# eorge Mason University



**George Mason University**

**Department of Geography and Geoinformation Sciences  
GGS 311: Introduction to Geographic Information Systems – Spring 2022**

**Class time:** Mondays & Wednesdays from 1:30 pm – 2:45 pm

**Location:** Exploratory Hall, Room 2103

**Instructor:** Lori Mandable (she/her)

Exploratory Hall, Room 2204  
[lmandabl@gmu.edu](mailto:lmandabl@gmu.edu)

703-966-5316

**Learning** Nik Hawley (he/him)

**Assistant:** Exploratory Hall, Room 2400 C/D

[nhawley2@gmu.edu](mailto:nhawley2@gmu.edu)

Discord: <https://discord.gg/WzDj8ucX>

**Office hours:** Lori: Monday – Thursday 12pm-1pm and by appointment in 2204 Exploratory Hall

and via Zoom Personal Meeting Room at <https://gmu.zoom.us/j/2749469680>

Nik: Tuesdays and Thursdays from 4:30pm-6:30pm and by appointment

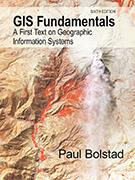
**Overview:** GGS 311 is an introductory course in Geographic Information Systems and is designated as a Mason Impact course. Mason Impact courses are part of a Provost initiative “that prepares students to tackle significant global questions and challenges by investigating meaningful questions, engaging multiple perspectives and creating new knowledge within the context of Undergraduate Research, Civic Engagement, Entrepreneurship and Global Activities.”

Topics covered include basic data structures, data sources, data collection, data quality, geodesy and map projections, spatial and tabular data analyses, digital elevation data and terrain analyses, cartographic modeling, and cartographic layout. Laboratory exercises provide practical experiences that complement the theory covered in textbook and lecture. While this course is not specifically a software course, you must show proficiency with the software to pass the class.

**Learning Objectives:**

1. Understand data and knowledge creation: Students will understand how data and knowledge are generated and communicated, and how they can be used to address questions or problems in disciplines and in society.
2. Engage multiple perspectives: Students will be able to identify and negotiate multiple perspectives, work collaboratively within and across multiple social and environmental contexts, and engage ethically with their subject and with others.
3. Investigate a meaningful question: Students will use inquiry skills to articulate a question; engage in an inquiry process; and situate the concepts, practices, or results within a broader context.

* Students will be able to ask increasingly complex questions about significant problems, debates, or challenges.
* Students will be able to evaluate and choose inquiry methods that are appropriate to a project.
* Students will be able to explain how a project has value to local, civic, professional, scholarly, or global contexts.

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**Required Text:** *GIS Fundamentals: A First Text on Geographic Information Systems,6th Ed.*, Bolstad, Paul. Eider Press 2019.

**ISBN:** 978-1-50669-587-7

Textbook website: <http://www.paulbolstad.net/gisbook.html>

Also available via Amazon in print form or via XanEdu in digital or print form

**You should do the readings before each Tuesday class period. It will be much more beneficial to you for lecture, and especially for labs on Thursdays.**

**Required Materials:** USB Drive -16GB or larger of free space.

Lab instructions and data will be provided on the course Blackboard site.

**Grading:** Grades for this course are based on individual performance in the following areas:

Lab exercises: 220 points (20 points each)

Quizzes: 50 points (10 points each)

In-Class Activities 60 points (20 points each)

Exam 1: 45 points

Exam 2: 45 points

Final Exam: 80 points

Total: 500 points

Grades will be determined according to the following schema:

|  |  |  |
| --- | --- | --- |
| Grade | Percentage | Points |
| A+, GPA 4.00 points earned | 97% and above | 485-500 |
| A, GPA 4.00 points earned | 94% - 96.99% | 470-484 |
| A-, GPA 3.67 points earned | 90% - 93.99% | 450-469 |
| B+, GPA 3.33 points earned | 87% - 89.99% | 435-449 |
| B, GPA 3.00 points earned | 84% - 86.99% | 420-434 |
| B-, GPA 2.67 points earned | 80% - 83.99% | 400-419 |
| C+, GPA 2.33 points earned | 77% - 79.99% | 385-399 |
| C, GPA 2.00 points earned | 74% - 76.99% | 370-384 |
| C-, GPA 1.67 points earned | 70% - 73.99% | 350-369 |
| D, GPA 1.00 points earned | 60% - 69.99% | 300-349 |
| F, GPA 0.00 points earned | 59.99% and below | 0-299 |

**Lab Exercises:** There will be 13 assigned labs over the course of the semester, with 11 of those 13 labs counting for the lab portion of your grade. Each lab is worth 20 points, and I will drop the 2 lowest lab grades from labs 1-12 in computing the score for a total of 220 points. The only exception to this is that Lab 13 is MANDATORY and CANNOT be dropped. It is the final, comprehensive lab of the semester requiring you to utilize all the skills you have developed over the course of the semester in ArcGIS.

Lab exercises will be available on Blackboard. I recommend downloading and/or printing the exercises prior to beginning your work. You may complete the exercises in class during lab days listed on the syllabus, in the GGS Computer Lab and/or at home. You should read the lab in advance, and review/note new procedures or activities. Labs will require more than the 1.25-hour class period to complete. One tip: Save the labs along the way – they make excellent references when doing more complex labs during the semester.

The GGS computer lab in Exploratory Hall 2102 has registered copies of ArcGIS Pro, which are accessible 24/7 via your GMU ID. Students registered for this class automatically receive permission to utilize this lab. Registered students will also receive a one-year copy of ArcGIS for use at home. We offer this software as a convenience, but do not provide tech support. For that you must contact ESRI Support at 1-888-377-4575. Labs must be submitted via Blackboard using the ArcGIS product.

All labs assignments are to be submitted via Blackboard. Submit by clicking on the appropriate assignment link to open the answer submission window. Written answers may be typed in, and attachments may be added there. Click “Submit” when complete. You may submit answers as many times as you would like up to the time due, though only the final submission will be graded. Once submitted, make sure you KEEP the submission email Blackboard sends you in case of technical issues – it is your proof that you have submitted the lab on time!

Please note you may work together on labs, but **you each must do every part of each lab** and **turn in your own work for the entire portion of each assignment/lab**. That means each of you should perform every step indicated in the lab instructions. Your grade is for individual effort. Shared/copied files/maps from other students will be construed as cheating, with all parties involved receiving ZERO points for that assignment. Additionally, copied files/maps will be reported to the Honor Committee and the Office of Academic Integrity in accordance with university policy.

Lab due dates are listed on the syllabus and students have until **11:59pm** of that date to submit their labs. Makeup labs will not be given, so please anticipate conflicts and contact the instructor in advance of an absence. Labs are only accepted through the Blackboard course site - **NOT Email**! Labs MUST BE submitted as **pdf files**. **Please do not send \*.mdx or shapefiles – Blackboard CANNOT read them, and it will result in a grade of 0 points.**

**Quizzes:** Quizzes on course topics will be given at random and can best be prepared for by answering the questions at the back of each chapter.

**In Class** We will have a combination of 3 required in class activities that each will count 20

**Activities**: points for a total of 60 points.

**Exams:** There will be three exams for this course. Exam 1 will cover Chapters 1-5 of the text, and Exam 2 will cover Chapters 6-9 of the text. The Final Exam will be comprehensive, but most of the exam will focus on Chapters 10-15 of the text.

## Instructor Policies

* **Attendance is key to doing well in this course.** Several scientific studies conclusively correlate academic success with regular class attendance. While the instructor does not take attendance for class, there will be 5 unannounced quizzes given in class during the semester, which comprise 50 points of the total grade for this class. If you must miss a class, please let the instructor know ahead of time via email or text message. It is the student’s responsibility to meet with the instructor to follow up on any missed material.
* **Absences:** Make up exams, make up in-class quizzes and late submissions of labs and other graded material will only be accepted at the discretion of the instructor for **DOCUMENTED** extenuating circumstances. Missed quizzes, exams and late submissions of labs and other graded work will receive a grade of 0 and it is the student’s responsibility to follow up with the instructor regarding a documented extenuating circumstance.
* **Respect for Others:** Occasional discussions may occur in class. Please be kind and respectful to fellow students, Learning Assistant(s) and the Professor. Remember your audience and use proper professional etiquette and language. We all bring our wonderful and unique experiences and perspectives to class. A foundation of respect and acknowledgement of diverse perspectives enables everyone to benefit from our collected insights.
* **Use of electronic devices/cell phones:** Please do not engage in activities that are unrelated to the class on the class computers and any private electronic devices brought into the classroom. Please mute cell phones prior to class commencing. If you do need to receive an incoming call during the class period, please step outside the classroom to take the call.
* **Email policy:** The instructor will return emails and text messages as quickly as possible Monday through Friday. If you send an email on Saturday or Sunday it could be a full 24-48 hours before the instructor is able to respond.

## University Policies

* **Catalog:** The University Catalog (http://catalog.gmu.edu) is the central resource for university policies affecting student, faculty, and staff conduct in university academic affairs. Other policies are available at [http://universitypolicy.gmu.edu/.](http://universitypolicy.gmu.edu/) All members of the university community are responsible for knowing and following established policies.
* **Email:** Students must use their MasonLive email account to receive important University information, including communications related to this class. The instructor will not respond to messages sent from or send messages to a non-Mason email address. See <http://masonlive.gmu.edu> for more information.
* **Inclement Weather and Class Cancelation:** GMU posts closings on its website (www.gmu.edu.) You can receive notification from Mason Alerts via email or text to a cell phone; please let the instructor know if you need more information.
* **Registration:** Instructors do not have the capacity to remove students from class enrollment, therefore students are responsible for any changes in enrollment.
* **Honor Code:** Students of this course must be familiar with the GMU honor code, which can be viewed via this link: <http://www.gmu.edu/catalog/9798/honorcod.html#code>.

Three fundamental and rather simple principles to follow at all times are that: (1) all work submitted be your own; (2) when using the work or ideas of others, including fellow students, give full credit through accurate citations; and (3) if you are uncertain about the ground rules on a particular assignment, ask the instructor for clarification. No grade is important enough to justify academic misconduct. Plagiarism means using the exact words, opinions, or factual information from another person without giving the person credit. Writers give credit through accepted documentation styles, such as parenthetical citation, footnotes, or endnotes. Paraphrased material must also be cited, using MLA or APA format. A simple listing of books or articles is not sufficient. Plagiarism is the equivalent of intellectual robbery and cannot be tolerated in the academic setting. If you have any doubts about what constitutes plagiarism, please see the instructor.

**Any** violation of the honor code is taken seriously and will be reported.

Pursuant to OAI policy, for any cases of cheating faculty must give two recommendations for sanctions, for first and second offenses. My recommendations will be as follows:

1st Offense: ‘F’ for the course and academic probation

2nd Offense: Expulsion from the university

* **George Mason Diversity Statement**:

*George Mason University promotes a living and learning environment for outstanding growth and productivity among its students, faculty and staff. Through its curriculum, programs, policies, procedures, services and resources, Mason strives to maintain a quality environment for work, study and personal growth.*

*An emphasis upon diversity and inclusion throughout the campus community is essential to achieve these goals. Diversity is broadly defined to include such characteristics as, but not limited to, race, ethnicity, gender, religion, age, disability, and sexual orientation. Diversity also entails different viewpoints, philosophies, and perspectives. Attention to these aspects of diversity will help promote a culture of inclusion and belonging, and an environment where diverse opinions, backgrounds and practices have the opportunity to be voiced, heard and respected.*

*The reflection of Mason’s commitment to diversity and inclusion goes beyond policies and procedures to focus on behavior at the individual, group and organizational level. The implementation of this commitment to diversity and inclusion is found in all settings, including individual work units and groups, student organizations and groups, and classroom settings; it is also found with the delivery of services and activities, including, but not limited to, curriculum, teaching, events, advising, research, service, and community outreach.*

*Acknowledging that the attainment of diversity and inclusion are dynamic and continuous processes, and that the larger societal setting has an evolving socio-cultural understanding of diversity and inclusion, Mason seeks to continuously improve its environment. To this end, the University promotes continuous monitoring and self-assessment regarding diversity. The aim is to incorporate diversity and inclusion within the philosophies and actions of the individual, group and organization, and to make improvements as needed.*

* **Support Resources:**

**Office of Disability Services:** If you have a documented learning disability or other condition that you believe will impact your academic performance: 1) Consult with the Office of Disability Services (SUB I, Rm. 2500; 703-993-2474; <http://ods.gmu.edu>) so that they can document the issues and determine about proper accommodations and 2) Provide the professor with the documentation of accommodations provided by ODS. As a matter of university policy, faculty cannot provide accommodations without documentation from the ODS.

**Responsible Employee:** As a faculty member and designated “Responsible Employee,” the instructor is required to report all disclosures of sexual assault, interpersonal violence, and stalking to Mason’s [*Title IX Coordinator*](https://diversity.gmu.edu/sexual-misconduct) per [*university policy 1412*](https://universitypolicy.gmu.edu/policies/reporting-of-clery-act-crimes-andor-prohibited-sexual-conduct/).

**Confidential Support Services:** If you wish to speak with someone confidentially, please contact the [*Student Support and Advocacy Center*](http://ssac.gmu.edu/) (703-380-1434) or [*Counseling and Psychological Services*](https://caps.gmu.edu/) (703-993-2380). You may also seek assistance from [*Mason’s Title IX Coordinator*](https://diversity.gmu.edu/sexual-misconduct) (703-993-8730; titleix@gmu.edu).

**Additional Support Services:** Several departments exist to aid students in a wide variety of ways and are listed on the last page of this syllabus.

## GGS 311 - Course Outline 1, 2

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| --- | --- | --- | --- |
| Week | Date | Chapter(s) Covered | Due Dates |
| 1 | 1/24 | Course/Lab Introduction |  |
| 1/26 | Chapter 1: Intro to GIS |
| 2 | 1/31 | Chapter 2: Data Models | **In Class Activity 1** |
| 2/2 | Lab 1: Intro to ArcGIS Pro |
| 3 | 2/7 | Chapter 3: Geodesy, Datums, Map Projections & Coordinate Systems |  |
| 2/9 | Finish Chapter 3 Lecture  Lab 2: Projections | **Lab 1 Due** |
| 4 | 2/14 | Chapter 4: Maps, Data Entry, Editing & Output |  |
|  | 2/16 | Lab 3: Digitizing | **Lab 2 Due** |
| 5 | 2/21 | Finish Chapter 4 Lecture |  |
| 2/23 | Lab 4: Topology | **Lab 3 Due** |
| 6 | 2/28 | **Exam 1 – Chp 1-4** |  |
|  | 3/2 | Chapters 5-6: Global Satellite Navigation & Aerial/Satellite Images | **Lab 4 Due** |
| 7 | 3/7 | Lab 5: Data Collection with GPS Units |  |
| 3/9 | Chapter 7: Digital Data  Lab 6: Digital Data & Tables | **In Class Activity 2** |
| 8 | 3/14 | **Spring Break** | |
| 3/16 |
| 9 | 3/21 | Chapter 8: Attribute Data & Tables  Lab 7: Tables | **Lab 5 Due** |
| 3/23 | Finish Chapter 8 Lecture  Chapter 9: Basic Spatial Analysis | **Lab 6 Due** |
| 10 | 3/28 | Finish Chapter 9 Lecture  Lab 8: Spatial Selection, etc. | **Lab 7 Due** |
|  | 3/30 | **Exam 2 – Chp 5-9** |  |
| 11 | 4/4 | Lab 9: Buffering & Overlay | **Lab 8 Due** |
| 4/6 | Chapter 10: Raster Analyses |  |
| 12 | 4/11 | Lab 10: Topics in Raster Analysis | **Lab 9 Due** |
|  | 4/13 | Chapter 11: Terrain Analyses |  |
| 13 | 4/18 | Lab 11: Terrain Analysis | **Lab 10 Due** |
| 4/20 | Chapter 12: Spatial Estimation |  |
| 14 | 4/25 | Lab 12: Interpolation | **Lab 11 Due** |
|  | 4/27 | Chapter 13: Spatial Models & Modeling |  |
| 15 | 5/2 | Lab 13: Intro to Cartographic Modeling | **Lab 12 Due** |
| 5/4 | Chapter 14: Data Standards & Data Quality  Chapter 15: New Developments in GIS | **In Class Activity 3** |
| 16 | Wed, May 11 – Tues, May 17, 2022 | **Comprehensive FINAL EXAM (Chp 1-15)**  **1:30pm-4:15pm** | **Lab 13 Due on May 17, 2022** |

**\*Notes:** 1This is a flexible course outline. The instructor reserves the right to make changes when necessary.

2The current “official” copy of the syllabus/course outline will be kept on Blackboard. Students will be notified of any changes.

**Student Support Services:**

|  |  |
| --- | --- |
| NAME OF RESOURCE | DESCRIPTION OF RESOURCE |
| [Academic Advising](https://advising.gmu.edu/) | [www.advising.gmu.edu](http://www.advising.gmu.edu) |
| [Assistive Technology Initiative](https://ati.gmu.edu/) | **Aquia Building Rm. 238 703-993-4329** [**www.ati.gmu.edu**](http://www.ati.gmu.edu)  Manages the production of accessible text for Mason students with disabilities. They also ensure access to information technology and communications to the entire university community through the use of adaptive equipment and provision of technical assistance. |
| [Center for Culture, Equity, and Empowerment (formerly ODIME and LBGTQ+)](https://ccee.gmu.edu/) | **SUB I Room 2400 703-993-2700** [**www.ccee.gmu.edu**](http://www.ccee.gmu.edu)  Leverages programs and services focused on advocacy and direct student support to strengthen equity and inclusion at George Mason University. Our advising fosters opportunities for identity development, cross-cultural engagement, and inclusive learning communities, affirming the indivisible aspects of all our identities. Our three areas: [Student Access and Equity (SAE)](https://ccee.gmu.edu/sae/), [Student Engagement for Racial Justice (SERJ)](https://ccee.gmu.edu/serj/), and [LGBTQ+ Resources](https://ccee.gmu.edu/lgbtq-resources/), serve as resources to those in the Mason Community who seek to meaningfully engage and interact with people with different identities and intersections to co-create an equitable campus environment. |
| [Counseling and Psychological Services](https://caps.gmu.edu/) | **SUB I Room 3129 703-993-2380** [**www.caps.gmu.edu**](http://www.caps.gmu.edu)  Students can take advantage of psychological services, a variety of learning services, multicultural services, and educational programs that support students’ educational goals. |
| [Disability Services](https://ds.gmu.edu/) | **SUB I Room 2500 703-993-2474** [**www.ds.gmu.edu**](http://www.ds.gmu.edu)  Implements and coordinates reasonable accommodations and disability-related services that afford equal access to university programs and activities. |
| [International Programs and Services](https://oips.gmu.edu/) | **SUB I Room 4300 703-993-2970** [**www.oips.gmu.edu**](http://www.oips.gmu.edu)  Provides guidance to students and scholars studying and working at George Mason University on immigration, employment and taxation, and adjustment issues, while fostering cross-cultural understanding through programs highlighting global themes. |
| [Learning Services](https://learningservices.gmu.edu/) | **SUB I Room 3129 703-993-2380** [**www.learningservices.gmu.edu**](http://www.learningservices.gmu.edu) Provides a variety of experience based learning opportunities through which students explore a wide range of academic concerns. Services include support to students with learning differences, individual study skills counseling, individualized programs of study, and provision of tutoring resources. Presentations on a variety of academic skill topics are available to the university community. The programs are open to all George Mason University students free of charge. Services are confidential and use of these services does not become part of the student’s academic record. |
| [Mason Student Services Center](https://masonec.gmu.edu/) | **SUB I Room 1003** [**www.mssc.gmu.edu**](http://www.mssc.gmu.edu)  Provides one-stop, integrated information and referrals regarding admissions, registrar, student accounts, and financial aid. |
| [Mathematics Tutoring Center](http://math.gmu.edu/tutor-center.php) | **Exploratory Hall 703-993-3622**  [**www.science.gmu.edu/academics/departments-units/mathematical-sciences/math-tutoring**](http://www.science.gmu.edu/academics/departments-units/mathematical-sciences/math-tutoring)  Offers tutoring on a walk-in basis for all George Mason University students who are enrolled in math courses up to MATH 290. |
| [Office of Academic Integrity](https://oai.gmu.edu/) | **SUB I Room 4100 703-993-6209** [**www.oai.gmu.edu**](http://www.oai.gmu.edu)  Provides information on the honor code and resources for students and faculty. |
| [Office of Coalition Building and Diversity Education (CBDE)](https://cbde.gmu.edu/) | **SUB I Room 2400 703-993-2700** [**www.cbde.gmu.edu**](http://www.cbde.gmu.edu)  Through collective and collaborative work with campus and community partners, supports, builds, and enhances the understanding of interpersonal identities to respond to systemic inequities, through engagement, advocacy, and education. CBDE aims to be a catalyst for change by creating, promoting and sustaining an inclusive and equitable campus community. |
| [Office of Compliance, Diversity and Ethics](https://diversity.gmu.edu/) | **Aquia Building Room 373 703-993-8730** [**www.cde.gmu.edu**](http://www.cde.gmu.edu)  The Office of Compliance, Diversity and Ethics provides leadership and support on matters relating to equity, diversity, access, respect and inclusiveness for all members of the George Mason University community. |
| [Office of Military Service](https://military.gmu.edu/support/services) | **SUB I 703-993-1316** [**www.military.gmu.edu**](http://www.military.gmu.edu)  Assists U.S. Military veterans, their dependents and survivors with navigating the complex benefits process. Also provides career assistance and social opportunites for military and veteran students. |
| [Safe Zone](https://lgbtq.gmu.edu/safe-zone/) | **SUB I Room 2200 703-993-2702** [**www.lgbtq.gmu.edu/safe-zone/**](http://www.lgbtq.gmu.edu/safe-zone/) Creates a safer, more welcoming and inclusive campus environment to strengthen community and encourage networking among faculty, staff, and students toward the goal of supporting the well-being of LGBTQ people. |
| [Social Action and Integrative Learning (SAIL)](https://sail.gmu.edu/) | **Enterprise Hall Room 442 703-993-2900** [**www.sail.gmu.edu**](http://www.sail.gmu.edu)  Fosters experiential learning opportunities on campus, regionally, and globally for the Mason community with a particular emphasis on effecting positive social change. SAIL is Mason’s home for service-learning initiatives. |
| [Student Conduct](https://studentconduct.gmu.edu/) | **SUB I Room 4100 703-993-6209** [**www.studentconduct.gmu.edu**](http://www.studentconduct.gmu.edu) Provides information about university policies, the student conduct process, and resources for faculty related to addressing student behaviors of concerns and other disruptive behaviors. |
| [Student Health Services](https://shs.gmu.edu/) | **SUB I Room 2300 703-993-2831** [**www.shs.gmu.edu**](http://www.shs.gmu.edu)  Provides high quality health care, counseling, education, and prevention services in support of student learning and retention. |
| [Student Support and Advocacy Center](https://ssac.gmu.edu/) | **SUB I Room 3200 703-993-3686** [**www.ssac.gmu.edu**](http://www.ssac.gmu.edu)  Provides comprehensive services for students in an effort to foster the safety and well-being of the Mason community. SSAC services include assisting students who are encountering barriers to their academic success or personal growth, interpersonal violence prevention, alcohol and drug education, health promotion/healthy relationships, student crisis intervention, and connecting students with appropriate campus and off-campus resources. |
| [University Career Services](https://careers.gmu.edu/) | **SUB I Room 3400 703-993-2370** [**www.careers.gmu.edu**](http://www.careers.gmu.edu)  Provides information on career choices, internships and employment, and graduate and professional school. |
| [UNIV Courses and Programs](https://transitions.gmu.edu/) | [**www.transitions.gmu.edu**](http://www.transitions.gmu.edu)  Serves as a resource and development center for undergraduates, providing courses, programs, and services to facilitate students’ personal and academic success. |
| [University Life](https://ulife.gmu.edu/) | **Merten Hall Room 5200 703-993-8760** [**www.ulife.gmu.edu**](http://www.ulife.gmu.edu)  Enhances students’ in- and out-of-class experiences, in addition to facilitating interactions among faculty, staff, and other students. These resources help students achieve academically, stay healthy, get involved with campus life, find jobs, and identify resources to enrich their learning. |
| [University Writing Center](https://writingcenter.gmu.edu/) | **Johnson Ctr Room 227E 703-993-1200** [**www.writingcenter.gmu.edu**](http://www.writingcenter.gmu.edu)  Offers free individual writing consultations for students, who choose between meeting a tutor on Zoom or submitting a draft for the tutor’s written feedback. Also offers online writing guides on specific genres of writing, citation style, and other topics. Additionally, the Writing Center provides assistance to faculty who are interested in holding in-class writing workshops, developing effective writing assignments, or evaluating students’ writing. |