Geo 491-02 – Undergrad Research Methods | Spring 2020

Instructor information
Instructor: Dr. Hilary Martens    ||    Office: CHCB 329/330    ||    Tuesdays 12:00-12:50 PM
Email: hilary.martens@umontana.edu    ||    Phone: 406.243.6855    ||    Office hours: T 3-4 PM; W 11-12 noon

Course description:
Whether or not you choose to pursue a career in research, engaging in an independent or group research project as an undergraduate can help you to develop valuable experience, relationships and skills that are transferable to any discipline and career! Capstone experiences, such as undergraduate research, provide opportunities to integrate classroom knowledge acquired during your bachelor’s program and apply the knowledge to real-world problems of importance to science and society.

Learning Outcomes:
By the end of the course, students should be able to:
1. Ask questions in subjects that interest them, narrow down a research topic, and formulate a research question
2. Identify and connect with prospective faculty mentors
3. Locate and apply for undergraduate scholarship and internship opportunities
4. Write and review a research abstract
5. Find and cite relevant background literature on their chosen research topic
6. Consider the opportunities, challenges, and strategies associated with pursuing graduate school and research careers
7. Communicate scientific results effectively through written, oral, and visual mediums
8. Assess the quality of scientific writing, presentations, and visuals, and provide critical feedback to peers
9. Design an independent research project proposal and adhere to ethical principles in scientific research
10. Develop strategies for organizing, managing, and implementing a research project

Textbook:
To save you money and time, we will use Open Educational Resources (OERs) this semester! OERs are educational resources that exist in the public domain. We therefore do not require a traditional fee-based textbook for this course. All required reading and learning materials will be provided to you, free of charge, throughout the course.


Optional Books:

Course Calendar*:
* The topics and dates are unlikely to change, but occasional updates may be necessary due to unforeseen circumstances. We may not have time to cover all topics depending on classroom discussions and student interest. We will focus our discussions and activities on one main topic each week (blue rows). Rows below each heading show sub-topics we will consider (as time allows).

<table>
<thead>
<tr>
<th>Dates</th>
<th>Topic</th>
<th>Assignments</th>
</tr>
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<tbody>
<tr>
<td>14 January</td>
<td>Welcome</td>
<td>1. Read a short handout on Essentials of UG Research</td>
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<td>Course organization and expectations</td>
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<td></td>
<td>What is undergraduate research?</td>
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<td></td>
<td>The value of undergraduate research</td>
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<td>21 January</td>
<td>Exploring and focusing interests</td>
<td>1. Create a concept map on a topic of interest</td>
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<td>Workshop with Mansfield Library on “Information Literacy” and RefWorks</td>
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<td>28 January</td>
<td>Formulating a research question</td>
<td>1. Formulate a research question in your topic of interest</td>
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<td>(Don’t worry about formulating a revolutionary or truly novel question; in this class, we are primarily concerned with the structure and design of a research project, rather than the topic or implementation)</td>
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<td>Share concept maps with the class</td>
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<tr>
<td></td>
<td>How to formulate a research question</td>
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| 4 February | Hypotheses and conjectures                      | 1. Following UMCUR guidelines, compose an abstract that summarizes your research question and plan  
|            |                                                | a. If you are already involved in research, this will be your UMCUR abstract (and include key methods and results)  
|            |                                                | b. If you are not yet involved in research, this will be a first draft of your proposal abstract that describes a potential project  |
| 11 February| Abstract peer review                            | 1. Revise and submit UMCUR abstracts (if applicable)  
|            |                                                | 2. Find and cite three papers relevant to your interests  
|            |                                                | 3. In 300-500 words, summarize the main methods and outcomes of one of the papers |
| 18 February| Literature searches                             | 1. Find a figure in the literature on your chosen topic of interest. Bring the figure to class next week and come prepared to discuss what is most effective and least effective about how the figure displays information.  
|            |                                                | 2. Due: Brief (300-500 word) summary of one paper |
| 25 February| Scientific visuals                               | 1. What makes an effective scientific visual?  
|            |                                                | 2. Compare and contrast scientific visuals |
| 3 March    | Project management                               | 1. Create an outline for your research project proposal  
|            |                                                | 2. Share and discuss scientific visuals in pairs  
|            |                                                | 3. Consideration of resources and budget  
| 10 March   | Points of connection with the public            | 1. Complete the “Points of Connection” worksheet  
|            |                                                | 2. Read “Ethics in Research” handout  
|            |                                                | 3. Share and discuss basic outlines in pairs  
|            |                                                | 4. Awareness of discipline-specific jargon  
|            |                                                | 5. Connecting with the public |
| 17 March   | Spring Break                                    | No class  
| 24 March   | Ethics in Research                              | 1. Prepare two questions to ask our guest panel next week about scholarships, internships, grad school, ethics, research practices, and/or research careers  
|            |                                                | 2. Fill in details to your research project proposal;  
|            |                                                | 3. Due: “Points of Connection” worksheet  
|            |                                                | 4. Share “Points of Connection” experiences  
|            |                                                | 5. Discuss “Ethics in Research” handout  
|            |                                                | 6. Discuss final proposal pitches  
| 31 March   | Scholarships, grad school, and careers         | 1. Fill in details to your research project proposal (Bring two copies to class on 14 April)  
|            |                                                | 2. Panel of special guests  
| 7 April    | Effective presentations                         | 1. Continue filling in details to your research project proposal. Remember to bring two copies of your proposal draft to class next week.  
|            |                                                | 2. No regular class: Attend one “Presentation Training” workshop at the Mansfield Library Monday April 6th 7-8 PM -- or -- Tuesday April 7th 4-5 PM  
| 14 April   | UMCUR practice                                  | 1. Provide critical feedback on two peer proposals. (Please email comments to your peers and to me by  
|            |                                                | 2. Please submit your revised abstracts if applicable.  
|            |                                                | 3. UM Writing Center “Orientation” workshop Wed. Feb. 12th 4-5 PM -- or -- Thurs. Feb. 13th 6-7 PM  
|            |                                                | 4. Annotated bibliographies  
|            |                                                | 5. Review of citation management  
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<td>21 April</td>
<td>UMCUR Week (24 April)</td>
<td>1. Attend UMCUR and make notes in research portfolio.</td>
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<td>Good luck to all our presenters! 😊</td>
<td>a. If attending: visit at least three posters/talks</td>
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<td>b. If presenting: make note of questions asked</td>
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<td>2. Revise your research proposal based on peer reviews</td>
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<td>3. Complete research portfolio (due next week)</td>
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<td>4. Due: Critical feedback on two peer proposals</td>
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<td>28 April</td>
<td>Reflections</td>
<td>1. Complete final draft of research proposal</td>
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<td>2. Complete presentation slides for proposal pitch</td>
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<td>3. Due: Research Portfolio</td>
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<td>5 May</td>
<td>Finals Week</td>
<td>Due: Independent Research Project Proposal</td>
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<td>Due: Proposal Pitch (in class)</td>
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**Required assignments:**

1. **In-class participation and attendance:** Students are expected to attend class, ask questions, and engage meaningfully in discussion throughout the term. The course will be mostly discussion- and activity-based, rather than formal lectures.
2. **Research portfolio:** The research portfolio will contain notes, ideas, figures, and reflections from throughout the term.
3. **Independent research project proposal:** Students will identify a topic of interest, formulate a research question, describe the motivation for the question and the value of the research to science, discuss the methods that may be used to investigate the question, and consider the resources required (time, money, equipment) to carry out the project.
4. **Oral pitch of independent research project proposal:** Students will pitch the subject, motivation, and logistics behind their research proposals through oral presentations on the final day of the term.
5. **Ad-hoc take-home assignments and peer review:** During some weeks, students will be given a short prompt or small assignment to complete for the following week. Students will also provide critical feedback on the work of peers.

**Course guidelines and policies:**

**Student conduct code**

All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code: [https://www.umt.edu/safety/policies/default.php](https://www.umt.edu/safety/policies/default.php)

**Attendance**

Regular attendance and participation in class activities is expected. If you need to miss a class, please inform me in advance.

**Course withdrawal**

Please refer to Institute policy on adding, dropping, and withdrawing from courses: [https://www.umt.edu/registrar/students/dropadd.php](https://www.umt.edu/registrar/students/dropadd.php)

Important dates and deadlines are provided by the Office of the Registrar: [https://www.umt.edu/registrar/calendar.php](https://www.umt.edu/registrar/calendar.php)

**Disability modifications**

The University of Montana assurs equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students. If you think you may have a disability adversely affecting your academic performance, and you have not already registered with Disability Services, please contact Disability Services in Lommasson Center 154 or call 406.243.2243. I will work with you and Disability Services to provide an appropriate modification.
Assignment expectations

Assignments and other course activities are expected to be completed thoughtfully and on-time.

Honor Code: "No member of the community shall take unfair advantage of any other member of the community." (Caltech)

Plagiarism: Reproducing the work of someone else, and representing the work as your own, without appropriate citation and attribution is forbidden. Plagiarism extends beyond tangible material to also include ideas. When in doubt, cite.

Collaboration: Research is team-based and collaboration is encouraged. However, work that you submit must be your own and reflect your own understanding of the material. Please respect and uphold the spirit of the Honor Code.

UM Writing and Public Speaking Center

The University of Montana Writing and Public Speaking Center offers students in all disciplines one-on-one consultations as they write or prepare presentations for any course. Welcoming all students, the Writing Center provides a learning environment where students can engage in supportive conversations about their work and receive feedback at any point during their process. To make an appointment and learn more about The Writing and Public Speaking Center, visit www.umt.edu/writingcenter.

Grading policy

<table>
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<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>In-class participation and attendance</td>
<td>20%</td>
</tr>
<tr>
<td>Independent research project proposal</td>
<td>35%</td>
</tr>
<tr>
<td>Research notebook/portfolio</td>
<td>20%</td>
</tr>
<tr>
<td>Ad-hoc take-home assignments and peer review</td>
<td>15%</td>
</tr>
<tr>
<td>Oral pitch of independent research project proposal</td>
<td>10%</td>
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Late assignments will not be accepted without prior written approval or in extenuating circumstances beyond the control of the student (e.g. hospitalization of student). Circumstances will be evaluated on a case-by-case basis. Extensions are not guaranteed.


Cultural leave policy

Cultural or ceremonial leave allows excused absences for cultural, religious, and ceremonial purposes to meet the student’s customs and traditions or to participate in related activities. To receive an authorized absence for a cultural, religious or ceremonial event the student or their advisor (proxy) must submit a formal written request to the instructor. This must include a brief description (with inclusive dates) of the cultural event or ceremony and the importance of the student’s attendance or participation. Authorization for the absence is subject to approval by the instructor. Appeals may be made to the Chair, Dean or Provost. The excused absence or leave may not exceed five academic calendar days (not including weekends or holidays). Students remain responsible for completion or make-up of assignments as defined in the syllabus, at the discretion of the instructor.

Additional information and resources

Student Academic Resources

Disability Services for Students (DSS): http://www.umt.edu/dss/
The Writing Center: http://www.umt.edu/writingcenter/
Office for Student Success: http://www.umt.edu/oss/
Career Services: http://www.umt.edu/career/
Mansfield Library: http://www.lib.umt.edu

Student Health and Wellbeing

Curry Health Center (mental health, physical health, pharmacy, health promotion): http://www.umt.edu/curry-health-center/
Campus Recreation: http://www.umt.edu/crec/
DiverseU: http://www.umt.edu/du/Student Activity Groups: http://www.umt.edu/sum/student_groups/