

Introduction to Weather, Climate and Astronomy for K-8 Teachers – June 2011

Course Information

Department and Course Number: SCI 595 or C&I 595 (4 credits)

Course Dates:

June 13-17 and June 20-24, 2011 from 8:30am to 4:30pm

Observing Night at Blue Mountain: Date to be announced

Course Location: CHCB (Clapp Building) Room 348

Course Instructors:

Dr. Beth Covitt, Research Asst. Professor Environmental Studies Program Email: beth.covitt@umontana.edu Office: Clapp Building 369 Phone: (406) 243-2077	Diane Friend, Lecturer Department of Physics and Astronomy Email: diane.friend@umontana.edu Office: Clapp Building 129 Phone: (406) 243-4299
Blair Baldwin, K-12 Education Specialist Email: powdr4me@yahoo.com Office: Clapp Building 369 Phone: (406) 243-2077	Colleen Windell, BSSP Noyce Fellow Science Teacher, Lolo Middle School Email: windells_montana@bresnan.net

Course Description:

The primary focus of this course is on the deepening of K-8 inservice teachers' understanding of weather, climate, and astronomy content knowledge. Teachers enrolled in the course will engage in a variety of learning experiences designed to investigate Earth's weather and climate and the factors that control weather and climate; the Earth, Sun and Moon system; comparative planetology; orbits and gravity; and the methods scientists use to investigate these topics. Topics explored will be in alignment with the National Science Education Standards [NSES] and will include classroom, laboratory and field based instructional methods.

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 develop proficiency in these areas of science teaching through critical examination of science education issues and the research literature, professional discourse with course participants including instructors, and the production and sharing of artifacts such as lesson plans, formative assessments, effective science models, and science teacher leadership plans. Course activities will model effective 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 weather and climate content knowledge,
- 2) deepen their understanding of astronomy content knowledge,
- 3) improve their ability to use scientific skills employed in these fields,
- 4) improve their understanding of the nature of science and how scientific knowledge is generated,
- 5) heighten their awareness of the interaction of science and society,
- 6) improve their ability to use educational technology that supports weather, climate, and astronomy education,
- 7) gain professional skills and knowledge that support the design and implementation of rigorous science instruction,
- 8) improve cultural competency in teaching American Indian students and meeting the goals of Indian Education for All,
- 9) improve their ability to use the Montana Science Standards to guide instruction and,
- 10) develop skills as science teacher leaders.

Course Materials:

- Weather/Climate Textbook: *The Atmosphere: An Introduction to Meteorology*, 10th edition, Frederick Lutgens, Edward Tarbuck, Prentice Hall, 512 pp., ISBN-10 0131874624 and ISBN-13: 9780131874626
- Astronomy course materials will consist of online resources to be provided. Examples include: <http://www.astronomycenter.org>, <http://ncisla.wceruw.org/muse>, and <http://phet.colorado.edu>.
- Additional articles and materials will be supplied to the teachers in the course.

Course Content

Content and Skills for Week One – Weather and Climate	
Day 1	Course Introduction and Expectations
	Weather, Climate and Astronomy Pretest
	Earth’s Atmosphere; Modeling Energy & Convection in the Atmosphere
	Intro to Scientific Modeling Practices
Day 2	Tools for Studying and Measuring Weather
	Air Masses, Weather Patterns, Weather Maps, & Weather Forecasting
Day 3	Modeling Cloud Formation and Using Clouds to Predict Weather
	Linda Briggeman - Seasons of the Montana Salish
	Teacher Resource Sharing Event
Day 4	Modeling the Seasons and Earth-Sun Relationship’s Effect on Climate
	Germaine White – Salish Educational Resources
Day 5	Climate, Biomes, & the Effects of Local Geographic Factors on Weather and Climate
	Anna Klene - History of and Change in Earth’s Climate

Content and Skills for Week Two – Astronomy	
Day 6	Modeling What We See in the Sky and Why
	Modeling the Earth, Sun and Moon System
Day 7	Modeling the Earth, Sun and Moon System (continued)
	Visit to Native American Research Lab
Day 8	Light and Telescopes
	Suzy Archibald-Wilson – Evaluating Cultural Materials
Day 9	Gravity and Orbits
	Modeling the Solar System
	Comparative Planetology
Day 10	Latrice Tatsey – Blackfeet Weather Sticks
	Astronomy Topics Roundup
	Course Wrap-up: Posttest, surveys, course evaluations
	Leadership Presentations and Cohort 2 Graduation Ceremony

Evaluation

Students enrolled in the course will receive a traditional letter grade. Students will be evaluated using multiple 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 **August 1st**.

Assignments:

1. Pre-course Astronomy Observing Assignment – including individual observing work plus attendance at a pre-course observing night (date to be announced) (15 points)
2. Weather Observing Assignment (5 points)
3. Leadership Report (5 points)
4. Leadership PowerPoint Presentation (5 points)
5. Leadership Culminating Project (15 points)
6. Model-Based Inquiry Lesson Plan Assignment (15 points)
7. In-Class Weather and Climate Assignments (4 points each: 20 points total)
 - a. Modeling Convection and Energy in Earth’s Atmosphere
 - b. Air Masses, Weather Maps and Weather Forecasting
 - c. Using Clouds to Predict Weather
 - d. Modeling the Seasons
 - e. Climate, Biomes, and Culture
8. In-Class Astronomy Assignments (4 points each: 20 points total)
 - a. Modeling the Earth-Sun System
 - b. Modeling the Phases of the Moon
 - c. Reading the Stories Told by Light
 - d. Gravity and Orbits: The Reason Behind the Motions
 - e. Modeling Planetary Systems

Maximum total points → **100 points**

Directions and instructions for completing all course assignments will be provided in class.

Grades will be awarded using the following scale:

93 to 100% = A

90 to 92% = A-

87 to 89% = B+

83 to 86% = B

80 to 82% = B-

77 to 79% = C+

73 to 76% = C

70 to 72% = C-

67 to 69% = D+

63 to 66% = D

60 to 62% = D-

Less than 60% = F

Attendance

Regular attendance is expected and recommended in order for students to have access to a rich and comprehensive learning experience. Please arrive on time each morning. We will begin promptly at 8:30AM. At least forty percent of the course grade is based on in-class assignments, therefore regular attendance is also recommended for the successful completion of the course with a passing grade.

Academic Integrity & Plagiarism

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. The Code is available for review online at http://life.umt.edu/vpsa/student_conduct.php

Plagiarism is subject to academic penalty that may include receiving a failing grade for the assignment or course.

"All of the following are considered plagiarism:

- turning in someone else's work as your own
- copying words or ideas from someone else without giving credit
- failing to put a quotation in quotation marks
- giving incorrect information about the source of a quotation
- changing words but copying the sentence structure of a source without giving credit
- copying so many words or ideas from a source that it makes up the majority of your work, whether you give credit or not"

(www.plagiarism.org)