

ASTR 1002-10: Origins of the Cosmos (Spring 2021)

Operational details:

Main (Lecture) Instructor: Prof. Oleg Kargaltsev (kargaltsev@gwu.edu)
- please address as Dr. Oleg or Professor Oleg

Lecture: When: **T/R, 12:45 pm - 2:00 pm** (US Eastern Time)
Where: via Zoom link in the GW Blackboard

Office Hours: When: **3:30-4:30 pm on T/R and 9 -10 pm on Thursdays**
(*mainly for students from a very different time zone but also for those with other time conflicts*) or by appointment (via e-mail).

Where: in **Blackborad Collaborate Ultra** (not in Zoom!)

Lab Instructor: Prof. Denis F. Cioffi (dcioffi@gwu.edu)
- please address as Dr. Cioffi or Professor Cioffi

Lab hours and location: See **Lab schedule** and **Labs** below in this syllabus

TA: Hallie Fausey (hfausey@gwmail.gwu.edu)

Required materials:

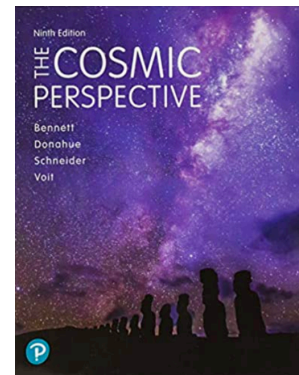
Computer: laptop or stationary PC with internet access, web browser, and Zoom app.

The textbook: The cheapest (and recommended) way is to sign up through the Blackboard->ASTR 1002-10->HW Assignments-> MyLab and Mastering Course Home. You can pay for access right there in the Blackboard and it gets you access to the electronic version of the textbook (eText). You also order the loose-leaf version of the book from within the MyLab and Mastering Course Home. It is substantially cheaper than the traditionally bound book. If you would like to purchase the book with a traditional binding you can do so in the GW bookstore **but be sure to select** Bennett, Donahue, Schneider & Voit. “*The Cosmic Perspective*”, 9th Edition, 2019, (ISBN-13: 9780135720875) with Modified Mastering Astronomy access. Please also see the Intro lecture slides.

Lab manuals: Provided through Perusall which is linked to the course page in Blackboard.

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

iClicker REEF app: This is an app for your smartphone (not the remote! do not install on your computer!). See <https://www.iclicker.com/students/apps-and-remotes/apps> for information.



OVERVIEW & COURSE OBJECTIVES

ASTR 1002 encompasses an exploration of our universe with a focus on improved scientific and mathematical literacy. This course is intended for non-science majors. There is no college prerequisite: high school science & math (basic algebra and trigonometry) are sufficient. There are two major goals to this course (with specific examples listed below):

1. Learning basic astronomical concepts, structures, and processes.

- a. Concepts:
 - i. Laws of nature, e.g., Kepler's Laws, momentum, energy, conservation laws, gravity, the electromagnetic spectrum
 - ii. Theories such as star formation, stellar evolution and "death", galaxy formation, Big Bang cosmology, dark matter and dark energy
- b. Structures:
 - i. Atoms and molecules
 - ii. Stars
 - iii. Galaxies
 - iv. The Universe
- c. Scientific Process:
 - i. For example: How do astronomers determine the mass, structure and chemical composition of various astronomical objects? How do astronomers know that black holes actually exist? How do astronomers develop theories of how the universe was formed?

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

- a. Mathematical:
 - i. Basic algebra (e.g., $y = mx + b$, the equation of a line, or 'distance = rate \times time', using given equations to solve for unknown values)
 - ii. Basic geometry (surface area and volume)
- b. Conceptual:
 - i. Scales and conversion factors (e.g., sizes in scaled models, light-years to meters conversion)
 - ii. Reasoning/thought problems (applying a law or theory to explain something)

Minimum amount of independent, out-of-class, learning expected per week: 8-10 hrs

GRADING

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

- 10% In-class Quizzes (administered during the lectures)
- 15% Lab report
- 10% Lab Preparation Activities
- 15% Term paper
- 20% Homework (via MyLab and Mastering in Blackboard)
- 30% 3 Exams (10% each)

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

LECTURES

Lectures, given twice a week, are the central part of this course. They are closely aligned with the textbook chapters but also designed to go beyond the textbook in terms of making sure you understand the material. During the lectures you will see additional examples and visualizations (e.g., videos, animations), participate in interactive activities. The instructor will explain in detail all difficult concepts or places that are not clearly written in the textbook and illustrate the textbook material through his own research experience. Taking short quizzes during the lectures will allow you to gauge your understanding throughout the course make you well prepared for the exam which will feature similarly designed questions. Attending lectures regularly will save you from unpleasant surprises during the exams and will help you greatly with the homeworks.

All lectures will be given in Zoom. You have to access Zoom from within the Blackboard course page -> “Lectures in Zoom” to be able to take quizzes and have your attendance recorded. When joining the meeting, your browser will open a new browser tab to launch the meeting session. If you have Zoom installed on your device, Zoom will automatically join you into the session. If you do not gain access to the Zoom session, you can click on the **Launch Meeting** button to start the session; if you don't have Zoom installed on your device, click on the **Download Now** link to download Zoom Client software. In case you are having difficulty with the Zoom Client, you can also access the session by clicking on the **Join from Your Browser** link. Choose either option and follow the prompts on the screen to finish joining. While it is possible to join Zoom session using the browser it is **strongly recommended to install Zoom on your computer** prior to the first lecture.

EXAMS

Three exams will be administered during the regular class time. *No make-up exams will be given without a documented legitimate reason (e.g., medical).* All three exams combined are worth 30% of overall grade (each exam is 10%). The final exam (15% of the grade) is a Term Paper with the due date during the final exam week.

This course requires the use of LockDown Browser & Monitor for online exams. Before taking a test on Blackboard, download and install LockDown Browser from this link:
<https://download.respondus.com/lockdown/download.php?id=936940528>.

To then take an online test, open LockDown Browser, log in to Blackboard, and open the exam. You will not be able to access the exam with a standard web browser as LockDown Browser prevents you from accessing other websites or applications. You will be unable to exit the test until all questions are completed and submitted.

Additional Resources for the LockDown Browser:

- [LockDown Browser User Guide for Students \(PDF\)](#)
- [Introduction to LockDown Browser for Students \(VIDEO\)](#)
- [LockDown Browser Student FAQs](#)

In addition to the LockDown Browser this course requires you to run iClicker REEF app on your smartphone during the entire exam period by joining the Focused Class in the REEF app (see below).

TERM PAPER

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 a submission of the Term Paper (with the due date during the finals week). The submission should be done by uploading your paper in the Blackboard->Term Paper Assignment. The rubric according to which this paper is graded will be provided. A set of possible projects will be discussed during the labs and examples of data resources will be provided. (15% of the overall course grade).

CLASS PARTICIPATION and EXTRA CREDIT

All students are expected to attend lectures, answer questions posed by the instructor, and ask questions about topics being discussed during the lectures. Specific activities to be considered in awarding the participation extra credit points include, asking questions during the lecture about the lecture content, active participation in discussions with other students, and thoughtful conversations during the office hours. The instructor may identify other pertinent activities for possible class participation credit. The participation extra credit is awarded solely at the instructor's discretion and is limited to 3% of overall numerical course grade.

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. It is worth 20% of the overall course grade. Expect to spend between 1 and 2 hours on homework most weeks, in addition to reading the book chapter(s). You will fall behind very quickly if you do not complete work as it is assigned. The homework assignments have clearly indicated due dates and any late homeworks are strongly penalized in the Pearson's Modified Mastering Astronomy system. Homework assignments will be made available to you way before their due date. *Therefore, getting sick or having an emergency the day the HW is due is not a valid excuse for not completing the HW. **Simply don't postpone your homework until the last minute!***

Homework will be assigned and completed on through the Pearson's Modified Mastering Astronomy which has to be accessed through the course page in GW Blackboard->ASTR-1002-10->HW Assignments-> MyLab and Mastering Course Home.

This page on Pearson's website offers help for the Modified Mastering Astronomy in MyLab and Mastering Course Home :

https://help.pearsoncmg.com/mastering/student/ccng/TopicsStudent/gettingstartedwithmastering_student.htm

The homework assignments and their due dates can be viewed inside the Blackboard->ASTR 1002-10->Assignments-> MyLab and Mastering Course Home.

IN-CLASS CHAPTER QUIZ QUESTIONS

Students will be challenged with in-class (during the lecture) quiz questions to be answered in Zoom. These will be multiple choice questions related to the material presented in the lecture during which the quiz question occurs. If you listen carefully to the lecture you should be able to answer these questions. You may also choose to read the corresponding book Chapter ahead of the lecture to improve your understanding (this is not required). You may be asked to have group discussion before answering the quiz question. If you are absent on a day when such questions are administered and do not respond to any question (correctly or incorrectly), you will *not* receive any credit for that day. If you respond but incorrectly you will receive a minimal credit of 1 point per question. In-class quiz questions are worth 10% of overall grade.

ATTENDANCE

Students are required to attend all classes and labs. Attendance will be automatically recorded during the in-class quizzes and labs. Missing a class requires a legitimate (documented) reason. Students who miss more than 4 lectures without medical or other legitimate (documented) reason will be unable to earn higher than a B- in this course. Missing 7 or more lectures or 2 or more labs will automatically result in a failing grade (F) for the semester. Students must notify both instructors **during the first week** of the semester if they have any issues with attending lectures or labs during their scheduled times and/or of their intention to be absent from class on their day(s) of religious observance.

COMPUTER/CELL PHONE POLICY

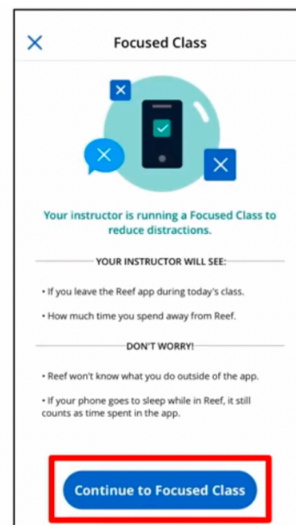
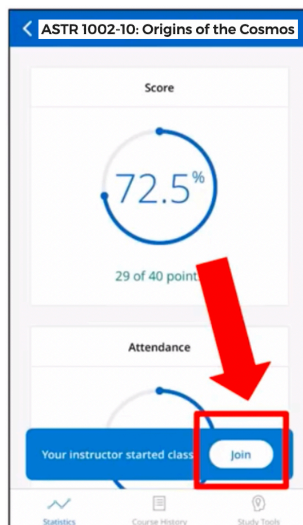
The use of laptop, tablet, or smartphone during the lecture is limited to only: (1) viewing and listening to the lecture, (2) to communicating the answers to the questions asked by the instructor during the lecture back to the instructor, (3) for the groups discussions when these are initiated by the instructor and (4) for asking the instructor questions about the lecture material or about the course in general (at the end of the lecture). During the exam you can only view the page with exam questions while answering them on your laptop. The use of any other browser pages or any other windows on your laptop or on other devices is strictly forbidden and will result in 0 points for the exam. Do not attempt to use Chegg.com (or CourseHero.com or similar websites) during

the exams or post the exam questions to those websites. They are being checked by the instructors regularly and the owners of these websites are required to report the IP address of those who posted exam questions at the instructor's request. Your IP is also recorded during the exam. If those match you will be found guilty in violating the academic integrity with may result in F grade for the course and other more serious consequences. You are allowed (and encouraged) to use scientific calculator during the in-class quizzes and exams.

This course requires you to run iClicker REEF app on your smartphone and join the Focused Class in this app during every lecture, lab, or exam by clicking "Continue to Focused Class" button and staying in it for the entire duration of lecture, lab, or exam. It is Ok for your phone to go to sleep during the Focused session. The instructor will get the report which says how much time you spend in your cellphone outside of Focused Class environment.

The iClicker REEF app is also used to take attendance and to conduct exit polls.

This course ID in iClicker Cloud is GWASTR1002-10SPRING2021. See Blackboard for details about getting the iClicker REEF app, iClicker account, and registering for this course. *Do not install or run iClicker REEF on your laptops* which should be used to join lectures in Zoom.



"In Focus":

- Using **iClicker Reef** to participate in class!
- Letting your device go into **sleep mode**
- **Dismissing** a notification

OFFICE HOURS

Virtual office hours will be held regularly (T/R, 2-3 pm) in Blackboard Collaborate Ultra (*not in Zoom!*). Blackboard Collaborate Ultra can be accessed from the Blackboard course page -> Office Hours. You may also request office hours by appointment at a different time if you have a valid reason that prevents you from joining during the regular office hours.

ONLINE RESOURCES

The course webpage is on **GW Blackboard** (<http://blackboard.gwu.edu/>). Course announcements will be posted on this site. Any PowerPoint slides shown in class will be made available online *after* each class as well as lecture video recordings. Exam and Lab grades will be posted in the Blackboard Gradebook on a regular basis.

After entering *Blackboard*, it is necessary for you to click on the course name (ASTR 1002-10). You are *automatically* subscribed within the *Blackboard* system to the courses for which you are registered (but you also must have your GW e-mail address!). The web access provided by

Blackboard is a valuable resource for all aspects of the class. It includes course announcements, access to live lectures, lecture recordings and slides, homework and exam access, discussion forum, office hours, and other useful features. You should visit it frequently!

Please visit these pages if you have any issues with Blackboard or tools within it:

<https://instruction.gwu.edu/instructional-technology-faqs-students>

<https://instruction.gwu.edu/instructional-technology-student-guides#RPNow>

There are plenty of online resources on how to use Zoom. A good starting point may be

<http://web5.lib.pacificu.edu/zoom/students/>

LABS

Students are expected to complete lab activities during the term on a schedule specified in the Schedule of Labs, which is part of this syllabus. Lab activities are conducted in Zoom sessions. To join, please go to Blackboard, “Labs in Zoom.” Lab attendance is mandatory, and students missing two or more labs without a proper excuse **will receive a grade of F for the entire course**. Lab experiments and exercises are worth 15% of overall grade, and lab preparation (in Perusall) is worth 10%, which should make one think: lab activities are worth one quarter of your total grade, and the preparation is worth nearly as much as the lab itself! Proper preparation will result in the labs running smoothly during those synchronous sessions. The labs are graded by the TA via a technique known as “specifications grading.”

In the introductory lab session (shorter than the others), these general issues will be discussed. If you have question about anything related to the lab, contact your lab instructor (Professor Cioffi) or the TA (Hallie Fausey) on the common Slack site created for the labs, 2021-1 ASTR 1002-L30-31 GWU. As virtually all communications for the labs will occur on this site, please join by the start of the semester using your @gwu email address at <https://join.slack.com/t/a1002l30-31-211/signup>.

After joining the site, please then join only one of the two channels, #l30_tuesday or #l31_thursday, as appropriate. Because the classes will be treated identically, these channels are expected to be used rarely compared to the general Announcements channel that will go to the entire class (and to which you are added automatically upon joining Slack). If you have not used Slack before, do not worry. In the words of a student from last semester, “I would use Slack for any contact you want to have with the professor or TAs that needs to be answered quickly. Slack was always answered in a very timely manner, and it can be used for questions about course structure or about content.” Also, feel free to create a private channel (i.e., by invitation only) that excludes the instructor.

Lecture and exam schedule

Week	Chapt er(s)	Tuesday		In-Class Quizzes and Chapter #s	Thursday	
1	1	Introduction and basics.	Jan 12	<i>Test quizzes (not graded)</i>	Jan 14	A modern view of the Universe
2	4	Physical laws	Jan 19	CH 4 Quiz *	Jan 21	Physical laws
3	5, S4	Light & Matter Quantum World	Jan 26	CH 5, S4 Quiz	Jan 28	Light & Matter Quantum World
4	S4	Quantum World Exam 1 review	Feb 2	CH S4 Quiz	Feb 4	EXAM #1 (Ch 1, 4, 5, S4)
5	14, 15	Our Sun	Feb 9	CH 14, 15 Quiz	Feb 11	Other stars
6	16, 17	Star birth	Feb 16	CH 16, 17 Quiz	Feb 18	Star life and death
7	S2, S3	Spec. Relativity	Feb 23	CH S2, S3 Quiz	Feb 25	General Relativity
8	S3, 18	General Relativity	Mar 2	CH S3,18 Quiz	Mar 4	WDs, NSs, BHs
9	...	Exam 2 review	Mar 9	...	Mar 11	EXAM #2 (Ch 14, 15, 16, 17, 18, S2, S3)
10	...	Spring break!	Mar 16	Spring break!	Mar 18	Spring break!
11	19, 20	Our Galaxy - Milky Way	Mar 23	CH 19, 20 Quiz	Mar 25	Galaxies
12	21, 22	Galaxy Evolution	Mar 30	CH 21, 22 Quiz	Apr 1	Big Bang
13	23	Big Bang	Apr 6	CH 22, 23 Quiz	Apr 8	Dark Matter & Dark Energy
14	6	Telescopes	Apr 13	CH 6 Quiz	Apr 15	Telescopes
15	...	Exam 3 review	Apr 20	...	Apr 22	EXAM #3 (Ch 6, 19, 20, 21, 22, 23)
16	...	Term paper discussion	Apr 27	Make up Lab week	...	Term paper (due date is the Final Exam date for this course)

* The in-class Chapter quizzes are administered during the lecture via polling in Zoom.

ASTR1002 Section 10: Lab Schedule Spring 2021

CLOSED	12234	ASTR 1002	10	Origins of the Cosmos	4.00	Kargaltsev, O	REMOTE INSTR	TR 12:45PM - 02:00PM	01/11/21 - 04/26/21	Linked
Comments: Also register for one laboratory section: ASTR 1002.30-.31. Course Attributes CSCI: GenEd:Scientific Reason w/ Lab ESCI: ESIA-Science										Find Books
LINKED COURSES :										
WAITLIST	12235	ASTR 1002	30	Laboratory	0.00	Cioffi, D	REMOTE INSTR	T 04:00PM - 05:50PM	01/11/21 - 04/26/21	Find Books
Course Attributes										
WAITLIST	15286	ASTR 1002	31	Laboratory	0.00	Cioffi, D	REMOTE INSTR	R 04:00PM - 05:50PM	01/11/21 - 04/26/21	Find Books
Course Attributes										

(Students **must** read the Lab and **complete** any pre-lab assignment **before** coming to lab):

Week	
Week 1, Jan 12,14	<i>No Labs (lectures begin)</i>
Week 2, Jan 19, 21	<i>No Labs</i>
Week 3, Jan 26, 28	Lab Orientation (must attend): Lab format & rules, Fitting, Logarithms, etc.
Week 4, Feb 2, 4	Preparing for exam (asynchronous activity). This is the week of exam #1.
Week 5, Feb 9, 11	Lab 1: Light intensity. Inverse square law.
Week 6, Feb 16, 18	<i>No Labs</i>
Week 7, Feb 23, 25	Lab 2: Sunspots and Solar Cycle.
Week 8, Mar 2, 4	Lab 3: Spectra and HR diagram.
Week 9, Mar 9, 11	Preparing for exam (asynchronous activity). This is the week of exam #2.
Week 10, Mar 16, 18	Spring break!
Week 11, Mar 23, 25	Lab 4: Stellar clusters.
Week 12, Mar 30, Apr 1	The Term Paper discussion and Q&A during the lab time. No lab.
Week 13, Apr 6, 8	Lab 5: Galaxies.
Week 14, Apr 13, 15	Lab 6: Cosmology.
Week 15, Apr 20, 22	Preparing for exam (asynchronous activity). This is the week of exam #3.
Week 16, Apr 27	<i>No Labs</i>

MODIFIED MASTERING ASTRONOMY HOMEWORK DUE DATES CAN BE VIEWED IN:

GW BLACKBOARD->ASTR 1002-10->ASSIGNMENTS->MyLab and Mastering Course Home

ABOUT YOUR INSTRUCTORS:



Prof. Oleg Kargaltsev is a full-time research and teaching faculty at GW. He conducts research in high-energy astrophysics studying neutron stars, black holes, and extreme cosmic 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 100 research publications and serves as a Principal Investigator of many observing programs on the above-mentioned international space missions. Prof. Kargaltsev's other interests include science philosophy and science policy, logical and mathematical puzzles, independent movies, chess, cooking, and science fiction.



An eclectic career finds Prof. Denis F. Cioffi back at his first academic love, thrilled to be a Visiting Professor in the Physics Department. This year marks his 23rd at the George Washington University, most of which has been spent teaching project management in the Business School, interspersed with University service, e.g., as the first director of the current teaching center. Long before that left-handed turn away from astrophysics, he had research positions at Berkeley, NASA Goddard, and NC State, transitioning to science policy with posts at the National Science Foundation, NASA Headquarters, and the Office of Science and Technology in the Executive Office of the President. (See <http://resume.cioffi.us> for a quick list.) He remains hopeful of returning to research this semester, examining early-universe star formation (and background starlight?).

University policies

Use of Electronic Course Materials and Class Recordings

Students are encouraged to use electronic course materials, including recorded class sessions, for private personal use in connection with their academic program of study. Electronic course materials and recorded class sessions should not be shared or used for non-course related purposes unless express permission has been granted by the instructor. Students who impermissibly share any electronic course materials are subject to discipline under the Student Code of Conduct. Please contact the instructor if you have questions regarding what constitutes permissible or impermissible use of electronic course materials and/or recorded class sessions. Please contact Disability Support Services at disabilitysupport.gwu.edu if you have questions or need assistance in accessing electronic course materials.

Academic Integrity Code

Academic Integrity is an integral part of the educational process, and GW takes these matters very seriously. Violations of academic integrity occur when students fail to cite research sources properly, engage in unauthorized collaboration, falsify data, and in other ways outlined in the Code of Academic Integrity. Students accused of academic integrity violations should contact the Office of Academic Integrity to learn more about their rights and options in the process. Outcomes can range from failure of assignment to expulsion from the University, including a transcript notation. The Office of Academic Integrity maintains a permanent record of the violation.

More information is available from the Office of Academic Integrity at studentconduct.gwu.edu/academic-integrity. The University's "Guide of Academic Integrity in Online Learning Environments" is available at studentconduct.gwu.edu/guide-academic-integrity-online-learning-environments. Contact information: rights@gwu.edu or 202-994-6757.

University policy on observance of religious holidays

In accordance with University policy, 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. For details and policy, see "Religious Holidays" at provost.gwu.edu/policies-procedures-and-guidelines.

Support for students outside the classroom

Virtual academic support

A full range of academic support is offered virtually in the fall 2020 and spring 2021 semesters. See coronavirus.gwu.edu/top-faqs for updates.

Tutoring and course review sessions are offered through Academic Commons in an online format. See academiccommons.gwu.edu/tutoring

Writing and research consultations are available online. See academiccommons.gwu.edu/writing-research-help

Coaching, offered through the Office of Student Success, is available in a virtual format. See studentsuccess.gwu.edu/academic-program-support

Writing Center

GW's Writing Center cultivates confident writers in the University community by facilitating collaborative, critical, and inclusive conversations at all stages of the writing process. Working alongside peer mentors, writers develop strategies to write independently in academic and public settings. Appointments can be booked online. See gwu.mywconline.

Academic Commons

Academic Commons provides tutoring and other academic support resources to students in many courses. Students can schedule virtual one-on-one appointments or attend virtual drop-in sessions. Students may schedule an appointment, review the tutoring schedule, access other academic support resources, or obtain assistance at academiccommons.gwu.edu. Academic Commons offers several short videos addressing different virtual learning strategies for the unique circumstances of the fall 2020 and spring 2021 semesters. See academiccommons.gwu.edu/study-skills. They also offer a variety of live virtual workshops to equip students with the tools they need to succeed in a virtual environment. See tinyurl.com/gw-virtual-learning

Disability Support Services (DSS) 202-994-8250

Any student who may need an accommodation based on the potential impact of a disability should contact Disability Support Services to establish eligibility and to coordinate reasonable accommodations. disabilitysupport.gwu.edu

Counseling and Psychological Services 202-994-5300

GW's Colonial Health Center offers counseling and psychological services, supporting mental health and personal development by collaborating directly with students to overcome challenges and difficulties that may interfere with academic, emotional, and personal success. healthcenter.gwu.edu/counseling-and-psychological-services