / Nov. 1/3	Terrestrial Planets / Our Solar System: Moons, Rings, Comets, Asteroids	HW 4 due Monday 10/30
Week 11 - Nov. 6/8/10	Solar System Tour / Search for other worlds / Review for Exam 3	
Week 12 - Nov. 13/15/17	Exam 3 (Nov. 13th) / Detection Methods	HW 5 due Friday 11/17
Week 13 - Nov. 20th	Detection Methods Continued	
Week 14 - Nov. 27/29 / Dec. 1	Earth-like Worlds / Star Formation in Galaxies / First Stars & Galaxies	HW 6 due Friday 12/1
Week 15 - Dec. 4/6/8	Are we alone? / The Drake Equation / Review for Exam 4	HW 7 due Friday 12/8
Week 16	Exam 4 (Dec. 11th)	

Course Conduct:

Please silence cell phones before you enter the classroom, no texting or using your cell phone during class. No cell phones may be present during any exam. Also, please do not pack up or leave class early unless you have talked to me in advance, as a consideration to me and your fellow students. If you bring a laptop computer, don't surf.

If I see inappropriate laptop behavior, I will have to amend these rules. Be respectful of others especially during in-class peer discussion times, even if you disagree with them.

The Canvas course webpage will be updated with course announcements, reading assignments, and deadlines. **It is your responsibility to check these on a regular basis.** Please come to class prepared, having read the required reading assignments, also please be prepared to participate in in-class discussions and activities, this is for your benefit.

Academic Dishonesty:

University of Texas Honor Code:

The core values of The University of Texas at Austin are learning, discovery, freedom, leadership, individual opportunity, and responsibility. Each member of the university is expected to uphold these values through integrity, honesty, trust, fairness, and respect toward peers and community. Students who violate University rules on scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and/or dismissal from the University. Standards for Academic Integrity are posted at http://deanofstudents.utexas.edu/sjs/acint_student.php

Plagiarism:

As a research university, the University of Texas at Austin takes plagiarism very seriously. Do not risk getting involved in a plagiarism infraction - the consequences simply aren't worth it. Always cite your sources, and when in doubt consult a professor or librarian. You may also read more about plagiarism at the Student Judicial Services website: <http://deanofstudents.utexas.edu/sjs/academicintegrity.html>

Documented Disability Statement

Please notify me of any modification/adaptation you may require to accommodate a disability-related need. We are committed to making an inclusive, accessible and welcoming classroom environment for all students. The University of Texas at Austin provides upon request appropriate academic accommodations for qualified students with disabilities. For more information, contact Services for Students with Disabilities at: 512-471-6259 (voice), 512-410-6644 (video phone), ssd@austin.utexas.edu (email) or online at: <http://diversity.utexas.edu/disability/>

Email - email is recognized as an official mode of university correspondence; therefore you are responsible for reading your email for university and course-related information and announcements. Please check your email regularly and frequently.

Additional Information - Attend an Astronomy Department Viewing Night

The Astronomy Department offers weekly public viewing nights with a 16-inch telescope on the roof of RLM (Wednesday nights) and at Painter Hall with a 9-inch telescope (Friday & Saturday nights). Observing nights are dependent on weather, so check the website for viewing times and for updated info and day of phone line for any weather cancellations. <http://outreach.as.utexas.edu/public/viewing.html>

You will need to attend one of these observing nights in order to complete HW #7 - your observing assignment and report. More details to follow early in the semester.