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GEO 390.01: Getting Started in Research

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Geo 390 – Getting Started in Research | Fall 2021

Instructor information

Instructor: Dr. Hilary Martens || Office: CHCB 329/330 || M / W 4:00-4:50 PM
Email: hilary.martens@umontana.edu || Phone: 406.243.6855 || Office hours: TBD

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.

COVID-19 protocols:

Please be advised that masks are required in all UM classrooms until further notice. We will also have assigned seats and take attendance for contact-tracing purposes. Thank you in advance for helping to keep our community safe.

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.

Recommended Book (free PDF available online): Kennett, B. (2014), "Planning and Managing Scientific Research: A guide for the beginning researcher," ANU Press, doi: <http://dx.doi.org/10.22459/PMSR.03.2014> .

Optional Books:

- Turabian, K.L. (2007), "A manual for writers of research papers, theses, and dissertations: Chicago style for students and researchers," The University of Chicago Press, Chicago 60637.
- National Academy of Sciences, National Academy of Engineering, and Institute of Medicine (2009), "On Being a Scientist: A Guide to Responsible Conduct in Research: Third Edition." Washington, DC: The National Academies Press. doi: <https://doi.org/10.17226/12192> .
- Goodstein, D. (2010), "On Fact and Fraud: Cautionary Tales from the Front Lines of Science," Princeton University Press.

Course Calendar*:

* Subject to change depending on progress, student interest, and guest presenters. We will focus our discussions and activities on one main topic each week (blue rows). Rows below each heading show sub-topics that we will consider as time allows.

| Dates | Topic | Assignments |
|-------------------------------|--|---|
| Week 1 (8/30; 9/2) | Welcome & Introduction | 1. Identify a broad topic that interests you (e.g., earthquakes). |
| | Intros, course organization, expectations; office hours, library workshop, seating chart | |
| | What is undergraduate research? | |
| | The value of undergraduate research | |
| | General Scientific Methodology | |
| Week 2 (9/8) | Exploring & Focusing Interests | 1. Narrow and focus your topic of interest. 2. Create a concept map. |
| | Create a concept map in class | Labor Day: No class on Monday |
| Week 3 (9/13; 9/15) | Formulating a Research Question | 1. Formulate a research question for your topic of interest. (Don't worry about formulating a revolutionary or truly |

| Dates | Topic | Assignments |
|---------------------------------|---|--|
| | | <i>novel question; in this class, we are primarily concerned with the structure and design of a research project, rather than the topic or implementation).</i> |
| | Guest: Dr. Catherine Filardi , UM Writing & Public Speaking Center | Orientation to UM Writing & Public Speaking Center |
| | How to formulate a research question | |
| Week 4 (9/20; 9/22) | Information Literacy | 1. Sharpen and finalize your research question. |
| | Special Workshop with Mansfield Library on "Information Literacy" and RefWorks | Monday, September 20th, 2:00-3:50 PM 2-Hour Workshop: No class on Wednesday |
| Week 5 (9/27; 9/29) | Literature Searches | 1. Annotated Bibliography: Find and cite five papers relevant to your topic; annotate each reference with a short (~100 word) summary. |
| | Annotated bibliographies | |
| | Review of citation management | |
| Week 6 (10/4; 10/6) | Project Planning & Management | 1. Create an outline for your project proposal. 2. Read "Ethics in Research" handout. |
| | Outline your project proposal | |
| | Creation of a timeline and milestones | |
| | Consideration of resources and budget | |
| Week 7 (10/11; 10/13) | Ethics in Research | 1. Read abstract handouts (provided in class). 2. Fill in details to your project proposal. |
| | Discuss "Ethics in Research" handout | |
| | Continue to generate ideas and develop project proposals (time in class) | |
| | Share and discuss proposal outlines in pairs or small groups | |
| Week 8 (10/18; 10/20) | Abstract Writing | 1. Compose an abstract that summarizes your research question and plan. (Due 10/20) a. If you are already involved in research, this will include key methods and results. b. If you are not yet involved in research, this will be a first draft of your proposal summary that describes a potential project. 2. Prepare two questions to ask our guest panel next week about scholarships, internships, grad school, ethics, research practices, research careers, etc. |
| | Guest: Dr. Catherine Filardi , UM Writing and Public Speaking Center | Abstract Writing Workshop |
| | Abstract peer review | |
| Week 9 (10/25; 10/27) | Scholarships, Grad School, & Careers | 1. "Points of Connection" worksheet |
| | Guest: Carl Spangrude , Montana Space Grant Consortium (MSGC) | 10/25 |
| | Graduate Student Panel | 10/27 |
| Week 10 (11/1; 11/3) | Experiential Learning & Connecting with the Public | 1. Find a figure in the literature on your topic; plan to bring the figure to class next week; consider what is most effective and least effective about how the figure displays information. 2. Continue to fill in details to your project proposal. a. <i>Bring one copy to class on November 10th</i> |
| | Discuss "Points of Connection" exercise | |
| | Awareness of discipline-specific jargon | |
| | Guest: Emily Lynch , ELCS (11/3) | |
| Week 11 (11/8; 11/10) | Scientific Visuals | 1. Develop and enhance your project proposal. 2. Provide critical feedback on one peer proposal. (<i>Please email comments to your assigned peer and to me by the start of class next Monday.</i>) |
| | What makes an effective scientific visual? | |
| | Compare and contrast scientific visuals | |

| Dates | Topic | Assignments |
|----------------------------------|--|---|
| | Share and discuss scientific visuals in pairs/teams | |
| | Proposal peer review (11/10) | |
| Week 12 (11/15; 11/17) | Effective Presentations | <ol style="list-style-type: none"> Watch at least 3 UMCUR presentations from Spring 2021. <ol style="list-style-type: none"> Note in your research notebook what each presenter did well (strengths). Note in your research notebook what each presenter could improve upon (opportunities for growth). Revise your proposal based on peer review. |
| | Explore undergraduate theses and presentations in UM ScholarWorks (in class; please bring a laptop if you can) | |
| | How to start a presentation | |
| | Workshop: Effective Presentations | |
| Week 13 (11/22) | Presentation Development | <ol style="list-style-type: none"> Work on presentation slides for your proposal pitch. Complete your research portfolio (due 12/1). Prepare two questions to ask our faculty guests next week. |
| | Presentation development (in class) | Thanksgiving Holiday: No class on Wednesday |
| Week 14 (11/29; 12/1) | Working with Faculty Mentors | <ol style="list-style-type: none"> Complete final draft of research proposal (due 12/6). |
| | Faculty Panel | |
| | Practice pitches and feedback (if time) | |
| Week 15 (12/6; 12/8) | Reflections | <ol style="list-style-type: none"> Complete slides for proposal pitch (due next week). |
| | Looking ahead: UMCUR | |
| | Wrap-up / Reflections / Evaluations | |
| Week 16 | Finals Week | Proposal Pitches (in class). |

Required assignments:

- 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.
- Research portfolio:** The research portfolio will contain notes, ideas, figures, and reflections from throughout the term.
- 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.
- 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.
- 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>

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>

Important dates and deadlines are provided by the Office of the Registrar:

<https://www.umt.edu/registrar/calendar.php>

Disability modifications

The University of Montana assures 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

| | |
|--|------------|
| In-class participation and attendance: | 20% |
| Independent research project proposal: | 40% |
| Research notebook/portfolio: | 15% |
| Ad-hoc take-home assignments and peer review: | 15% |
| Oral pitch of independent research project proposal: | 10% |

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.

We use traditional letter grades: A [93–100%], A- [90–92.99%], B+ [87–89.99%], B [83–86.99%], B- [80–82.99%], etc.

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/diverseu/>
Student Activity Groups: http://www.umt.edu/asum/student_groups/