My contact information:

office: 327 Planetary Hall, (not there this semester)
phone: × 34166 (not there this semester)
e-mail: awyczalk@gmu.edu

By far the best way to contact me is by e-mail. However, I teach a lot (and have a life) so please keep in mind that my response may not be instantaneous. I will be checking my e-mail as often as I can and try to get back to you as soon as I can. If your question does not involve anything personal, the best place for it is our discussion board: if you are unsure about something, your classmates may be too and this way everyone gets the information faster, especially since your Learning Assistant will be also able to see your post and respond. Since I also teach other courses, **please make sure to include the course (ASTR113) in your mail.**

Please allow 48 hours for responses both to mail and the discussion board. Note that at times it is not possible for me to answer all emails, particularly if I receive a real large number of them over a short period of time. Bottom line: while I'll do my best to be accessible to you and to respond promptly, I need your cooperation to keep the amount of mail at a manageable level. If you do not get a reply from me within 48 hours, please assume that your mail got buried and re-send it. I try to ensure that this does not happen, but I do occasionally get overwhelmed by the volume and miss something. (Also, please do not use the Blackboard e-mail function. E-mails sent through Blackboard get bundled all together and sometimes do not show as new. You are more likely to get a timely answer if you do not use the Blackboard system.)

office hours: I will be scheduling on-line sessions on Blackboard Collaborate. The exact time will be announced on Blackboard. If you cannot make the scheduled time and wish to speak with me, please mail me and we'll schedule an appointment.

Course meeting:

Tuesday and Thursday 3:00 PM - 4:15 PM, Blackboard Collaborate site: ASTR 113 (Spring 2021)

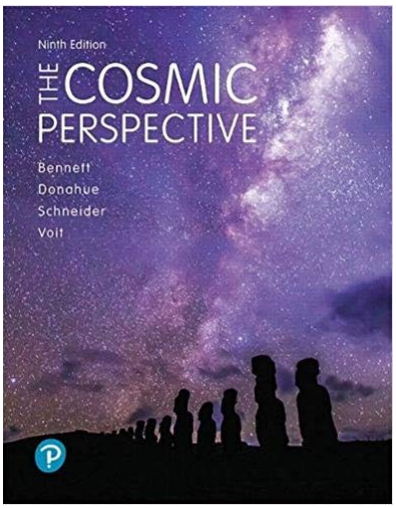
course website: Blackboard 9. The course is available on Blackboard with your GMU log-in name and password. Select ASTR 113 (Spring 2021). (This is where I'll post course content and assessment (which are NOT a substitute for the textbook), announcements, schedule adjustments, etc. I will also post your grades there. It is your responsibility to check the website frequently for any announcements and updates).

GMU email account: You must activate your GMU email accounts to receive important University information, including messages related to this class.

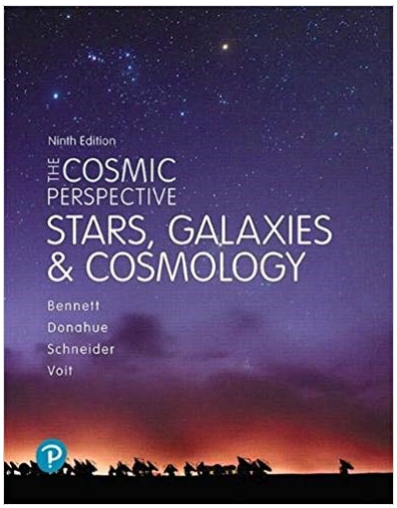
Computer support: Computer and/or Web support is not my responsibility.

Prerequisites: none

Textbook:



The 9th edition full text.
ISBN-13: 978-0134874364
or ISBN-10: 0134874366



The 9th edition split text.
ISBN-13: 978-0134990781
or ISBN-10: 0134990781

We will use **Bennett, Donahue, Schneider, and Voit:** ***"The Cosmic Perspective: Stars, Galaxies and Cosmology"*** (9th edition). The publisher is Addison-Wesley.

You can purchase the book in GMU bookstore or elsewhere, but be aware that there are many, many different versions of this textbook and some do not contain all of the material we'll study. Particularly, **avoid anything with the word "essential" or "fundamentals" in the title.** Make sure you get the "Stars, Galaxies & Cosmology" part.

And be aware that this textbook often comes bundled with an online homework system called Mastering Astronomy, with tutorials, with stargazing software or with iclickers. You won't need those. Just get the book.

For our class, you'll need the split book, but some options described below only offer the full text, so I listed both. Many retailers, including amazon, offer rentals, so check those. Other good options, and substantially less expensive than a paper copy, is e-text. You can either get an access card from GMU bookstore, the publisher, or any retailer, or directly from the publisher. Here is the link: https://www.pearson.com/store/p/cosmic-perspective-the/P100001120237/9780135161753 (**ISBN-13:** 9780135161753)

Additional materials: You'll need something to write with and on, so make sure that you have pencils or pens, notebook or paper. Occasionally a calculator may be handy.

Technology Requirements:

Nature of course delivery: The course is delivered through Blackboard. Please be sure you have adequate technology to access the site and do the required work. Go to MyMason, sign in and select the Courses tab, then look for the Physics 103 001 course. If you need help, there is a section of the courses page of MyMason called "Courses 9.1 Resources for Faculty and Students" with helpful links. Other sources of help with Blackboard:

- Contact courses@gmu.edu and include your Mason email and G#
- Walk in and Phone support at the Collaborative Learning Hub, Johnson Center 311, (703) 993-3141
- Contact the ITU Support Center at (703) 993-8870 for general help, including login or network issues

Blackboard Login Instructions: Access to My Mason and GMU email are required to participate successfully in this course. Please make sure to update your computer and prepare yourself to begin using the online format BEFORE the first day of class. Check the IT Support Center website. Navigate to the Student Support page for help and information about Blackboard. In the menu bar to the left you will find all the tools you need to become familiar with for this course.

Take time to learn each. Make sure you run a system check a few days before class. Become familiar with the attributes of Blackboard and online learning.

Hardware: You will need access to a Windows or Macintosh computer with at least 2 GB of RAM and access to a fast and reliable broadband internet connection (e.g., cable, DSL). A larger screen is recommended for better visibility of course material. You will need speakers or headphones to hear recorded content and a headset with a microphone is recommended for the best experience. You will need a microphone and a webcam for tests as well as an old-fashioned calculator that is not connected to the internet. You must be able to download and install executable files, as well as to upload and download documents and spreadsheets, and may need to install programs or upgrades. A smartphone or iPad will not be sufficient for the course, be sure you have access to a fully featured computer. A computer with an operating system and web browser certified or at least compatible to support the new Blackboard 9.1: http://www.edugarage.com/pages/viewpage.action?pageId=51414180

For the amount of Hard Disk Space required taking a distance education course, consider and allow for:

- the storage amount needed to install any additional software and
- space to store work that you will do for the course.

If you consider the purchase of a new computer, please go to Patriot Tech to see recommendations.

Software: This course uses Blackboard as the learning management system. You will need a browser and operating system that are listed compatible or certified with the Blackboard version available on the myMason Portal. See supported browsers and operating systems. Log in to myMason to access your registered courses.

You must have a GMU email account. I will not answer emails sent from a private email account. You will need to check email and Blackboard regularly and will be required to submit materials.

Online courses typically use Acrobat Reader, Flash, Java, and Windows Media Player, QuickTime and/or Real Media Player. Your computer should be capable of running current versions of those applications. Also, make sure your computer is protected from viruses by downloading the latest version of Symantec Endpoint Protection/Anti-Virus software for free here.

Students owning Macs or Linux should be aware that some courses may use software that only runs on Windows. You can set up a Mac computer with Boot Camp or virtualization software so Windows will also run on it. Watch this video about using Windows on a Mac. Computers running Linux can also be configured with virtualization software or configured to dual boot with Windows.

Note: If you are using an employer-provided computer or corporate office for class attendance, please verify with your systems administrators that you will be able to install the necessary applications and that system or corporate firewalls do not block access to any sites or media types.

Collaborate: Lectures, labs and office hours will be conducted using Collaborate Ultra, which you can access on Blackboard. To participate, you will need headphones and a mic. Instructions for using Collaborate are here: https://its.gmu.edu/knowledge-base/introduction-to-blackboard-collaborate-ultra/
You can get a full student guide from the site linked above including the instructions for troubleshooting audio and connections. Office hours are not mandatory: your participation is welcomed, but not required. Office hours are for you: to ask me questions, get help, or discuss with me anything you want.

Course-specific Hardware/Software: You will need to use MS Office in the lab portion of this class, specifically PowerPoint, Word and occasionally Excel. Google Docs and Google Sheets or Office 365 version of Word and Excel are generally sufficient, but Google Slides and Office 365 version of PowerPoint lack many features and you may not be able to use my PPTX with all its features.

For the tests, you'll need Respondus Lockdown Browser (can be downloaded from Blackboard) and a working microphone and a webcam. If you have privacy, technical, or other concerns related to using this system, please contact me to make alternative arrangements.

Hardware or software required for this course or program may be available for purchase at Patriot Computers (the University's computer store that offers educational discounts and special deals) or elsewhere.

Policies:

Work Ethic: Distance education courses require more organization and self-discipline than traditional courses. You are responsible for keeping up with what is going on in the course, with any announcements and changes. Most importantly, you are responsible for keeping up with assignments. There is no time for makeups and there won't be any. Bottom line: you must do the learning - I can only assist and provide guidance and clarity.

Withdrawal: If you need to withdraw from this course you must do it within the University established time frame.

Students with disabilities: Please contact The Office of Disability Services (SUB I, Room 222, Phone 703-993-2474) if you have a learning or physical disability that will require accommodation in this class. You must obtain the proper paperwork as soon as possible and contact me during the first week of classes so that I can accommodate your needs throughout the course.

Student resources: for more info go to http://ctfe.gmu.edu/teaching/student-support-resources-on-campus/

- A few of the resources available are listed below.
- **Counseling and Psychological Services** offers psychological services, a variety of learning services, multicultural services, and educational programs that support students' educational goals.
- **The English Language Institute** holds workshops for students whose first language is not English.
- **Mathematics Tutoring Center** offers tutoring on a walk-in basis for all George Mason students enrolled in math courses up to MATH 290
- **Office of Alcohol, Drug, and Health Education Services** provide health-related information, education and training, and resources for the Mason community.
- **Office of Disability Services** implements and coordinates reasonable accommodations and disability-related services that afford students with special needs equal access to university programs and activities.
- **Office of Diversity Programs and Services** serves students, cultural organizations, and the Mason community by promoting an environment that fosters and values human understanding and diversity. The office seeks to provide services and programs that will instill university-wide appreciation for diverse perspectives and ensure equal levels of inclusion, participation, and retention of underrepresented student groups in their quest for a quality education.
- **Sexual Assault Services** provides direct services for survivors of sexual assault and sexual assault education and information to the university community. All services are available to survivors, and to their families, significant others, and friends at no cost.
- **Student Health Services** provides high quality health care, counseling, education and prevention services in support of student learning and retention.

Academic Advising Center – 703-993-2470
Campus Counseling Center – 703-993-2380
Office of Disability Services – 703-993-2474
Math Tutoring Center – 703-993-1460
Writing Center – 703-993-1200; http://writingcenter.gmu.edu
University Library: "Ask a Librarian" http://library.gmu.edu/mudge/IM/IMRef.html
Counseling and Psychological Services (CAPS): (703) 993-2380; http://caps.gmu.edu
University Policies: The University Catalog, http://catalog.gmu.edu, is the central resource for university policies affecting student, faculty and staff conduct in university affairs.

Getting help: In addition to your instructor, a **Learning Assistant** will be available to help you with the course material. Detailed information will be announced in class and posted on Blackboard. Help is also available from **Physics and Astronomy tutor:** Planetary Hall room 2A. See http://mason.gmu.edu/~sfisher2 for hours. If you have any problems, seek help right away**.** Do not wait until the last minute before the test.

Computer support: **Computer and/or Web support is not my responsibility.** You can find help as well as available workstations at the Johnson Center or contact GMU IT Support at support@gmu.edu.

Deadlines: New materials will be released several times a week so check Blackboard daily for new course materials and assignments.

Classroom courtesy: It is important that students participate in all activities and contribute actively to group and class discussions. Discussions should be conducted with respect for each other and at a high level of discourse. Disruptive behavior will not be tolerated and may result in being temporarily or permanently barred from participating in on-line activities.

Honor code: You are expected to adhere to the George Mason University student honor code:

"*George Mason University shares in the tradition of an honor system that has existed in Virginia since 1842. The Honor Code is an integral part of university life. On the application for admission, students sign a statement agreeing to conform to and uphold the Honor Code. Therefore, students are responsible for understanding the provisions of the code. In the spirit of the code, a student's word is a declaration of good faith acceptable as truth in all academic matters. Therefore, cheating and attempted cheating, plagiarism, lying, and stealing of academic work and related materials constitute Honor Code violations. To maintain an academic community according to these standards, students and faculty must report all alleged violations of the Honor Code to the Honor Committee. Any student who has knowledge of, but does not report, an Honor Code violation may be accused of lying under the Honor Code*."

We expect you to hold to this standard by carefully citing sources used in your work and by doing your own work on tests and individual assignments. In an environment where group work is highly valued it can be difficult to sort out what policies apply. At a minimum follow these guidelines:

- During **all tests** you must work alone and that includes online resources.
- Work identified as individual should be strictly your own. Submitting work of another student as your work is considered cheating.
- Students are expected to actively collaborate on assignments identified as group, e.g. in the lab, during a group quizzes, while practicing problem solving in lecture. I say collaborate, not mindlessly copy. All students working together are expected to do the work. In case of group assignments all group members assume responsibility for these assignments. Only students who actively participate are given credit.
- Students are also encouraged to form study groups to work on homework assignments and study the course material together. The group is responsible for ensuring that all members take part, learn the material, and understand how to do the assignments and not merely copy the other members' work.
- Material that is drawn from written or electronic sources must be appropriately cited. To cut and paste from web sources without citation is considered plagiarism,

If you have questions about the meaning of any of these terms or if you are in doubt about what the above policies mean in regard to specific assignments, ask me for a clarification. If you are caught cheating, you will be brought before the Academic Honor Council which may result in a failing grade in this course, a permanent mark on your transcript, suspension, or expulsion.

General course policies: In order to facilitate the optimum learning environment for your fellow students, the following behavior is expected:

- Class will start on time. Show up on time and be prepared to start working. If you experience technical difficulties, join when you can, but please refrain from disrupting the entire class with questions about what was already covered. I will record our sessions (hopefully I won't forget, but a reminder at the start of the session will be very welcomed) and make them available to you after class, so you can catch up on what you missed whether it's a part of the session or an entire class.
- This class requires active participation by you. You are expected to think, write, share, ask questions, and in general be engaged while you are here.
- Other than for a valid reason, please refrain from joining and leaving in the middle of the class: it is extremely distracting and discourteous to your fellow students as well as to me. This is a large class and we all need to be disciplined and work together to make it a success.
- Be respectful of yourself and others in the class. Try to find a quiet place or mute yourself. Don't talk When working in groups, keep voices to a low level so all can communicate; don't denigrate others' work or ideas. Give everyone in your group a chance to speak and contribute.
- Keep notes and keep them orderly so you can easily find things. Whether or not you choose to keep notes by hand or just listen is up to you, but you should bring some writing implements to practice solving problems in class.

Goals:

Purpose: Astronomy 113 is part of the general education program at GMU: the Mason Core. According to the GMU catalogue the purpose of general education courses is:

"…to educate, liberate, and broaden the mind, and to instill a lifelong love of learning. In conjunction with each student's major program of study and other electives, minors, or certificates, this program seeks to produce graduates with intellectual vision, creative abilities, and moral sensibility as well as skills to ensure a well-rounded and usable education.

General Education courses will ensure that all undergraduates develop skills in information gathering, written and oral communication, and analytical and quantitative reasoning; expose students to the development of knowledge by emphasizing major domains of thought and methods of inquiry; enable students to attain a breadth of knowledge that supports their specializations and contributes to their education in personal and professional ways; and encourage students to make important connections across boundaries—for example, among disciplines, between the university and the external world, and between the United States and other countries."

Overview: Astronomy 113 is a general education natural science course designed to help students understand the scientific process and to develop their scientific reasoning skills in the context of astronomy. This 3 credit lecture is usually taken with Astronomy 114 lab to fill the requirement for a 4 credit natural science lab course.

Astronomy 113 is designed to familiarize you with the universe in which we live and with the principles of scientific inquiry that have enabled us to explore and understand that universe. We are part of the universe and thus can learn about our origins by studying it. The study of the universe is possible through evidence based scientific inquiry that anyone can understand.

Astronomy 113 has for its subject matter stars, galaxies and cosmology. The first part of the course will concentrate on the history and fundamentals of astronomy, including the night sky as seen from the Earth, the historical development of astronomy, and the nature of light and matter and how they interact. The remainder of the course will focus on stars and galaxies, how they form, evolve and die. We'll also discuss selected topics from cosmology.

To achieve these goals you will:

- Understand how scientific inquiry is based on investigation of evidence from the natural world, and that scientific knowledge and understanding is not a body of facts but rather a process through which we seek to understand the world around us and so it continuously evolves based on new evidence differs from personal and cultural beliefs

- Recognize the scope and limits of science
- Recognize and articulate the relationship between the natural sciences and society and the application of science to societal challenges (e.g., health, conversation, sustainability, energy, natural disasters, etc.)
- Evaluate scientific information (e.g. assess credibility and validity of information)
- Participate in scientific inquiry and communicate the elements of the process, including:
  - ★ Making careful and systematic observations
  - ★ Developing and testing a hypothesis
  - ★ Analyzing evidence
  - ★ Interpreting results

Perhaps most importantly, in line with the general education goals, this class should stimulate your curiosity about the universe, and encourage you to continue to read and think about astronomy and other areas of science long after your college education is complete.

The class will focus on concepts, and the expression of these concepts in colloquial, graphical, and schematic descriptions. You will be asked to show your understanding in all these ways on the exams. By the end of this term, you should have a strong conceptual understanding of the primary topics, and be able to interpret data to support that understanding.

Students will understand:

- the scientific method and how we apply it to investigate the universe
- that universe is comprehensible through scientific principles that anyone can understand
- the size and scale of the solar system, galaxies, and the universe
- how the motions of the Earth affect our view of the sky
- the basic physical laws that govern the motion of objects
- what light is, how it works, and how we use it to study distant objects
- how light and matter interact
- what stars are and how they differ from other astronomical objects
- how the stars are born, evolve over time and die
- what types of galaxies we observe and what do we know about their structure, formation, and evolution
- what structure our universe, how it began and what is its current state
- when and how life arose on Earth, and the possibilities for finding life elsewhere
- how astronomers have come to know these things
- how astronomy affects each of us personally with the new perspectives it offers
- what are the current issues, what is the focus of research in astronomy today, and what big questions remain unanswered.

As the instructor in this course, I am the guide through the territory of astronomy. I will not be pouring facts into your head. **You must do the thinking and the learning: I can only assist and provide guidance and clarity.**

Class components:

Lectures: The lectures will follow the subjects as shown in the Course Schedule at the end of this document. **Attendance is vital to your success.** The textbook does not cover everything that I discuss in class. Likewise, I will not be talking about everything covered in the textbook, only the things I think are particularly important, or confusing, or pertain to the more recent discoveries and ongoing investigations. **You need to read the textbook, go over PowerPoint lecture slides and, in general, follow the Learning Modules provided on Blackboard.** You are expected to spend at least twice as much time studying as you spend in class, that is if you study efficiently. If you don't, it can be a lot longer than that.

In this class you will be encouraged to make your own observations, ask and wonder why, and arrive at your own conclusions. So observe, participate, and question. Be on time and come prepared to start working. Arriving late or leaving early will not be tolerated. You are responsible for any materials distributed during the class and any oral announcements made in class which are binding. If you miss a class, it is your responsibility find out what went on that day.

Homework: **All assignments must be submitted on time, assignments submitted late will not receive credit.**

Homework is vital to reinforce the material you study. For each portion of material there will be assignments composed of reading, video, and other materials, followed by questions that will allow you to test your understanding. All of the homework is contained in the Learning Modules on Blackboard and I strongly recommend that you read the information and follow the instructions in the Modules before attempting homework. Most weekly homework assignments are cut-up into smaller pieces that follow the lessons contained in the Learning Modules. You will have unlimited number of attempts at each portion of the homework until the due date, with the highest score counting. The answers will be available after the due date. For that reason, extensions beyond the due date are not possible. You should make it a habit go over the answers once they are available and learning from your mistakes.

Activities: **All assignments must be submitted on time, assignments submitted late will not receive credit.**

There will be many in and out of class activities throughout the semester. There will also be several observing activities to be done on your own. The activities will be accompanied by quizzes that allow me to assess that you did, in fact, do the activity.

Exams: **All tests are to be taken within allotted time window. There are no make-up tests.**

Exams will include questions similar to those in the homework assignments. Anything covered in class, in homework, in the textbook, and in the assigned supplementary sources (including websites, applets, visualizations, and videos), may appear on the tests.

There will be three midterm tests and a comprehensive final. There are no make-up exams. If you do well on all three midterms, labs and homework, you don't need to take the final. The tests will be delivered via Blackboard using Respondus Lockdown Browser see Course-specific Hardware/Software section of Technical Requirements.

Exam Schedule:

Test	Dates
Midterm 1	Wednesday, Feb. 24th – Friday, Feb. 26th
Midterm 2	Wednesday, March 24th – Friday, March 26th
Midterm 3	Wednesday, April 28th – Friday, April 30th
Final	Wednesday, May 5th – Friday, May 7th **The final test is comprehensive.**

Each test will be delivered for a period of a few days. If you miss a test, you get a zero. The use cell phones and other devices with connectivity (other than your computer which will be locked out by Respondus) is not allowed during the tests. You can have a beverage, blank paper, and writing implements. You will be prompted at the start to show the environment using the webcam. You will also be prompted for a photo ID. If you have privacy, technical, or other concerns related to using Respondus, please contact me well in advance of the test to make alternative arrangements.

Grades:

In this course, you will get exactly the grade you deserve by a mathematically weighted average. It is **YOUR** responsibility, not mine, to make sure you study hard enough to get the grade you want. Your final grade in this class will be based on homework, activities, and tests. I will **NOT** answer questions about individual grades at any time in class or by mail. If you have a question about your grades, you need to come to my office hours and see me individually.

Type of Assignment	Percent
Homework	30 %
Activities	10 %
Best 3 out of 4 exams each	total 60 % 20 %

Final grades will be assigned by me at the end of the semester. Your final grade in this class will not be changed under any circumstances at any time.

Letter grade based on the percentage score:

Letter Grade	Percent
A+	97-100
A	93-96.99
A-	90-92.99
B+	87-89.99
B	83-86.99
B-	80-82.99
C+	75-79.99
C	70-74.99
C-	67-69.99
D	60-66.99
F	below 60

There will be no so called "extra credit project"- that's a cop out and I'd rather you spend your time studying. So don't count on improving your grade that way. There are, however, going to be opportunities to earn extra credit in homework, activities, and during the tests.

Any individual agreements that involves adjustment to requirements, schedule and/or grades due to documented prolonged illness or other documented serious and unforeseen circumstances, need to be negotiated with me and made in writing. You are responsible of reminding me of such agreements before the time of the finals.

Tentative Course Schedule for ASTR 113, Spring 2021

(subject to verification by real life)

Week	Lectures	Dates	Chapters from textbook
1	1, 2	Tuesday, January 26, 2021	Chapter 1 A modern view of the Universe
		Thursday, January 28, 2021	
2	3, 4	Tuesday, February 2, 2021	Chapter 2 Discovering the Universe for yourself
		Thursday, February 4, 2021	Chapter 3 The science of astronomy
3	5, 6	Tuesday, February 9, 2021	Chapter 3 The science of astronomy
		Thursday, February 11, 2021	Chapter 4 Making sense of the Universe
4	7, 8	Tuesday, February 16, 2021	Chapter 4 Making sense of the Universe
		Thursday, February 18, 2021	Chapter 5 Light and matter
5	9, 10	Tuesday, February 23, 2021	Chapter 5 Light and matter
		Thursday, February 25, 2021	Chapter 6 Telescopes: portals of discovery
6	11, 12	Tuesday, March 2, 2021	Chapter 14 Our Star
		Thursday, March 4, 2021	
7	13, 14	Tuesday, March 9, 2021	Chapter 15 Surveying the Stars
		Thursday, March 11, 2021	
8	15, 16	Tuesday, March 16, 2021	Chapter 16 Star Birth
		Thursday, March 18, 2021	
9	17, 18	Tuesday, March 23, 2021	Chapter 17 Star Stuff
		Thursday, March 25, 2021	
10	19, 20	Tuesday, March 30, 2021	Chapter 18 Bizarre Stellar Graveyard
		Thursday, April 1, 2021	
11	21, 22	Tuesday, April 6, 2021	Chapter 19 Our Galaxy
		Thursday, April 8, 2021	
12	23, 24	Tuesday, April 13, 2021	Chapter 20 Galaxies and the Foundation of Modern Cosmology
		Thursday, April 15, 2021	
13	25, 26	Tuesday, April 20, 2021	Chapter 21 Galaxy Evolution
		Thursday, April 22, 2021	Chapter 22 The Birth of the Universe
14	27, 28	Tuesday, April 27, 2021	Chapter 22 The Birth of the Universe
		Thursday, April 29, 2021	Chapter 23 Dark Matter, Dark Energy, and the Fate of the Universe