

University of Montana

## ScholarWorks at University of Montana

---

University of Montana Course Syllabi

Open Educational Resources (OER)

---

Fall 9-1-2020

### GEO 224.R00: General Science - Physics and Geoscience

Hilary R. Martens

*The University Of Montana*, [hilary.martens@umontana.edu](mailto:hilary.martens@umontana.edu)

Follow this and additional works at: <https://scholarworks.umt.edu/syllabi>

## Let us know how access to this document benefits you.

---

#### Recommended Citation

Martens, Hilary R., "GEO 224.R00: General Science - Physics and Geoscience" (2020). *University of Montana Course Syllabi*. 11309.

<https://scholarworks.umt.edu/syllabi/11309>

This Syllabus is brought to you for free and open access by the Open Educational Resources (OER) at ScholarWorks at University of Montana. It has been accepted for inclusion in University of Montana Course Syllabi by an authorized administrator of ScholarWorks at University of Montana. For more information, please contact [scholarworks@mso.umt.edu](mailto:scholarworks@mso.umt.edu).

# Geo 224N – Gen Science: Phys & Geoscience | Fall 2020 \$

## Instructor Information:

Instructor: Dr. Hilary Martens || Office: CHCB 329/330 || Blended Learning (In-Person / Online-Interactive)  
Email: [hilary.martens@umontana.edu](mailto:hilary.martens@umontana.edu) || Phone: 406.243.6855 || Office hours: T 3-4 PM; W 9-10 AM; By appointment

## Teaching Assistants:

Chloe Boucher | [chloe.boucher@umontana.edu](mailto:chloe.boucher@umontana.edu) | Masters student in Geosciences  
Gina Belair | [gina.belair@umontana.edu](mailto:gina.belair@umontana.edu) | Masters student in Geosciences

## Lecture and Labs:

**Lecture:** MWF; mostly online asynchronous (you can complete readings and activities at a time convenient for you); occasionally \* lectures will be held in an online synchronous format using Zoom at the normally scheduled class time of 2-2:50 PM (mountain time) \*

**Labs:** TR; online asynchronous and synchronous (we will let you know in advance of each lab session) \*

**Thank you** in advance for your patience and flexibility as we navigate uncertain times. Our goal is for all students to achieve and \* excel at the learning outcomes of the course while keeping all members of our community as safe and healthy as possible. \*

## Course Description:

This course will introduce basic principles of the physical sciences, including fundamental topics in physics, astronomy, and Earth sciences. A major focus of the course will be on building confidence in science, inspiring scientific curiosity, and preparing students to incorporate current science education standards in their future K-8 classrooms. Specific topics that we will explore include the scientific method, the physics of motion, force, and energy. We will also cover the four main components of the Earth system, the history and evolution of the Earth as a planet, the ways in which humans use resources and affect our planet, and our planet's place in the Solar System and Universe.

## Learning Outcomes:

By the end of the course, students should be able to:

1. Describe the motion of an object in terms of position, speed, velocity, and acceleration
2. Apply the scientific method to ask questions and conduct basic scientific experiments
3. Explain and provide conceptual examples to illustrate Newton's Laws of Motion
4. Differentiate between kinematic and potential energy, and discuss methods of energy transfer
5. Describe the interior structure of the Earth and the physical processes that shape its surface
6. Summarize the roles that human communities play in the evolution of our planet
7. Characterize Earth's place in the Solar System and Universe
8. Appreciate the impact of science on society and discover ways to inspire the next generation of scientists!

## Textbook:

**Conceptual Physical Science, 6<sup>th</sup> Ed.**, Hewitt, P.G., Suchocki, J.A., & Hewitt, L.A. 2017, Pearson.

## Online Learning:

**Moodle:** Login to Moodle through UM-Online ([moodle.umt.edu](http://moodle.umt.edu)). We will use Moodle extensively in this course for asynchronous learning, class discussions, activities, assignments, and exams.

**Zoom:** A Zoom link will be posted to the Moodle site and sent via email. We will use Zoom for synchronous lectures, remote laboratory sessions, class discussions, interactive activities (e.g. breakout rooms), team projects, and office hours.

**Labs:** Laboratory exercises will involve a combination of asynchronous and synchronous online learning. Some labs may have the option to meet in person in outdoor, socially-distanced settings. We will inform you of each upcoming laboratory format in advance via email and Moodle.

## Important Dates:

UM Office of the Registrar: <https://www.umt.edu/registrar/calendar.php>

## Time Management:

The standard expectation for college courses is that two hours outside of class will be required for every one credit hour in class. As a 5-credit course, you should therefore expect to spend an average of 15 hours/week on lectures, labs, homework, readings, exams, and other course activities. Please ensure that you have sufficient time to devote to this course before enrolling.

**Course Calendar\*:**

\* Subject to change: We will try to stick to the schedule as best as possible, but may need to adjust from time to time.

<b>Dates</b>	<b>Topic</b>	<b>Assignments and Due Dates</b>
<b>Week 1</b>	<b>The Nature of Science</b>	
19 August	Unit 1: Welcome and Introductions	
20 August	<b>Lab 1:</b> Campus Scavenger Hunt	
21 August	Unit 1: A Brief History of Science	
<b>Week 2</b>	<b>Scientific Inquiry</b>	
24 August	Unit 2: Scientific Methods	
25 August	<b>Lab 2:</b> Making Observations in Nature	
26 August	Unit 2: Questions and Observations	
27 August	<b>Lab 3:</b> Accuracy and Precision	
28 August	Unit 2: Hypotheses and Theories	
<b>Week 3</b>	<b>Physics of Motion</b>	
31 August	Unit 3: Distance, Time, and Speed	
01 September	<b>Lab 4:</b> Distance, Time, and Speed	
02 September	Unit 3: Position and Velocity	
03 September	<b>Lab 5:</b> Position and Velocity	
04 September	Unit 3: Mass and Inertia	
<b>Week 4</b>	<b>Acceleration and Gravity</b>	
07 September	<b>Labor Day: No Class</b>	
08 September	<b>Lab 6:</b> Acceleration	
09 September	Unit 4: Acceleration and Gravity	
10 September	<b>Lab 7:</b> Measuring Earth's Gravity	
11 September	Unit 4: Review and Active Practice	
<b>Week 5</b>	<b>Net Force and Projectile Motion</b>	
14 September	<b>Midterm Exam 1</b>	
15 September	<b>Lab 8:</b> Net Force	
16 September	Unit 5: Net Force	
17 September	<b>Lab 9:</b> Projectile Motion	
18 September	Unit 5: Projectile Motion	
<b>Week 6</b>	<b>Newton's Laws</b>	
21 September	Unit 6: Newton's 1 <sup>st</sup> and 2 <sup>nd</sup> Laws	
22 September	<b>Lab 10:</b> Newton's 2 <sup>nd</sup> Law	
23 September	Unit 6: Newton's 3 <sup>rd</sup> Law	
24 September	<b>Lab 11:</b> Newton's 3 <sup>rd</sup> Law	
25 September	Unit 6: Active Practice	
<b>Week 7</b>	<b>Work and Energy</b>	
28 September	Unit 7: Work	
29 September	<b>Lab 12:</b> Mission Possible! 1	
30 September	Unit 7: Energy	
01 October	<b>Lab 13:</b> Mission Possible! 2	
02 October	Unit 7: Practice Problems	
<b>Week 8</b>	<b>Astronomy and Planetary Science</b>	
05 October	Unit 8: Solar System	
06 October	<b>Lab 14:</b> The Moon	
07 October	Unit 8: Earth Seasons	
08 October	<b>Lab 15:</b> Space Exploration	

Dates	Topic	Assignments and Due Dates
09 October	Unit 8: Space Missions	
<b>Week 9</b>	<b>Journey Inside the Earth</b>	
12 October	<b>Midterm Exam 2</b>	
13 October	<b>Lab 16:</b> Earth Materials	
14 October	Unit 9: Layers of the Earth	
15 October	<b>Lab 17:</b> Earth's Interior	
16 October	Unit 9: Mechanical Behavior	
<b>Week 10</b>	<b>Plate Tectonics</b>	
19 October	Unit 10: Plate Boundaries	
20 October	<b>Lab 18:</b> Plate Boundaries and Motion	
21 October	Unit 10: Earthquakes	
22 October	<b>Lab 19:</b> Global Earthquakes	
23 October	Unit 10: Volcanoes	<b>Due: Project 1</b>
<b>Week 11</b>	<b>The Water Cycle</b>	
26 October	Unit 11: The water cycle	
27 October	<b>Lab 20:</b> The Water Cycle	
28 October	Unit 11: Atmosphere and oceans	
29 October	<b>Lab 21:</b> Geomorphology	
30 October	Unit 11: Climate change	
<b>Week 12</b>	<b>History of Earth and Life</b>	
02 November	Unit 12: Geological time scale	
03 November	<b>Election Day: No Lab</b>	
04 November	Unit 12: Mass extinction events	
05 November	<b>Lab 22:</b> History of Life	
06 November	<b>Midterm Exam 3</b>	
<b>Week 13</b>	<b>Natural Resources and Sustainability</b>	
09 November	Unit 13: Natural Resources	
10 November	<b>Lab 23:</b> Personal Water Usage	
11 November	<b>Veterans Day Observed: No Class</b>	
12 November	<b>Lab 24:</b> Ask a Scientist / Points of Connection	
13 November	Unit 13: Sustainability	<b>Due: Project 2</b>
<b>Week 14</b>	<b>Inspiring the Next Generation!</b>	
16 November	Unit 14: Be curious & Inspire curiosity	
17 November	<b>Lab 25:</b> Reflections	
18 November	Course wrap-up and evaluations	
<b>Week 15</b>	<b>Finals Week</b>	
<b>19-25 November</b>	<b>Final Exam</b>	<b>Final Exam (Due: Wednesday 25 Nov 2020 by 5 PM)</b>

#### Required assignments and exams:

1. Readings: You are expected to complete online (Moodle) readings and activities as you work through the course.
2. [15%] Term Projects: Create a lesson plan on a physical science topic of interest (10%); "Notes to Myself" (5%)
3. [5%] Participation: Active and thoughtful contributions to online Moodle activities/forums
4. [10%] Midterm Exam 1: Scientific methods, basic physics of motion, and gravity
5. [10%] Midterm Exam 2: Newton's Laws, work, energy, and astronomy
6. [10%] Midterm Exam 3: Earth and water sciences
7. [10%] Homework: Weekly exercises to explore course content more deeply
8. [20%] Laboratory Exercises: Two laboratory exercises and reports per week
9. [20%] Final Exam: Comprehensive (covering all units)

## 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 participation in online/remote course exercises is expected. If you need to miss class activities (e.g. due to illness, inadequate technology, or other extenuating circumstances), then 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. The University does not permit fundamental alterations of academic standards or retroactive modifications. It is the responsibility of the student to ensure that I am aware of requested modifications as soon as possible during the term (including providing me a copy of their official DSS letter).

### Assignment expectations

Readings, homework, labs, projects, exams 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: Since the course is remote/online, peer-to-peer collaboration will not look the same as in other courses. Although you are welcome and encouraged to discuss course materials (except for exams) with your fellow classmates, it is expected that you submit your own work that reflects your own understanding of the material. Please respect and uphold the Honor Code.

### Grading policy

Term Projects:	15% )
Participation:	5% (Participation in discussions, readings, and activities in the Moodle course) *
Homework:	10% )
Laboratories:	20% )
Midterm Exams:	30% (3 x 10%) *
Final Exam:	20% )

It is recommended that you begin assignments early and keep track of due dates. \*

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. \*

### Late assignments

Late assignments will only be accepted for full credit with **prior written approval** (e.g. disability with official DSS letter) or as a result of **extenuating circumstances** beyond the control of the student (e.g. hospitalization of the student). Formal documentation will typically be provided in the case of extenuating circumstances. Situations will be evaluated by the instructor on a case-by-case basis, and the acceptance of a late assignment or exam is **not guaranteed**. The guiding principal will be in the **spirit of fairness** to all students in the course, based on the **Honor Code** (see above). It is the responsibility of the student to plan ahead and submit work on time. **Late assignments will incur the following penalties:**

- **Projects:** A deduction of **20%** off the maximum possible grade will be assessed for assignments submitted by 10 PM (Montana time) the next business day. A deduction of **40%** off the maximum grade will be assessed for assignments submitted before 10 PM on the third business day following the deadline. Beyond the third business day, late assignments will **not** be accepted. Late assignments must be emailed directly to me; the portal on Moodle will close at the deadline.
- **Midterm Exams:** A deduction of **50%** off the maximum possible grade will be assessed for late exams submitted before 10 PM on the third business day following the deadline. Beyond the third business day, late exams will **not** be accepted. If you missed the deadline for an exam, you must first email me to reopen the exam portal for you on Moodle.
- **Final Exam:** Late Final Exams will **not** be accepted.
- **Homework and Laboratory Reports:** A deduction of **10%** off the maximum possible grade will be assessed for every 24 hours that elapses after the due date.

### 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/](http://www.umt.edu/asum/student_groups/) \*

### Tips for Success and Frequently Asked Questions

1. \* Each "lesson" in our Moodle course is equivalent to one in-class lecture. I strongly recommend that you **take notes** as you read the content and engage with the multi-media (e.g. videos, animations, and activities). Taking notes, or even speaking out loud, may help you to engage more actively with the material and to retain it better.
2. \* To be successful in this course, you must (1) **submit all your work**, and (2) **submit all your work on time**. Even if you fail an exam, chances are that you can still pass the class (and maybe even still receive an A!) as long as you submit all your work on time. The best thing to do is to stay on track and work diligently through the material each week. Do not put everything off until the last minute. If you work steadily and actively through the material, and submit all of your work on time, then you are highly likely to succeed in this class, regardless of your prior experience in math and science.
3. \* **I don't have a computer; can I take the course on my mobile phone?** Technically, yes you could take the course on most mobile phones, but it is **not recommended**. The small screen size of a mobile phone may make it difficult to navigate and read course materials. If you need a computer, free computers are available on campus for students to use, including at the Mansfield Library and in some departments.
4. \* **Start the projects early**, and use the UM Writing Center as a resource. Procrastination is tempting, but I strongly encourage you to start your projects early so that you can have time to create your best work and explore your topic fully!
5. \* **Feeling confused? Reach out!** Please feel free to start discussions and ask questions using the open forums at the bottom of each unit. Online courses present challenges for student engagement – it is easy to stay in your own bubble when you aren't in a classroom surrounded by other people. I encourage everyone to participate in the open discussions.
6. \* **This is my first online course – help!** I have structured the course with straight-forward navigation – some activities will require completion of other activities before you can move on. UM-Online offers Moodle trainings for students. You can also reach out to me and the TAs via email and/or office hours with questions.
7. \* **How can I engage more with other students in the course?** One of the best ways to engage directly with other students in the course is by posting to the open discussion forums at the end of each unit or the "Common Room" forum.