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BIOB 226N.03: General Science - Earth & Life Science Lab

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**Laboratory Syllabus BIOB 226-03: Earth and Life Sciences
Spring 2019**

Lab Time: W & F 10:00AM – 11:50 AM

Lab Location: HS 204

Office Hours: By appointment

Teaching Assistant: Kayla Ruth

Office Location: FOR 303

E-mail: kayla.ruth@umontana.edu

Laboratory Course Content

BIOB 226 lab exercises are designed to accomplish three primary objectives: a) help you understand more completely, and in an on-hands fashion, fundamental principles of Earth and Life Sciences, b) cultivate your self-directed, inquisitive and experiment-based learning abilities, and c) experience a collaborative and communication-based learning/work environment. In most cases the lab exercises will overlap completely with the lecture material. However, sometimes labs will parallel or expand further on lecture topics. In both cases, the introductory lecture at the start of each week's lab will provide you with necessary background information.

Learning Outcomes

At the end of the course, students will be able to:

1. Demonstrate an understanding of the scientific method and its application
2. Demonstrate an understanding of the theory of plate tectonics, earth processes and earth materials that shape the surface of the earth and their importance.
3. Demonstrate an understanding of geologic principles and apply them to interpreting earth history and the development of the geologic time scale.
4. Explain the structure and composition of the oceans and atmosphere and the processes that govern weather and climate.
5. Demonstrate a fundamental understanding of the important molecules of life and the structure and function of cells.
6. Understand basic metabolic processes and the flow of energy in the biosphere.
7. Understand the process of evolution and how evolution accounts for the unity and diversity of life
8. Analyze and discuss the interactions and relationships between the biosphere, the lithosphere, the atmosphere and the hydrosphere.

Required Materials

- **Lab handout:** these will be uploaded to the Moodle lab page each week. Please print out a copy each week and bring it with you to lab.
- **Lab notebook:** You will need a 3-ring binder, composition notebook, spiral notebook or sketchbook to keep your notes from each lab. These notes will help you study for your weekly quizzes, retain data for your lab writeups and help deepen your understanding of lab concepts. Keeping your lab notebook up-to-date is part of your lab grade and will be graded.

Student Expectations

BIOB 226 laboratory students are expected to follow the some basic course conditions:

- Arrive on time for lab session. Quizzes will be handed out at the start of lab, and late comers may not have time in which to complete them. If you need accommodations for quizzes, please present me with your letter of accommodation as soon as possible.
- Come to lab prepared. This means reading over the week's lab beforehand. There will be a 10 minute quiz at the start of lab. Quiz content will pull heavily from the summary section of each week's lab manual.
- Work collaboratively, write independently. Work with your lab group to complete and better understand each week's lab. However, all assignments must be your own work or you will not receive credit for them.

- Attend the full 2-hour session. Quizzes will be followed by an introductory lecture. Concluding remarks, which are likely to appear on the next week's quiz, occur at the end of the 2-hour session. Additionally, lab clean-up and reorganization is required. Points will be deducted from your participation grade if your area is left messy.

Grading

Your grade in the laboratory section of BIOB 226 will make up approximately 50% of your total course grade. You will have 250 points possible from the lab section. Points are broken down by assignment in the table below.

Type of Assignment	How Many in the Semester	Points Each is Worth	Total Points for that Type of Assignment
Quizzes	9 (8 graded, 1 dropped)	10	80
Scientific Lab Report	1	30	30
Primary School Science Projects	3	15	45
Primary School Presentation	1	30	30
Lab Notebook	2x	25	50
Lab Participation, Notebook Checks, and Clean Up	1	15	15
Total Points Possible for Lab:			250

Quizzes: Quizzes will be handed out at the start of class. They are ten minutes long. They will start the week of January 28. There will be nine lab quizzes, but you will be able to drop the lowest score. The material covered will be ~70% about the previous week's lab, and ~30% about the current week's lab.

Scientific Lab Report: You will have to complete one scientific lab report. The report will be written on your self-designed experiment begun in the Scientific Method Lab. Lab reports will be turned in on the Moodle page for the lab. More information and guidelines will be available on the Moodle page.

Lab Report: You will have to complete one scientific lab report. The report will be written on your self-designed experiment begun in the Scientific Method Lab. Lab reports will be turned in on the Moodle page for your lab section.

Primary School Science Projects: Throughout the semester, you will work in teams to create three science activities that can be adopted into a primary school science classroom curriculum to enhance science education and awareness in our schools. We hope to compile these activities into a Montana specific science education guide. This document will contain a set of suggestions concerning selected concepts and activities and use low-cost materials or equipment, which can be modified, adapted, and enriched according to the needs of the students and individual schools. This curriculum guide will outline the Montana Science Content Standards to assist teachers in developing high quality science curriculum and activities.

Primary School Science Presentations: You will present one of your primary school science projects at our science symposium. You and your partners get to choose which of your three projects to present to a group of primary school students. You will be graded on your preparation, delivery, and grasp of the concepts presented.

Lab Notebook: Lab notebooks will be checked at the end of the second lab each week as part of your participation grade. Lab notebooks do not need to be completed by then, but should be close to being done as you have completed the lab itself. A full grading of your lab notebooks will take place during the middle and end of the semesters. These will each be 25 points, totaling a possible 50 points. Please order your notebooks chronologically (i.e., in the order we go through activities over time) and include a **Table of Contents** in the beginning of your notebook. Each week you should have a lab entry with the following sections:

- **Heading:** include your name, the date and the title of the lab activity or investigation
- **Introduction:** explain the general objectives of the activity; why are you doing these activities; give background as to why the activity is important; what do you expect to learn. The introduction should be at least one paragraph of 3-4 sentences or bullet points. This is often completed before coming to lab.
- **Methods:** what techniques, procedures, and tools did you use?; how did you use the tools?; what settings did you set the tools to?; how much time did the activity take?; did you use chemicals or compounds and how much did you use?
- **Results:** This is the quantitative (numerical) and /or qualitative (descriptive) information (i.e., data) observed during the activity. Quantitative data may include lengths, weights, time till some reaction occurred, or a count of some number of organisms or features; qualitative data might include the colors or shapes of items or organisms. Qualitative data is often best described by drawing or diagrams; therefore your results section should include sketches and/or labeled diagrams, numbers, charts, figures, short descriptions, and/or even images from the internet (note: data is plural, datum is singular).
- **Discussion:** Include your personal critique of what you learned during the activity. What methods and activities worked well and why? What methods and activities did not work so well and why? What did you like? What did you not like or struggle with? Would you use these activities for your future students, why/why not? How could you adapt the activities to be useful to your future students?

Lab Participation and Clean Up: You can think of these points as a grade buffer. To get them all you have to do is show up to lab, be respectful of the (often expensive!) lab materials while in lab, participate fully in the lab experiments, maintain your lab notebook, and clean up your supplies at the end of lab.

Policy for Late Assignments or Missed Labs:

If you know that you need to miss a lab, please let me know as soon as possible. There is a possibility to attend an alternate lab within the week, but you will have to contact the TA of the alternative lab section before attending. While you can attend another lab section to make up a lab you miss, we might not have enough space or materials for you if you do not coordinate with us ahead of time. Unannounced “walk-ins” to alternative lab sections may be denied. If you arrive late to lab and miss a quiz, you will not be given the opportunity to make it up unless you have a documented excuse for that absence. Lab reports turned in late are -5% per day. The primary school presentations should not be late, as rescheduling your presentation for a different time may not be possible.

Statement on Academic Honesty and Plagiarism:

Quizzes must be completed independently or you will not receive credit for them. All turned in assignments (i.e lab reports) must be written independently, or you will not receive credit for them. Please DO work with your lab mates to complete the labs in class. Teamwork is necessary for the completion of these labs in the allotted time. However, you cannot WRITE your lab with your lab mates. You may discuss the concepts together, but if sections of the written lab reports are the same, you will not receive credit for that lab report. Turning in the same written concept is known as PLAGIARISM, and it can get you discredited from the scientific community. All intentional acts of plagiarism will be reported to the University of Montana.

Students with Disabilities:

If you are a student with a disability and wish to request reasonable accommodations for this course, contact me privately to discuss the specific modifications. Please be advised, I may request that you provide a verification letter from Disability Services for Students. If you have not yet registered with Disability Services, located in Lommasson Center 154, please do so in order to coordinate your reasonable modifications. For more information, visit the Disability Services website at www.umt.edu/disability.

Extra Credit:

Five points of extra credit will be given if you visit the Writing and Public Speaking Center to work on any assignment in this lab during the semester. You can do so up to two times, resulting in a max of 10 extra credit points over the semester.

Schedule of Alternate Lab Times and TA Contact Information

If you need to switch labs for a lab period due to unavoidable conflicts, please contact both your current lab TA and the TA of the lab you would like to drop in on. Remember, requests to switch lab sections for a week must be made **in advance** and motivated by a **documented**, unavoidable conflict approved by your TA.

Tuesday/Thursday 1-2:50 (section 1) **Brett Addis**
Tuesday/Thursday 3-4:50 (Section 2) **Jackson Birrell**
Monday/Wednesday 10-11:50 (Section 3) **Kayla Ruth**

brett.addis@umontana.edu
jackson.birrell@umontana.edu
kayla.ruth@umontana.edu

Lab Schedule*

Week of	Lab Investigation	Assignment Due
1/15	NO LABS	
1/22	Introduction/ Tools and Measurements	
1/29	Scientific Method	Quiz
2/5	Minerals and Rocks	Quiz
2/12	MT Maps/Plate Tectonics	Quiz
2/19	Data Collection	Quiz Primary School Science Project 1 Due
2/26	Data Collection	
3/5	Fossils	Quiz Lab Notebooks Due (Lab Notebook Check #1)
3/12	Cells	Quiz
3/19	Energy	Quiz Primary School Science Project 2 Due
3/24	NO LAB: Spring Break	
4/2	Natural Selection	Quiz Scientific Lab Report Due
4/9	Biodiversity	Quiz
4/16	Field Trip	Lab Notebooks Due (Lab Notebook Check #2)
4/23	Primary School Presentations	Primary School Science Project 3 Due

*Subject to slight changes

Statement of Credit:

This lab syllabus was a collaboration of Kevin Murray, Miriam Bayer, Elise Zarri, Annie Green, Brett Addis, Jackson Birrell, and Kayla Ruth (always cite your sources!).