

ASTR 1001-11 (SCALE-UP): Stars, Planets and Life in the Universe (Fall 2017)

Instructors: Prof. Oleg Kargaltsev (kargaltsev@gwu.edu)
Prof. Denis F. Cioffi (dcioffi@gwu.edu)

Class Hours & Location: Mon and Wed, 6:15 pm – 8:15 pm, Monroe Hall 111

Office Hours

Primary Instructor: Prof. Kargaltsev; Staughton Hall 202, 707 22nd St., N.W.

- Mondays and Wednesdays, 2 pm – 4 pm, or by appointment.

Co-instructor: Prof Denis F. Cioffi, Duques Hall 660D (the Dean's Suite), 2201 G Street, N.W.

- Tuesdays and Thursdays, 2 pm – 3 pm
- An appointment can be suggested at <http://www.meetme.so/dfc123>

Required Materials

The textbook: Bennett, Donahue, Schneider & Voit. “*The Cosmic Perspective*”, **8th (only!) Edition**, San Francisco: Addison-Wesley, 2013 (ISBN: **978-0321839558**) + **Mastering Astronomy access code**.

Lab Manual and Workbook: ASTR 1001 Laboratory Manual and ASTR 1001 Workbook from GWU bookstore (<http://www.bkstr.com/georgewashingtonstore/home>).

TurningPoint Response Card: *must be registered via GW Blackboard*

Course Website: <http://blackboard.gwu.edu>

Homework: MasteringAstronomy.com; Course ID: **ASTR1001FALL17KARGALTSEV**

TA: TBD - office hours TBD. *See the TA for Mastering Astronomy homework questions.*

OVERVIEW & COURSE OBJECTIVES

ASTR 1001 encompasses an exploration of our solar system with a focus on improved scientific and mathematical literacy. The course is intended for non-science majors and thus has no college-level prerequisites: high school science and math (basic algebra and trigonometry) suffice. The two major goals of this course, with examples, are described below:

1. Learning objectives for astronomical concepts, structures, and processes.

- a. Concepts**
 - i. Laws of nature, e.g., apply Kepler's laws; gravity; conservation laws of momentum and energy.**

- ii. Electromagnetic spectrum, related astrophysical concepts, and tools that allow use to learn about the Universe using electromagnetic waves
 - iii. The formation of the inner and Jovian planets and their subsequent motion around sun; the geology and atmospheres of the inner planets; the sun's energy source.
- b. Structures**
- i. The geology and atmospheres of the inner, rocky planets and where existing, their moons; similarly for the gaseous planets.
 - ii. Our Sun
 - iii. Other objects: asteroids, comets, etc.
- c. Scientific Process**
- i. For example: be able to determine the mass, structure and chemical composition of various objects in our solar system, explain what powers our Sun.

2. Practicing mathematical and conceptual problem solving in an astrophysical context.

- a. Mathematical**
- i. Basic algebra, e.g., $y = mx + b$, the equation of a line, which can be used to write “distance = rate \times time,” and then solving for unknown values in the given equation.
 - ii. Basic geometry (e.g., surface area and volume).
 - iii. Scientific notation.
- b. Conceptual**
- i. Apply scales and conversion factors (e.g., sizes in scaled models, light-years-to-meters conversion).
 - ii. (Astro)physical reasoning (applying a law or theory to explain some observed celestial or physical phenomenon).

SCALE-UP FORMAT

The SCALE-UP classroom emphasizes more student-centered group-learning and less traditional oratory and formal lecture. Students learn more in classes where they interact with faculty, collaborate with peers and are engaged with the material they are learning. In contrast to sitting and listening passively, this approach is known as “active learning,” and it has been rigorously shown to lead to much improved outcomes, i.e., better learning.

The SCALE-UP classroom demands more of students than a traditional lecture class: you must be familiar with the material prior to class. Unlike the traditional lecture-based class in which the instructor repeats material that textbook already describes adequately, SCALE-UP class time is dedicated to fostering a fuller understanding of the material and learning how to

apply that knowledge to novel situations (such as solving problems). ***The payoffs for the student are:***

- (1) ***improved conceptual understanding of the material.***
- (2) ***Advanced problem-solving skills.***
- (3) ***Improved team-work skills.***

GRADING

Your final numerical course grade will be calculated as a weighted average of:

- | | |
|-----|--|
| 5% | Chapter Reading Check Ups (C-RCUs) [<i>TurningPoint clickers</i>] |
| 5% | Lab Reading Check Ups (L-RCUs) [<i>TurningPoint clickers</i>] |
| 3% | Class Participation (Instructors' Discretion – ask and answer questions in class!) |
| 10% | Labs & Workbook |
| 10% | Astronomy Project |
| 15% | Homework [<i>MasteringAstronomy.com</i>] |
| 30% | 2 Mid-Term Exams |
| 25% | Cumulative Final Exam |

Numerical course grades translate into letter grades using the following scale:

≥ 94.00	A	70.00 – 73.99	C
90.00 – 93.99	A-	66.00 – 69.99	C-
86.00 – 89.99	B+	61.00 – 65.99	D+
82.00 – 85.99	B	55.00 – 60.99	D
78.00 – 81.99	B-	50.00 – 54.99	D-
74.00-77.99	C+	≤ 49.99	F

EXAMS

The 2 midterm exams will be held during the regular class time. The dates of the exams are available in the Timetable at the end of this syllabus. Any changes to the exam dates will be announced in advance. *No make-up exams will be given.* The 2 midterms combined are worth 30% of the overall grade.

The final exam will be in December (likely on the last day of the exam week). The room and date are to be determined by GW. Therefore, the instructors have no way to change the date. This exam is worth 25% of the student's overall grade and is **mandatory and comprehensive**. *No make-up exams will be given* (except in the event of a Final Exam "hardship" – e.g., a student with more than three Finals scheduled on a given day – if you are declaring a hardship you must contact the instructor by mid-October to make alternative arrangements). **Do not make end-of-semester travel plans before the Final exam date is announced. The date is set by GW, not by the instructor.**

Minimum amount of independent, out-of-class, learning activity expected per week: 5 hrs

CLASSROOM PARTICIPATION

This course is being held in a classroom (Monroe 111) that is specially designed for active learning. We will spend time in small group activities such as scientific/mathematical exercises, laboratory experiments, group projects and discussions. ***Everyone is expected to attend class and actively participate!*** This is essential for SCALE-UP classes. Working actively on the material during class time is critical to understanding the concepts being discussed and to improving critical thinking and quantitative reasoning skills. Equally important is ***reading the textbook material before*** the class, not during the class.

When working in a group, please be respectful of your group-mates. Be patient! Get to know each other. Be sensitive to other group members' ideas, thoughts, and opinions. It might be helpful at times to assign specific roles to each group member, such as a group leader and a group note-taker. **Be sure to stay on task!** Do not be afraid to speak up and ask questions of your fellow group-mates. If you see another member of your group struggling to understand a concept, take the time to explain the concept before plowing ahead; you will both benefit because teaching someone a concept is a great way to really internalize the concept for yourself.

ATTENDANCE

Because in-class participation is a critical component of this course, attendance is mandatory. **You will lose 5 Lab/Workbook points for every absence (excused or unexcused).** Since absences are occasionally unavoidable, there *will be ongoing opportunities to gain extra credit* toward your Lab/Workbook score, however...

Missing more than 4 days of class (for any reason) will result in a 0% for the entire Lab/Workbook portion of the class: the lab/workbook, the Lab-RCUs and the Astronomy Project. This represents 20% of the final grade, so that students who are absent for more than 4 days will be unable to earn a grade higher than a B- in the course.

Missing 7 or more days of class will result in a failing grade (F) for the semester.

There are no make-ups for RCUs (Chapter or Lab). If you are absent or tardy on a day when an RCU is administered, you will *not* receive any credit for that RCU. You will also not receive any points for RCUs if you fail to bring your *TurningPoint Clicker* to class.

HOMEWORK ASSIGNMENTS

Homework is assigned both as a way to help you learn the material being covered and as a way for you to explore new material independently. In addition to chapter reading, expect to spend between 1 and 2 hours on homework most weeks. You will fall behind very quickly if you do not complete work as it is assigned. To that end **NO LATE ASSIGNMENTS WILL BE ACCEPTED**. All the homework assignments will be available for you from the very start of the

semester. *Therefore, getting sick or having an emergency the day the HW is due is not a valid excuse for not completing the HW. Don't wait until the last minute!* Homework will be assigned and completed on Mastering Astronomy's website (www.masteringastronomy.com). Registration requires a Student Access Code (which will come bundled with your textbook or can be purchased separately online). Students are encouraged to discuss course material outside of class, and you may help each other with homework assignments. However, copying or cheating of any kind will not be tolerated and will result in Integrity Code (<https://studentconduct.gwu.edu/code-academic-integrity>) violation charges for all involved students and zero credit on the entire homework portion of this course (15% of overall grade).

The MasteringAstronomy Course ID for this class is: ASTR1001FALL17KARGALTSEV.
All homework is due at **11:59 pm on Sundays**. Consult the MasteringAstronomy.com website for a full calendar of HW due dates.

RESEARCH PROJECT

You will need to pick a topic related to class material, formulate a research question, and answer it using real astronomical data. This will be a group project (group size can be between 1 and 4 students), which will culminate in the presentation to the entire class. A set of possible projects will be discussed and data resources will be provided. (10% of the overall course grade).

IN-CLASS QUIZ QUESTIONS with TURNING POINT RESPONSE CARDS (RCUs)

Students will be challenged with in-class quiz questions to be answered using *TurningPoint Clickers* available from the GWU bookstore. There are no make-ups for in-class quiz questions. If you are absent or tardy on a day when such questions are administered, you will *not* receive any credit for that day. You will also not receive any points for such questions if you fail to bring your *TurningPoint Clicker* to class. In-class quiz questions are worth 10% of the overall grade.

REQUIRED MATERIALS

1. The textbook: Bennett, Donahue, Schneider & Voit. "*The Cosmic Perspective*", **8th** Ed., Pearson, 2016 (ISBN-13: 978-0134059068).
2. Students must also obtain a "Student Access Code" to access *MasteringAstronomy* on the web (<http://www.masteringastronomy.com/>). This generally comes *bundled* with the textbook, but may also be *purchased* separately online.
3. The ASTR 1001 Laboratory Manual, available only through the GWU Bookstore.
4. You must bring a *stand-alone scientific* calculator to class. No cell phone or computer-based calculators are permitted.



5. A **TurningPoint Response Card** (see image below), this is informally called a “clicker,” which will be used to answer in-class RCU questions (as well as other questions during class). These clickers are available through the GWU Bookstore (be sure to buy a *TurningPoint* clicker and not some other brand). The clickers are also the primary mechanism for tracking attendance – your must bring your clicker to class each day and it must be associated with you via BlackBoard registration.



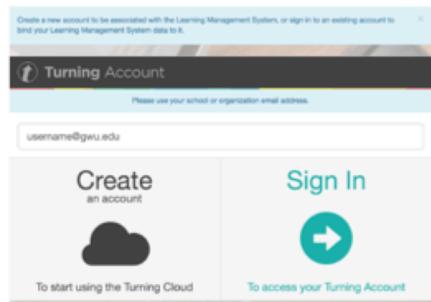
Turning Account Registration for Students

Please follow the steps below to register your Turning Point device/license.

1. Log into Blackboard.
2. Select the appropriate course under Course List.
3. Click Tools from the menu.

4. Click Turning Account Registration.

You will be taken to the Turning Account Registration website. A Turning Account is required to register your device and license. If you have a Turning Account, enter your Email and Password and click Sign In. If you do not have a Turning Account, follow the steps below to create an account.



5. Enter your GW email address, (username@gwu.edu) Click on the Create an account option. A verification email containing a link to create your account will be sent to you. Follow this link to continue the account creation process.

Enter all required fields on the resulting page.

- Enter your First Name, Last Name and Email in the appropriate fields
- Select Participant.
- Click Create Account.
- Confirm your Email.
- Create and confirm a password.
- Click Save.

6. Sign in to your Turning Account. This takes you to the Turning Account Dashboard.



7. Register your device and license.

Note:

- If you are a returning student and you have a clicker, you will only need to purchase a Turning Account license.
- If you are a New Student you will need to purchase the Turning account clicker/license bundle.

Turning Account licenses and clickers can also be purchased at the GW Book Store. [Turning Technologies is offering a \\$20.99 rebate for purchases of new devices, bundles or licenses. You can download the rebate information from your Blackboard course.](#)

If you are having trouble with your TurningPoint card or you tried but could not figure out how to operate it, please visit the Instructional Technology Lab in the Gelman's Library basement (room B05).

COMPUTER/CELL PHONE POLICY

Laptop and tablet use is not allowed during the lecture unless specifically noted explicitly by the instructor. Cell phones must be turned off and stored during class, and texting is not allowed. Do not rely on your cell phone for calculations since *any use of a cell phone during quizzes or exams is forbidden and will result in the student receiving a failing grade for that exercise or exam.*

ONLINE RESOURCES

Blackboard system: The *Blackboard* courseware system will be used for this class. The address for the *Blackboard* web site is: <http://blackboard.gwu.edu>

After entering *Blackboard*, it is necessary for you to click on the course name (ASTR 1001-11). You are *automatically* subscribed within the *Blackboard* system to the courses for which you are registered (but you must have a GW e-mail!). The *Blackboard* page is a valuable resource for all aspects of the class. It includes course announcements, lecture slides/notes, exam information, research project information, grades, and other useful features. You should consult it frequently!

ACADEMIC INTEGRITY

Under GW's Code of Academic Integrity, academic dishonesty is defined as "cheating of any kind, including misrepresenting one's own work, taking credit for the work of others without crediting them and without appropriate authorization, and fabrication of information." Note that plagiarism covers both *words and ideas*—be sure to use proper citations for both! Find more information about the GW Academic Integrity Code at <https://studentconduct.gwu.edu/code-academic-integrity>. Violations of the code will be referred to the Academic Integrity Council for action.

ABOUT YOUR INSTRUCTORS

Prof. Oleg Kargaltsev is a full-time research and teaching faculty at GWU. He does research in high-energy astrophysics studying neutron stars, black holes, and extreme explosions. Prof. Kargaltsev uses Hubble Space Telescope (NASA), Chandra X-ray Observatory (NASA), the X-ray Multi-Mirror Mission (ESA), and NuStar Hard X-ray Observatory (NASA) to study the physics, evolution, and properties of the compact, high-energy objects. He authored and co-authored more than 160 research publications and serves as a Principle Investigator of multiple observing programs on the above-mentioned space missions. Prof. Kargaltsev's other interests include science philosophy and science policy, logical and mathematical puzzles, independent movies, cooking, and science fiction.

After his eclectic journey through academe and administration, Prof. Denis F. Cioffi, also full time faculty at GW, is thrilled to return to teaching astronomy and feels privileged to work with Professor Kargaltsev. His old astrophysical research crossed many areas: supernova remnants and the interstellar medium, neutron stars, galactic jets, galaxy clusters, and radiative shocks. He has worked in research and administration at NASA Goddard, NASA Headquarters, the National Science Foundation, and the Office of Science and Technology Policy in the Executive Office of the President. Currently he serves as Senior Advisor to the Dean of the GW School of Business as well as Interim Associate Dean of Graduate Programs there.

Timetable: Class Schedule & Important Dates:

HW*	Chapter	Monday	In-Class Quizzes and Chapter #s	Wednesday	
	1	A modern view of the Universe	Aug 28	...	Aug 30 ...
	2	Discovering the Universe	Sep 4/Labor day	...	Sep 6 Article Discussion introduction & Research Project Introduction
#1	2	Discovering the Universe	Sep 11	CH 1 & 2 RCU @	Sep 13 Article Discussion #1, Lab 1 RCU Lab 1: Parallax & Appendix A: Measurements
#2	3	Science of Astronomy	Sep 18	CH 3 RCU	Sep 20 Article Discussion #2, Lab 2 RCU Lab 2: Kepler's Laws
#3	4	Making Sense of the Universe	Sep 25	CH 4 RCU	Sep 27 Article Discussion #3, Lab 3 RCU Lab 4: Acceleration Due to Gravity—Free Fall Motion
#4	5	Light & Matter	Oct 2	CH 5 RCU	Oct 4 Article Discussion #4, Lab 4 RCU Lab 5: Light Radiation and Planck Distribution
	1-5	Fall break /Exam	Oct 9	...	Oct 11 EXAM #1 (Ch 1, 2, 3, 4, 5)
#5	6	Telescopes	Oct 16	CH 6 RCU	Oct 18 Article Discussion #5, Lab 5 RCU Lab 6: Optics and Ray Tracing
#6	14	Our Star	Oct 23	CH 14 RCU	Oct 25 Article Discussion #6, Lab 6 RCU Lab 10: Sunspots and Solar Cycle
#7,8	7, 8	Our planetary system/Formations of Solar system	Oct 30	CH 7 & 8 RCU	Nov 1 Article Discussion #7, Lab 7 RCU Lab 7: Scale of the Solar System
#9,10	9,10	Planetary Geology & Atmospheres	Nov 6	CH 9 & 10 RCU	Nov 8 Article Discussion #8 Research Project Discussion. Research paper ideas with the group member names are due by e-mail!
#11	11	Jovian planet systems	Nov 13	CH 11 RCU	Nov 15 Article Discussion #8, Lab 8 RCU Lab 8: Diameter of Jupiter
...	...	EXAM #2 (Ch 6,14,7,8,9,10,11)	Nov 20	...	Nov 23 Thanksgiving Break
#12	12	Asteroids, comets, small planets	Nov 27	CH 12 RCU	Nov 30 Research Project Presentations
...	13	Extra solar Planets, Aliens	Dec 4	CH 13 RCU	Dec 6 Review for Final Exam
...		Make up / Snow Day	Dec 11	...	FINAL DECEMBER 21 st

* All homeworks are due at 23:59 on **Sundays for the week in the corresponding row of this Table.** @ Chapter and Lab RCUs take place in the beginning of the class, don't be late!

Mastering Astronomy homeworks and their due dates:

Assignments [List View](#) | [Calendar View](#)
(sorted by Due Date)

#	TITLE	CATEGORY	DUe DATE/TIME
1	HW01 Intro to MasteringAstronomy & Mathematical Methods, and Chapters 1 & 2 (Place In Universe & Discovering For Yourself)	Homework	09/17/17 at 11:59pm
2	HW02 Chapter 3 (The Science of Astronomy)	Homework	09/24/17 at 11:59pm
3	HW03 Chapter 4 (Making Sense of the Universe: Motion/Energy/Gravity)	Homework	10/01/17 at 11:59pm
4	HW04 Chapter 5 (Light & Matter)	Homework	10/08/17 at 11:59pm
5	HW05 Chapter 6 (Telescopes)	Homework	10/22/17 at 11:59pm
6	HW06 Chapter 14 (The Sun)	Homework	10/29/17 at 11:59pm
7	HW07 Chapter 7 (Our Planetary System)	Homework	11/05/17 at 11:59pm
8	HW08 Chapter 8 (Formation of the Solar System)	Homework	11/05/17 at 11:59pm
9	HW09 Chapter 9 (Planetary Geology)	Homework	11/12/17 at 11:59pm
10	HW10 Chapter 10 (Terrestrial Planetary Atmospheres)	Homework	11/12/17 at 11:59pm
11	HW11 Chapter 11 (Jovian Planets)	Homework	11/19/17 at 11:59pm
12	HW12 Chapter 12 (Asteroids and Comets)	Homework	12/03/17 at 01:00pm

University Policy Information:

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

Any student who feels that an accommodation may be needed based on the impact of a disability should contact the instructor privately to discuss specific needs. Please also contact the Disability Support Services office at 202-994-8250 in Rome Hall, Suite 102, to establish eligibility and to coordinate reasonable accommodations. For additional information, refer to: <https://disabilitysupport.gwu.edu/>.

MENTAL HEALTH SERVICES (202-994-5300):

The University's Mental Health Services offers 24/7 assistance and referral to address students' personal, social, career, and study skills problems. Services for students include: crisis and emergency mental health consultations confidential assessment, counseling services (individual and small group), and referrals. See <https://healthcenter.gwu.edu/mental-health> for additional details.

RELIGIOUS HOLYDAYS

1. Students should notify faculty during the first week of the semester of their intention to be absent from class on their day(s) of religious observance.
2. Faculty should extend to these students the courtesy of absence without penalty on such occasions, including permission to make up examinations.
3. Faculty who intend to observe a religious holiday should arrange at the beginning of the semester to reschedule missed classes or to make other provisions for their course-related activities.

The full University policy regarding religious holidays can be found at:
<https://students.gwu.edu/accommodations-religious-holidays>

Classroom Emergency Preparedness and Response Information

To Report an Emergency or Suspicious Activity

Call the University Police Department at 202-994-6111. If the line is unavailable dial 911.

Shelter in Place – General Guidance

In the case of an emergency, if at all possible, the class should shelter in place.. No matter where you are on campus, the basic steps of shelter in place will generally remain the same:

- If you are inside, stay where you are unless the building you are in is affected. If it is affected, you should evacuate. If you are outdoors, proceed into the closest GW building or follow instructions from emergency personnel on scene.
- Shelter-in-place in an interior room, above ground level, and with the fewest windows. If sheltering in a room with windows, keep away from the windows. If there is a large group of people inside a particular building, several rooms maybe necessary.
- Shut and lock all windows (locking will form a tighter seal) and close exterior doors.
- Turn off air conditioners, heaters, and fans. Close vents to ventilation systems as you are able. (Facilities staff will turn off ventilation systems as quickly as possible).
- Make a list of the people with you and call the list in to UPD so they know where you are sheltering.
- Visit GW Campus Advisories for incident updates <http://campusadvisories.gwu.edu> or call the GW Information Line 202-994-5050. If possible, turn on a radio or television and listen for further instructions. If your e-mail address or mobile device is registered with Alert DC, check for alert notifications.
- Be comfortable and look after one other. You will get word as soon as it is safe to come out.

An **evacuation** will be considered if the building we are in is affected or we must move to a location of greater safety. We will always evacuate if the fire alarm sounds. In the event of an evacuation, please gather your personal belongings quickly (purse, keys, cell phone, GWorld card, etc.) and proceed to one of the nearest exits. Do not use the elevator. Once we have evacuated the building, proceed to meet in front of the building.

Alert DC provides free notification by e-mail or text message during an emergency. Visit GW Campus Advisories for a link and instructions on how to sign up for alerts pertaining to GW. If you receive an Alert DC notification during class, please share the information immediately.

GW Alert provides popup notification to desktop and laptop computers during an emergency. In the event that we receive an alert to the computer in our classroom, we will follow the instructions given. You are also encouraged to download this application to your personal computer. Visit GW Campus Advisories to learn how.

Additional information about emergency preparedness and response at GW as well as the University's operating status can be found on GW Campus Advisories <http://campusadvisories.gwu.edu> or by calling the GW Information Line at 202-994-5050.