INTRODUCTION TO ASTRONOMY

Tuesday & Thursday | WEL 3.502 | 11:00a-12:15p
Zoom Synchronous Meeting Room: https://utexas.zoom.us/j/92366134570

Teaching Team

Prof. Stella Offner
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Dr. David Guszejnov
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Ning Liu (Teaching Assistant)
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Help Sessions:
Tu 1:30-2:30 (Ning)
Th 1:00-2:00 (Prof. Offner)
Fr 1:00-2:00 (Dr. Guszejnov)
Location: **Zoom** (see Canvas)

Class email:
UTastro301@gmail.com
This email is preferred and reaches all of us.

Email Policy: Email at any time with questions specific to your personal situation. Note: no permission is needed to miss class. For questions about class procedure and grading, **first** check this syllabus.

Prerequisites: None! AST301 is course for non-science majors. Concepts will be primarily qualitative, though there will be a small amount of algebra.

What is intro to astronomy about?

This is a course about the Universe, including planets, stars, galaxies and cosmology. We will see how physical principles can be used to study places that we may never visit and to understand events billions of years in the past and future. We will explore where, when and what we are in the cosmic scheme of things. The semester is divided into 5 parts:

1. The View from a Spinning Rock (Lectures 1-5)
2. Exploring the Solar System (Lectures 6-10)
3. The Lives of Stars (Lectures 11-15)
4. Anybody else out there? (Lectures 16-19)
5. The Cosmic Web (Lectures 20-24)

One question we cannot answer is *why* the Universe is the way it is. But we hope that you gain some new insights into this ultimate question and decide what it means to you.

Course Learning Objectives: You will...

- Develop a broad understanding of the nature, scope and evolution of the Universe, and where the Earth and Solar System fit in.
- Improve your critical thinking and quantitative reasoning skills, and their importance in the context of the scientific process.
- Learn that science is a process, the world is knowable, and we come to know it through observations, experiments and theory.
- Get acquainted with the history of astronomy and the evolution of scientific ideas (science as a cultural process).
- Gain a familiarity with the night sky and how its appearance changes with time and position on Earth.

Required Materials:

(1) ***Lecture-Tutorials for Introductory Astronomy, 3rd Edition***, by Prather, Slater, Adams & Brissenden. Do not rent or buy used. Available at Coop or online. You also have the option to purchase an e-version. It is slightly cheaper, but you'll either have to print it, or make your notes on a separate sheet of paper.

(2) ***Astronomy from OpenStax (free!)***, ISBN 1938168283 **Link: www.openstax.org/details/astronomy** A low-resolution version is available to download from Canvas. If you prefer a print version, you can purchase that from Open-Stax on amazon.com, but web view is recommended – the responsive design works seamlessly on any device. If you buy on Amazon, use the link on your book page on openstax.org so you get the official OpenStax print version.

(3) **A device** (e.g., smart phone) for the Instapoll *in-class response system* - a UT-developed *free* system through Canvas. Have a device ready that will allow you to respond to my questions.

Class recordings: These are reserved only for the use of members of this class (students, TAs, and the instructor) and only for educational purposes. Recordings should not be shared outside the class in any form.

What is expected of me in this class?

- Attend class (online or in-person) and **participate**! Work collaboratively and be prepared to share your ideas.
- Complete all assignments on time. Spend time with the book or come get help if you have questions!
- Don't procrastinate on the homework, especially the Moon journal one!
- Study for the quizzes; ask questions about any concepts that confuse you.
- Take advantage of us! We are here to help you!

What happens in lecture?

- Lecturing, interactive questions and small-group activities! My goal is that you learn mostly by *doing* rather than only listening.
- Early in the semester we will operate the classroom at reduced density, and simultaneously broadcast the class on zoom. Hopefully, we can all come together by the end of the semester.
- You will only learn if you participate, thus attendance and participation are ***required***! Students distracting or not participating will be asked to leave.
- A typical class will contain:

  Astronomy coffee – some interesting astronomy fact, quick activity or news item to wake you up..

  Brief review of the previous class and Q&A from 2-minute paper questions.

  Lecture and several think-pair-share and discussion questions.

  Lecture tutorial carried out in groups of 2-3, followed by class discussion.

  Two-minute paper and lecture tutorial submission.

Classroom Safety and COVID-19

This is a science classroom and we strongly recommend that you look to the science and follow the guidance of local public health officials and the CDC. **There are several important ways YOU can help preserve the safety of our in-person learning environment:**

- **PLEASE wear a face covering** that covers your mouth and nose to in-person classes. Face masks are no fun, but they are an important way to reduce community spread. As per university policy, masks are *highly recommended* but not required. See **university mask guidance**.
- **Maintain social distance as much as possible in the classroom.** Leave an empty seat between you and your neighbor. Please do not crowd each other, myself, Dr. Guszejnov or Ning while inside the classroom. We will wait outside the Wel 3.502 main door to answer any individual questions you have at the end of in-person class.
- **If you feel ill or have a positive COVID test please *DO NOT* come to class in person.** Participate in class online if you feel well enough or catch up by watching the Zoom recording later. Participation can be completed from home.
- **Get vaccinated.** **Vaccinations are widely available**, free and not billed to health insurance. The vaccine will help protect against the transmission of the virus to others and reduce serious symptoms in those who are vaccinated.
- **Get tested.** If you are experiencing any symptoms of COVID-19, please follow **university guidelines**, including getting tested. If you test positive, you should isolate yourself at home. Contact the Behavior Concerns and COVID-19 Advice Line (BCCAL) to report your positive result. BCCAL can also assist you with isolation options, class absence notification or other support.
- **Proactive Community Testing** remains an important part of the university's efforts to protect our community. Tests are fast and free, and I recommend testing at least once weekly.
- Visit **protect.utexas.edu** for more information.

Blended Modality

To maximize learning and safety for everyone through September 20th, and likely beyond, I will teach this class simultaneously in person and online. The classroom will operate at a ***maximum of 50% density***. You will be assigned the opportunity to attend in person on Tuesday *or* Thursday.

In-person attendance: On your designated in-person day, you have the option to attend in person, though you may also choose to attend via zoom. We will use a seating chart as per UT policy to enable contact tracing (see below). The first row will be closed except to TAs. In all subsequent rows, you may sit in every other seat, occupying the first seat on the left side when in the front of the room facing the rear. When it is time for group work, work with one person near to you, still keeping one empty seat between you. You are also welcome to work by yourself.

Zoom Attendance: On your designated virtual day, log in via zoom and *do not attend in person*. I will run zoom from my laptop, sharing my screen so you can see my slides, and using a microphone so you can hear me both in the classroom and online. The TA will monitor Zoom, and let me know when you have questions (which you can ask in the chat, or using the "raise hand" feature). When it is time for group work, the TA will open breakout rooms. Please find a room with 2-3 other people.

Contact Tracing: To assist with contact tracing efforts, per UT policy we will keep a daily seating chart. You may sit where you like (within the bounds above), however, each class, I will have a short-answer Instapoll question where you will identify your row letter and seat number, and answer the question. If you are on Zoom, please answer "zoom". ***This question will count towards your participation, so make sure to answer it***. I will only share this data with University Health Services if they request it.

Zoom Etiquette: All classroom norms apply when in a Zoom session. If you wouldn't do something in a physical class, don't do it in a digital classroom. Please dress similar to how you would in a university classroom. Please ensure that your microphone is working before class. You will be working with other students in breakout rooms during lecture periods and conversing with your classmates will be an important part of the experience. **Mute your audio whenever you are not speaking.**

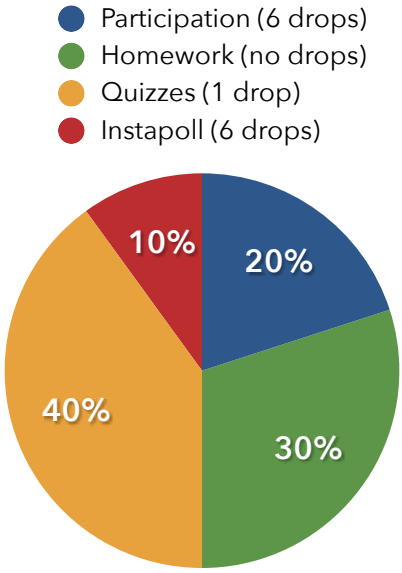
Video: I encourage you to keep your video on when in the main classroom to help us maintain a personal connection (this is especially true when in small breakout rooms). When in breakout rooms, you are required to have your video on, unless you email me ahead of time letting us know why you cannot use video. You may use video and Zoom backgrounds if your device allows, but they must be appropriate. If I ask you to change your background, you must do so immediately.

Breakout Rooms: Breakout Room discussions should be structured and on topic. Take turns sharing ideas without a single person dominating the discourse. The TA will drop in at random to listen in, promote the discussion, and answer questions.

How is my performance in this class assessed?

Your final course grade will be determined as follows:

There are two grade components that evaluate participation and synchronous engagement with class material (total 30%). These begin counting for credit the second day of class. First day is a trial run!



20% - Participation in LT Activities and Two-Minute Paper: This grade is based on the "two-minute" paper completion and uploading your completed LT. Ideally, you complete these and submit at the end of class: I will reserve 5 minutes of class time. I will give a one hour grace period after class ends (1:30 pm) to submit this. Although ***makeup participation points will not allowed***, I realize that you may need to occasionally miss class, or have a technical problem with submission. For this reason I give

a little extra time and have Canvas automatically ***drop your six lowest participation class grades***.

What is the grading scale?*

93.0 - 100 A
90.0 - 92.99 A-

87.0 - 89.99 B+
83.0 - 86.99 B
80.0 - 82.99 B-
77.0 - 79.99 C+
73.0 - 76.99 C
70.0 - 72.99 C-

67.0 - 69.99 D+
63.0 - 66.99 D
60.0 - 62.99 D-
< 59.9 F

*no rounding

10% - Synchronous Class Participation: You will receive credit for this component by answering in-class think-pair-share questions through InstaPoll on your device. As this component is giving you credit for participating in ***class*** activities during class time, it is not permissible to respond to Instapoll when not logged in and engaged via Zoom. We will randomly check the zoom logs each class to ensure that you do not respond to Instapoll when you are not connected to zoom and participating in the class. This grade will be calculated as an average of the grade for each class, where each class grade is equal to the percentage of questions you submit an answer to. Canvas will automatically ***drop your six lowest participation class grades***.

The large number of drops is to account for unexpected covid-related absences. ***Should you miss a few classes due to COVID (or any other reason), there is no need to contact me***. Your zero grade in Canvas on those days will be dropped, and you can catch up on what you missed by watching the recordings on Canvas. Should illness or other circumstances cause you to miss three or more class periods in a row, please contact Student Emergency Services, and they will contact me for accommodations.

20% - Homework: There will be 6 homework assignments. The first and last homeworks are comprehension surveys to find out what you know (HW1) and what you have learned (HW6) about astronomy. The first is graded on completion not correctness; if you complete it you will receive a '2' (see below). The final survey grade (HW6) is graded 35% for completion and 65% for correctness (for example if you get half correct, your HW score will be 67.5%). Homeworks 2-5 are observing and writing activities related to the material we cover in class. See lecture schedule for deadlines. **One late homework, with a grace period of one week,** will be allowed with no penalty. A second late or missing homework will receive a zero.

Homework Grading: Homework 1-5 will be graded on a scale of 3 with possible values of 3 (exceeds expectations, given rarely), 2 (meets expectations), 1 (significantly incomplete) or 0 (no credit). A score of either 2 or 3 receives full credit. A score of 1 corresponds to half credit and a score of 0 receives no credit. In other words: a score of 2 or 3 earns 100% (5% of the class grade) and a score of 1 earns 50% (2.5% of the total class grade). Here are some examples:

You have:	Grade on those HWs
Five HWs with a score of 2 or 3	100%
Four HWs with a score of 2 or 3, one HW with a 1	90%
Three HWs with a score of 2 or 3, two HWs with a 1	80%
Four HWs with a score of 2 or 3, one HWs with a 0	80%

….

40% - Quizzes: There will be five online quizzes. These are timed at 1 hour. The quizzes are open book - you can use your course notes and course book, but ***you may not consult the internet or any other person*** (e.g., do the quiz alone). They will be non-cumulative and there will be no final. Quiz questions are mainly multiple choice and a few short answer questions (~30 questions). The quizzes will cover 4 or 5 lectures as indicated on the lecture schedule below. I will drop the lowest quiz score. If you miss two quizzes, then one will count as a zero. ***In general there will be no makeup quizzes***, although if you are unable to take the quiz during the designated quiz time due to covid-related illness, contact us to arrange an accommodation.

A practice quiz will be posted beforehand. There will be a short review and opportunity to ask questions in the class the day of the quiz. They will be non-cumulative and there will be no final: education research shows that more frequent, low-stakes testing is more effective for student learning.

Extra credit: There will be *a few* opportunities for extra credit announced. Take advantage of these! Please don't email us at the end of the semester asking for additional points (this includes grade rounding!).

What are other policies on exams, assignments, and other course structure?

Course Website:

Canvas page for this course:

https://utexas.instructure.com/courses/1313087

Course Webpage: The course webpage on the Canvas system will be updated with course announcements, homework and reading assignments, and deadlines. It is your responsibility to check these on a regular basis. Please come to class prepared to participate in in-class discussions and activities – this is for your benefit!

Late work: Late work *(except one late homework)* is not accepted. Makeup (or early) quizzes or exams are not offered. *However*, I understand that life events happen, so if you are unable to turn

an item in on time or attend a quiz or exam, contact me ***in advance of the due date***. Note that being busy with other classes will not be considered a valid excuse. If you miss class for a sponsored University event, and you contact me ***in advance of the due date***, we can discuss accommodations.

Course Conduct: Please silence cell phones before you enter the classroom. ***No texting or using your cell phone*** during class except for use in specified classroom activities. Please do not pack up or leave class early unless you have talked to me in advance, as a consideration to us and your fellow students. Students may use laptops to take notes. Students found to be using their computers for non-class activities will be a distraction to those around them, and will be asked to leave, and will not earn participation for that day. If laptop distraction becomes a problem, I reserve the right to reverse this policy.

Be respectful of others, especially during in-class peer discussion times, and even if you disagree with them.

Students with Children: I recognize the difficulty of being a full time student with children. If you have children, or other family commitments, please contact us to discuss any modifications of the course policies which will maximize your success in this course.

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.

Administrative Deadlines: It is your responsibility to keep track of the administrative deadlines for dropping the course, changing to Pass/Fail etc

Syllabus Changes: I reserve the right to make changes to the syllabus and class schedule if necessary. If any changes are made they will be announced through Canvas and new versions will be uploaded

Equity & Inclusion:

Astronomy belongs to all people, independent of race, religion, gender, gender identity, gender expression, or sexual orientation. Incidents of discrimination, assault, harassment, threats, intimidation, profiling, or coercion based on membership or perceived membership will not be tolerated.

Please see this university **Resources Page** for a list of student resources. Note all faculty members, including myself and your undergraduate major advisors, are also resources.

The University of Texas President's statement of community values can be found here.

Land Acknowledgement:

I would like to acknowledge that we are meeting on the Indigenous lands of Turtle Island, the ancestral name for what now is called North America.

Moreover, I would like to acknowledge the Alabama-Coushatta, Caddo, Carrizo/Comecrudo, Coahuil-tecan, Comanche, Kickapoo, Lipan Apache, Tonkawa and Ysleta Del Sur Pueblo, and all the American Indian and Indigenous Peoples and communities who have been or have become a part of these lands and territories in Texas. These people observed the night skies and marked the passing of the seasons here long before the founding of Texas.

Frequently Asked Questions:

Where can I find.. ?

Canvas will have:

1. Important announcements
2. Lecture slides
3. Weekly assignments and modules
4. Syllabus
5. List of Learning Objectives
6. Gradebook

Canvas will be our main form of communication, so check it regularly and stay up to date on assignments and communications.

What about technical difficulties?

If you have a technical problem that causes you to miss a class while on zoom, this is one of the reasons you get several drop participation grades. If you have a recurring computer or internet problem, please email us to help find a solutions. If ***my*** internet goes out during class, don't leave! I will log back in via my phone and continue the class (I will also strive to upload in-class lecture PDFs before class so you can follow along). If you have a technical glitch which causes you to miss an instapoll question, please send a zoom chat message to the TA **during** the class, and they will fix it.

Do you record the in-class lectures?

Yes! Links for the recordings will appear under "Cloud Recordings" found on the Zoom tab on the class Canvas page. This tab is along the left side navigation.

How do I Succeed in this class?

The best way to succeed is to buy in and ***participate***! The LT book is *your* textbook and you are the author. If you don't work hard on it, you won't have it to study from!

How do I study for the quizzes?

1) Study the LTs. Don't just read them, re-do them! Cover your old answers, then check your new answers against them. Work in a group if you can!

2) Go over the in-class PDFs, and practice the think-pair-share questions.

3) Re-watch the relevant module videos, find concepts which you feel less secure on, find those concepts in the book, and read up.

4) Come to help hours and review sessions. Ask questions!

I missed a quiz, when can I make it up?

There are no makeup quizzes. The only exception to this will be:

1) If you have a major life event, **and you notify us ahead of time.** Depending on the situation, I may ask you to contact Student Emergency Services for assistance.

2) I am contacted by Student Emergency Services, and they request a makeup.

3) You are absent for a university-sponsored event, ***and*** you notify me ahead of time.

I'm sick, and can't come to class today, what do I do?

You don't need to email me! Stay home and get better (you can miss several classes, and still receive a full participation grade). Still complete the missed lecture tutorials and after class, download the PDF and watch the class recording to see what you missed. If you have to miss multiple consecutive classes, please contact Student Emergency Services, and they will let me know if they feel you should be allowed to make up for missed participation.

I need to leave class early. How do I make sure I don't lose participation?

Participation is counted through InstaPoll. You will not receive credit for questions when you are not in class.

I forgot to do my homework before midnight, can I turn it in later?

One late homework is accepted. Make sure it doesn't happen again!

Its two days before the moon journal is due, and I haven't started!

There's nothing I can do to help you. Don't let this be you - do this early in the semester!

I got a zero in the gradebook for something I did or turned in!

We can make mistakes when inputting 200 grades! If you believe there is a mistake in the gradebook, stay calm, just email us and we'll investigate.

University Resources:

Student Support: *COVID-19 Updates and Information:* This course may have changes, we all will need to be flexible with the learning environment depending on changing situations. But I will

do my best to build in flexibility and options for you to be successful in this course. To help yourself, please explore the resources available here: https://protect.utexas.edu/students-families/

Academic accommodations (SSD): This class respects and welcomes students of all backgrounds, identities, and abilities. If there are circumstances that make our learning environment and activities difficult, or if you have medical information that you need to share with me, please let me know. I am committed to creating an effective learning environment for all students, but I can only do so if you discuss your needs with me as early as possible. I promise to maintain the confidentiality of these discussions. Any student with a documented disability who requires academic accommodations should contact Services for Students with Disabilities at 471-6259 (voice) or 512-410-6644 (Video Phone) as soon as possible to request an official letter outlining authorized accommodations. For more information, visit **http://ddce.utexas.edu/disability/about/**. *I am also happy to meet to discuss more.*

Counseling and Mental Health Center: Do your best to maintain a healthy lifestyle this semester by eating well, exercising, getting enough sleep and taking some time to relax. This will help you achieve your goals and cope with stress. All of us benefit from support during times of struggle. You are not alone. There are many helpful resources available on campus and an important part of the college experience is learning how to ask for help. Asking for support sooner rather than later is often helpful. If you or anyone you know experiences any academic stress, difficult life events, or feelings like anxiety or depression, we strongly encourage you to seek support. **http://www.cmhc.utexas.edu/individualcounseling.html**

The Sanger Learning Center: Did you know that more than one-third of UT undergraduate students use the Sanger Learning Center each year to improve their academic performance? All students are welcome to take advantage of Sanger Center's classes and workshops, private learning specialist appointments, peer academic coaching, and tutoring for more than 70 courses in 15 different subject areas (including Astronomy). For more information, please visit **http://www.utexas.edu/ugs/slc** or call 512-471-3614 (JES A332).

University and Course Policies:

Academic integrity: 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. Ethical conduct is expected at all times.

You are responsible for understanding UT's Academic Honesty and the University Honor Code which can be found at the following web address: **https://deanofstudents.utexas.edu/conduct/standardsofconduct.php**

- ***Sharing of Course Materials is Prohibited:*** No materials used in this class, including, but not limited to, lecture hand-outs, videos, assessments (quizzes, exams, papers, projects, homework assignments), in-class materials, and review sheets, may be shared online or with anyone outside of the class unless you have my explicit, written permission. Unauthorized sharing of materials promotes cheating. It is a violation of the University's Student Honor Code and an act of academic dishonesty. I am well aware of the sites used for sharing materials, and any materials found online that are associated with you, or any suspected unauthorized sharing of materials, will be reported to Student Conduct and Academic Integrity in the Office of the Dean of Students. These reports can result in sanctions, including failure in the course.

- **Class Video Recordings:** Class recordings are reserved only for the use of members of this class (students, TAs, and the instructor) and only for educational purposes and are protected under FERPA. Recordings should not be shared outside the class in any form. Violation of this restriction could lead to Student Misconduct proceedings.

Plagiarism: is defined as using another's words or ideas without credit. This includes copying text from a source without using quotation marks *and* including the source reference. Written assignments (e.g., the homework) may be evaluated by turnitin.com, which compares the uploaded document with internet sources, past student papers, and other common information resources.

Plagiarized assignments, lecture tutorials or quiz questions will receive a zero. 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. See the Student Judicial Services website: http://deanofstudents.utexas.edu/conduct/academicintegrity.php Incidences of academic dishonesty will be reported to Student Judicial Services.

Personal or Family Emergencies: If you experience a personal or family emergency (death in the family, protracted sickness, serious mental health issues) that prevents you from attending an exam or forces you to miss multiple days of class, you should contact Student Emergency Services in the Office of the Dean of Students http://deanofstudents.utexas.edu/emergency/. They will work with you to communicate with your professors and let them know of your situation.

Religious Days: A student who is misses a class or examination for the observance of a religious holy day will be permitted to make up the missed work, if notice is given at least fourteen days prior to such an absence.

Core curriculum: This course may be used to fulfill three hours of the natural science and technology component of the university core curriculum and your successful participation addresses the following four core objectives established by the Texas Higher Education Coordinating Board: communication skills, critical thinking skills, teamwork, and empirical and quantitative skills.

Title IX: Beginning January 1, 2020, Texas Senate Bill 212 requires all employees of Texas universities, including faculty, report any information to the Title IX Office regarding sexual harassment, sexual assault, dating violence and stalking that is disclosed to them. Texas law requires that all employees who witness or receive any information of this type (including, but not limited to, writing assignments, class discussions, or one-on-one conversations) must be reported. If you would like to speak with someone who can provide support or remedies without making an official report to the university, please email advocate@austin.utexas.edu. For more information about reporting options and resources, visit http://www.titleix.utexas.edu/, contact the Title IX Office via email at titleix@austin.utexas.edu, or call 512-471-0419.

Course Calendar:

* The pages in *Astronomy* that correspond with the lecture topic are given below.
* HW must be completed and uploaded to Canvas by 11:59pm on the day it is due.

Date			Lecture Topic	Reading *Astronomy* (pages)	LT/Activities (pages)	Homework **Due 11:59pm in Canvas**
Part 1. The View from a Spinning Rock						
Aug	26	Th	1. Intro / Scales of the Universe	11-28	Astronomy vs. Astrology PDF	
	31	Tu	2. The Earth and the Sun	103-113	Seasons I,II,III (93-96)	**HW #1:** Entrance Survey
Sep	2	Th	3. Lunar Cycles	120-124, 129-135	Moon Phases (81-83, 85)	
	7	Tu	4. The Night Sky	32-42	Causes of Positions/ Seasonal Stars (1,2,7,8)	
	9	Th	5. Ancient Astronomers	42-49	Parsec (37-39)	
	14	Tu	*Review*			**Quiz 1**
Part 2. Exploring The Solar System						
	16	Th	6. Beginning of Modern Astronomy	54-61	Sun Size (13-15)	
	21	Tu	7. Planetary Motion I	69-73	Kepler's 2nd Law (21-24)	
	23	Th	8. Planetary Motion II	73-75	Kepler's 3rd Law (25-27)	

	28	Tu	9 Gravity	76-88	Newton's Law and Gravity (29-32)	
	30	Th	10. Rocky Planets & Gas Giants	246-251, Appendix K	Temp. & Formation of the Solar System (111-112)	
Oct	5	Tu	*Review*			**Quiz 2**
Part 3. The Lives of Stars						
	6	Th	11. Light	17-18, 145-156	Spectrum of Light (47-49)	**HW #2:** Moon Journal
	12	Tu	12. Observing Stars	157-165, 595-604,	Blackbodies (59-62)	
	14	Th	13. Classifying Stars	621-624, 630-632, 635-646	HR Diagram (117-118)	
	19	Tu	14. Birth of Stars	723-730, 766-771	Star Formation (119-120)	
	21	Th	15. Death of stars	803-815, 865-873	Stellar Evolution (133-134)	
	26	Tu	*Review*			**Quiz 3**
Part 4. Anybody else out there?						
	28	Th	16. Other Planetary Systems	740-754	Dopper Shift (75)/ Planet Motion (125-127)	**HW #3:** Star Gazing
Nov	2	Tu	17. Goldilocks Problem	1110-1111	Greenhouse Effect (105-109)	
	4	Th	18. Search for Life Elsewhere	1106-1110 , 1111-1121	Radio Signal PDF	
	9	Tu	19. Drake Equation	1121-1125	Drake equation PDF	
	11	Th	*Review*			**Quiz 4**
Part 5. The Cosmic Web						
	16	Tu	20. Galaxies	890-897, 930-939	Galaxy Classification (139-142)	**HW #4:** Astronomy in the news
	18	Th	21. Galaxy Formation	987-1002	Distant Objects, Making Sense of the Universe I (149-152)	
	23	Tu	22. Composition of the Universe	1016-1029 , 1070-1074	Dark Matter (143-147)	
	25	Th	No class. Happy Thanksgiving!			

	30	Tu	23. Big Bang	1039-1054 , 1081-1083	Making Sense of the Universe II (152-154)	**HW #5:** Citizen Science
Dec	2	Th	*Review (Last Class Day)*			**Quiz 5**
	7	Tu				**HW #6:** Exit Survey

50% Density Seating Chart: