Introduction to the Geosciences for K-8 Teachers

Course Information
Department and course number: GEOS 595
Credits: 4 graduate
Course meeting dates and times: June 14th – 18th and June 21st – 25th from 8:30 AM to 4:30 PM
Course Locations: Beaverhead Building, Room 102, Salish Kootenai College

Course Instructors:
Instructor of Record
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Course Description
The primary focus of this course is on the deepening of K-8 teachers’ understanding of Geoscience content knowledge through an Earth Systems Science approach. Teachers enrolled in the course will engage in a variety of learning experiences designed to investigate the past, present, and future behavior of Earth’s interacting physical systems. Topics explored will be in alignment with the National Science Education Content Standards [NSES] and will include the rock, water, and carbon cycles, the fossil record, the structure and formation of Earth’s physical features, mapping, and topics that are culturally relevant to western Montana, such as water quality issues, fire ecology and Tribal natural resource management. Classroom, laboratory and field based instructional methods will be employed. Teachers will engage in extensive fieldwork and laboratory experiences designed to increase their understanding of Earth’s composition and the processes that form it.

The secondary focus of the course is on the development of teacher professional knowledge and skills that support rigorous K-8 science instruction, including pedagogical methods, curriculum development, cultural competency and teacher leadership. Teachers will begin to develop proficiency in these areas through critical examination of science education issues and the research literature, professional discourse with peers and mentors, and the production and sharing of artifacts such as lesson plans, curriculum implementation plans, and science teacher leadership plans. Course activities will model effective geoscience instructional methods and assessments, providing opportunities for teachers to experience, critique, and adapt activities and methods for use in their own classrooms.
Course Learning Outcomes:
Through the successful completion of this course teachers will
1) deepen their understanding of Geoscience content knowledge,
2) improve their ability to use scientific skills employed in the geosciences,
3) improve their understanding of the nature of science and how scientific knowledge is
   generated,
4) heighten their awareness of the interaction of science and society,
5) improve their ability to use educational technology that supports Geoscience education,
6) gain professional skills and knowledge that support the design and implementation of
   rigorous science instruction,
7) improve cultural competency in teaching science to American Indian students and
8) develop skills as science teacher leaders.

Course Materials:
❖ Other readings as assigned by instructors

Course Content:

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<thead>
<tr>
<th>Day</th>
<th>Content and Skills</th>
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<tbody>
<tr>
<td>Day 1</td>
<td>Course introduction and expectations</td>
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<tr>
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<td>Earth’s creation and geologic history</td>
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<td>Tribal perspectives on Earth formation and history</td>
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<td>Plate tectonics</td>
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<td>Earth’s composition</td>
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<td>Day 2</td>
<td>Density of rocks</td>
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<td>Minerals and mineral identification</td>
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<td>The rock cycle and rock identification</td>
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<td>Mining issues for Montana’s Kootenai People</td>
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<td>Day 3</td>
<td>Geology of the Flathead Reservation and Western Montana</td>
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<td>Stratigraphy and geologic structures</td>
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<td>Using models to model geologic formations and processes</td>
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<td>Fieldtrip to McDonald Lake to examine rock formations</td>
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<td>Tribal oral history of the Mission Valley</td>
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<td>Day 4</td>
<td>Maps and mapping: Topography and geology</td>
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<td>Glaciers and glaciation</td>
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<td>Glaciation fieldtrip</td>
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<td>Day 5</td>
<td>Google Earth inquiry investigation of Glacial Lake Missoula</td>
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<td>Glacial Lake Missoula and the geology of the northwestern U.S.</td>
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<td>Concept maps in Earth Science education</td>
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<td>Glacial Lake Missoula fieldtrip</td>
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<td>Tribal oral history of the Big Draw and Camas Prairie</td>
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| Day 6 | Introduction to stream morphology  
Stream table inquiry investigation  
Inquiry based instruction/Shifting a lesson to inquiry  
Stream morphology fieldtrip |
| Day 7 | Fieldtrip to Jocko River Restoration Area for field study  
Designing inquiry investigations  
Cultural significance of water/Tribal water management |
| Day 8 | The hydrologic cycle  
Groundwater  
Schwartz lake fieldtrip for hydrology study |
| Day 9 | Introduction to fire ecology  
Tribal fire management/"Fire on the Land” curriculum resource  
Fire on the Land lesson development  
Fieldtrip to study fire regimes  
Cultural use of fire by the Salish, Kootenai and Pend d’ Oreille people |
| Day 10 | Introduction to dendrochronology  
Dendrochronology inquiry investigation  
Carbon cycle inquiry investigation  
Carbon cycle and climate change theories  
Teacher leadership and development of preliminary leadership plans  
Summative assessment and course evaluation |

**Evaluation**

Students enrolled in the course will receive a traditional letter grade. Students will be evaluated using multiple assessment methods and **ALL assignments must be completed to at least a minimum standard of proficiency specified by instructors in order to receive a passing grade for the course**. All course assignments must be completed by July 30th.

Points will be awarded to students as follows:

- In class activities: 40 points maximum
- Field journal: 25 points maximum
- PowerPoint on course concepts: 15 points maximum
- Science Leadership Plan (graduate credit only): 20 points maximum
- Maximum total points: 100 points maximum

Grades will be awarded using the following scale:

- 90 to 100% = A
- 80 to 89% = B
- 70 to 79% = C
- 60 to 69% = D
- Less than 60% = F
Attendance
This is an intensive two week course. Full attendance is expected. No opportunities for makeup assignments will be offered except in cases of extreme emergency. Forty percent of the course grade is based on in class assignments therefore full attendance is required for the successful completion of the course with a passing grade. Any absences must be approved in advance with the course instructors.

Academic Integrity
All students must practice academic honesty. Plagiarism is unacceptable and will result in a failing grade. 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. The Code is available for review online at http://www.umt.edu/SA/VPSA/index.cfm/page/1321

Stipend Payment
All participants enrolled in this course are required to complete the entire course and all of its assignments to a minimum standard of proficiency as determined by the instructors and to receive a minimum grade of “B” in the course before they will receive their stipend and course credit. The stipend will be paid by check to each participant in full, if all requirements are met, in August 2010, after the submission of final grades. No partial stipends will be paid.