SCIE 203 – INVESTIGATIVE SCIENCE III
THE EARTH SYSTEM

This course is designed especially for you – the pre-service elementary education major!

Fall 2009 Syllabus | 4 credit Laboratory | USP Natural Science

Section 01:
M W F 8:00 – 9:50 am

Instructor: Dr. Jennifer L. B. Anderson (Geoscience)
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Office Hours: See JLBAnderson schedule (D2L)
Learning Assistant: Brooke Miskowski (BCMiskow5719@winona.edu)
Desire2Learn Webpage: https://winona.ims.mnscu.edu/

Section 02:
M W F 10:00 – 11:50 am

Instructor: Dr. Kim Bates (Biology)
Email: KBates@winona.edu
Office: Pasteur 228 *Phone*: 457-5458
Office Hours: See KBates Schedule (online)
Learning Assistant: Jamie Skala (JSkala7075@winona.edu)
Class Webpage: http://course1.winona.edu/kbates/Inv.SciIII.htm

Why the Earth System?

Well, for one thing, we live on the Earth and the Earth is a complicated system of geology, biology, chemistry, and physics, not to mention all of the human interactions with this system. It is important that we understand our world, the things in it, on it, above it, below it, its origin, its history, its current state, its future. Today, more than ever, we need the Earth – we need to use its resources wisely, minimize our negative impact on its interconnected systems, and help care for this amazing blue sphere that carries us through space. As teachers, it is our responsibility to make sure that we pass along our knowledge and appreciation of this wonderful place to our students.

Plus, kids LOVE nature and rocks and bugs and fish and clouds and a million other things that make up this planet. The Earth System is all around and they cannot help but be curious about it. You, as teachers, have the opportunity to help these kids explore nature in a responsible way. You can teach them as they are growing and maturing to understand our natural environment and to "walk lightly" upon the Earth. These children, whether they turn out to be doctors, teachers, lawyers, scientists, or social workers, will remember these lessons and be less likely to knowingly pollute or destroy their natural world. Don't forget, they are also our future politicians who will be guiding our country and how we relate to our planet!

This course is not likely to resemble any other course you take during your college career (except for Investigative Science I). We're taking a novel approach to science by integrating geology and biology, in particular, while still incorporating and building upon the physics and chemistry that you learned in SCIE 201. We are blurring the boundaries between lecture, labs, and field experiences. This semester, we will integrate concepts of geology, biology, astronomy, (physics, and chemistry) to help you gain a unique perspective of the Earth System and teaching. One of our primary goals is to help you build "pedagogical content knowledge" – your knowledge of science and ideas about how to pass your wisdom on to your future elementary students. Although we don't want to scare you off, you should be aware that this course will be challenging and demanding, both of your time and of your mind. The best elementary school teachers are not just the folks who "love kids" – exceptional elementary teachers not only love kids, but also love helping them learn; in order for you to do that, it is critically important that you have a solid foundation of knowledge.

Purpose of this Class

The purpose of this class is to help you become familiar with the fundamentals of science in a manner that also prepares you to teach science in your future elementary classroom. It is important that elementary students be allowed and encouraged to explore their world and that teachers of students at this young age support their curiosity. Too many students come to college claiming to hate science. When pressed, many say that they had a miserable teacher in their K-12 years who didn't answer their questions or who made them memorize a textbook. Science is so critically important to understanding our world that we want the future teachers of our nation's children to be enthusiastic about science so that their future students will likewise be passionate about science.

One of the easiest ways to engage children in science is to help them understand the things in their everyday world. To that end, we will explore the science within the Earth System and the different environments we find there. Since all of your future students will live on the Earth and since the environment is central to all life on our home planet, we've developed a course that will give you the foundation you need to challenge your students and make them eager to learn. Most importantly, this course will help you learn how to engage kids in exploring their Earth, by designing and conducting simple, cheap, and safe experiments that can be completed in any elementary classroom.

Teachers are Scientists!

Every day, when teachers prepare lesson plans, they try to predict how their students will answer questions or react to an instruction. Then, while the lesson plan is put into action, the teacher will observe and try to understand if the lesson plan is working. But how will a teacher know if a lesson is working? How will they compare their results to their prediction? How will they modify the lesson plan for the next time to (hopefully) improve it? Teachers are some of the greatest social scientists of our time (even though they don't get paid for it). They perform experiments on kids every school day! So, one purpose of this class is to get you to think critically about what you are doing and why you are doing it.

Course Expectations

In order to achieve the goals for this course, it is important that everyone participating have a clear understanding of expectations. To that end, we've compiled an initial list of expectations, which we will discuss (and potentially modify) in class.

We expect that you will:

- **Attend** and **participate fully** in every class meeting and all field experiences.
- **Make an honest effort** on all activities, assignments, and other course requirements.
- **Communicate <u>in advance</u>** to your instructors and your group members any time that you will be unable to participate in class meetings.
- **Listen respectfully** to your peers and treat all class members with respect for their diverse opinions and talents. Treat others as you would like to be treated.
- **Work hard** to connect course material to what you already know.
- **Ask questions** to help further your understanding (either when you don't understand something or when you need to understand something at a deeper level). Ask questions of yourself, your peers, and your instructors.
- **Come prepared** to class for each day and be ready to get going on time!
- **Move outside of your "comfort zone."** It is only then that true and significant learning can occur. If you are just learning facts and not really trying to restructure the way that you are organizing knowledge and thinking about "how you know what you know," then you are not really learning.

You can expect that we will:

- **Be available for questions** through office hours, email, hallway contacts, and during class.
- **Be enthusiastic** about the course material and activities.
- **Challenge you** to connect course concepts, solve new problems and be the best teacher you can.
- **Encourage you** to push yourself beyond your comfort zone, ask questions about the course material or our teaching methods, and get more comfortable with science.
- **Respond to questions** and try to rephrase material in a way that you can understand.

- **Be open to new suggestions and flexible in how we teach** – thereby moving outside of our comfort zone.
- **Come prepared** for class every day.
- **Be respectful** of all of the people in our classroom and their ideas and suggestions.
- **Model effective pedagogy and scientific process**. Watch us and ask questions about why we are doing what we are doing!
- **Grade you fairly** (but rigorously) and without bias.
- Make every effort to **help you learn course material**, if you put forth an equal effort.
- **Go ballistic if we discover cheating** of any kind – DO NOT test this one.

University Studies Compliance

This course qualifies as a University Studies course in the Natural Science with Laboratory category. If you successfully complete this course, you will have completed the laboratory requirement and 4 credits of Natural Science in the University Studies Program. **The purpose of the Natural Science requirement in the University Studies program is to provide students with the tools to understand and be able to apply the methods by which scientific inquiry increases our understanding of the natural world.** Courses that satisfy the Natural Science requirement must include requirements and learning activities that promote students' abilities to...

a. understand how scientists approach and solve problems in the natural sciences;
b. apply those methods to solve problems that arise in the natural sciences;
c. use inductive reasoning, mathematics, or statistics to solve problems in natural science;
d. engage in independent and collaborative learning;
e. identify, find, and use the tools of information science as it relates to natural science;
f. critically evaluate both source and content of scientific information; and
g. recognize and correct scientific misconceptions.

Courses that satisfy the laboratory requirement in the Natural Sciences will additionally provide students the opportunity to practice scientific inquiry through hands-on investigations and to analyze and report the results of those investigations. Course activities described throughout the remainder of this syllabus will be coded to the above list of outcomes by the corresponding letter. These outcomes will be integrated throughout course content—each new topic will be presented in a manner in which the student will be able to understand and apply the methods by which scientists approach and solve problems in the natural sciences, using inductive reasoning or mathematics (outcomes a-c). Common scientific misconceptions will be identified, and class material will be directed toward correcting those misconceptions (outcome g). You will be asked to work collaboratively on certain in-class and take-home activities and independently on other assignments (outcome d). In-class and homework assignments will require that you work with the internet, reference books, science education texts, and other sources to critically evaluate scientific information as it relates to the science of water (outcomes e, f). During the laboratory portion of the course, you will have the opportunity to engage in hands-on scientific investigation of natural phenomena, and you will be required to analyze and report the results of your investigations (laboratory outcome).

Skill Goals – At the end of this course, students will be able to:
- Synthesize diverse information to draw reasonable scientific conclusions and to support those conclusions with evidence and scientific reasoning
- Solve simple mathematical problems
- Read, interpret and make graphs and diagrams

Content Goals – At the end of this course, students will be able to:
- Make connections between the macroscopic and microscopic worlds.
- Construct a model illustrating the interactions between geology and biology in specialized environments throughout the world.
- Design and construct simple experiments that can be completed in an elementary classroom.

Academic Integrity Policy

We are all scientists in this class and, as scientists, our reputations depend on our good names, which includes being responsible for our own work. In addition, this is a college-level course that you are attending in an effort to learn something. Because no one can learn for you, we expect you to do your own work. We absolutely will not tolerate any dishonest behavior and will take appropriate measures to remove anyone in violation of WSU's academic integrity policy from our classes.

We cannot emphasize enough how serious we are about this. Attached below is WSU's Academic Integrity Policy. Read it thoroughly and know that e will hold you to these standards. A violation of this policy will result in a minimum "F" on the given assignment and could result in an "F" in the course and expulsion from the university.

Please do your own work – this is how you learn!

ACADEMIC INTEGRITY POLICY (http://www.winona.edu/studentaffairs/conduct_policy.htm)

At WSU, academic integrity is based on honesty. The University community requires that work produced by students in the course of their studies represents their personal efforts and requires that students properly acknowledge the intellectual contributions of others.

WSU students are required to adhere to the University's standards of academic integrity. The following are examples, not intended to be all-inclusive, of types of behavior that are unacceptable and will be viewed as violations of the academic integrity policy.

Examples of Academic Integrity Violations

Cheating: Using or attempting to use unauthorized materials in any academic exercise or having someone else do work for you. Examples of cheating include looking at another student's paper during a test, bringing a "crib sheet" to a test, obtaining a copy of a test prior to the test date, or submitting homework borrowed from another student.

Deception and Misrepresentation: Lying about or misrepresenting your work, academic records, or credentials. Examples of deception and misrepresentation include forging signatures, falsifying application credentials, and misrepresenting group participation.

Enabling Academic Dishonesty: Helping someone else to commit an act of academic dishonesty. This would include giving someone else an academic assignment with the intent of allowing that person to copy it or allowing someone else to cheat from your test paper.

Fabrication: Refers to inventing or falsifying information. Examples of fabrication include "dry-labbing" (inventing data for an experiment you did not do or did not do correctly) or making references to sources you did not use in academic assignments.

Multiple Submission: Submitting work you have done in previous classes as if it were new and original work. Although faculty may be willing to let you use previous work as the basis of new work, they expect you to do new work for the class. Students seeking to submit a piece of work to more than one class should seek the permission of both instructors.

Plagiarism: Using the words or ideas of another writer without proper acknowledgment, so that they seem as if they are your own. Plagiarism includes behavior such as copying someone else's work word for word, rewriting someone else's work with only minor word changes, and/or summarizing someone else's work without acknowledging the source.

The Nitty Gritty Details…

Required Materials Please bring with you to class every day:

Your Science Notebook (available at the bookstore), laptop, and calculator

- → Yes, your science notebook is required and it MUST be the one sold in the bookstore.
- → Other than assignments we specify (such as foldables, reports, presentations, etc.), everything that you turn in must be recorded within your Science Notebook.

There is no required text. Throughout the semester, you will be compiling an Earth & Life Science Resource Collection which will contain a number of appropriate activities for your future elementary school classroom that cover the various content topics we discuss in class. In addition, there are a number of Earth & life science textbooks available for you to use in the SCIE classroom. If you are interested in purchasing a text, we recommend the following books:

- *Integrated Science* (4th ed.) B.W. Tillery et al., 2003, McGraw-Hill, 861 p.
- *Concepts and Inquiries in Elementary School Science* (4th ed.) J.M. Peters and P.C. Gega, 2002, Merrill Prentice Hall, 428 p.
- *The Sciences: An Integrated Approach* (4th ed.) Tefil & Hazen, 2004, John Wiley & Sons.
- *Elementary Science Methods: A Constructivist Approach* (4th ed.) Martin et al., 2006.

Excused/Unexcused Absences

Just as you would not skip out of work and expect to get paid, you cannot skip out of class and expect to be rewarded with a good grade. Therefore we have a very strict policy regarding the reasons for which you may be excused from any class period or activity.

Excused Absences include **verifiable illness, family emergency, jury duty, athletic events (within reason) or military/public service duties**. For an absence to be excused, you must contact us **PRIOR** to class (via email or phone) and you must provide **written documentation verifying** the need for your absence (doctor's notes, police reports, jury notification, etc) to us as soon as possible after your absence.

Unexcused Absences include, but are not limited to: attendance at weddings, convenient rides home, extended vacations, oversleeping, and unpreparedness.

If you miss class, you are responsible for finding out what we covered from a fellow student. We will not address questions such as "what happened on Monday?"

Note about Disabilities

If you have a physical or cognitive disability that requires academic accommodation, please see me as soon as possible so that we can discuss how best to accommodate your needs. You are not required to disclose a disability, but I am unable to accommodate anything of which I am not aware. You may also wish to speak with the staff of the Disability Services in located in Maxwell 314, 457-2391, http://www.winona.edu/disabilityservices.

Grade Information

We do not "give out" grades; you EARN your grade. We just keep track of the numbers for you.

		Final Grades:
2 Mid-term Exams (10% each)	= 20%	A = 100% - 90%
Final Exam	= 15%	B = 89% - 80%
Resource Collection	= 10%	C = 79% - 70%
Assignments	= 45%	D = 69% - 60%
Participation, Attendance, etc.	= 10%	F = 59% and below
TOTAL	= 100%	

Exams – Mid-term exam dates will be announced in class. The final exam will emphasize the last third of the course, but will also be cumulative.

Resource Collection – Since there is no text for this course, you will be building your own Resource Guide throughout the semester filled with example activities that you could use in your future elementary classroom. You will find at least two activities for each topic that we cover in class, print out the teaching guide, and write a short summary about each activity. We will collect the summaries at a few different points throughout the semester. More specific details about the Resource Collection will be given in class.

Assignments – Other assignments include (but are not limited to) activities, projects, written reflections, concept maps, foldables, quizzes, homework, etc.

Participation – Obviously you cannot participate if you are not present, but your participation will also be evaluated by yourself, your peers (during group work activities), and your professor based on your interaction with your group, your participation in class discussions and activities, etc.

Course Theme: The Earth System

- Nature of Science
- Classification & Dichotomous Keys
- Earth – The Broader Context
  - Origin of Earth & Solar System
  - History of the Earth
  - Cells and Micro-organisms
  - Photosynthesis
  - Plate Tectonics
  - Rock Classification
- Weather & Climate
  - Astronomy & Seasons
  - Weather Patterns
  - Diseases & Immunology
  - The Water Cycle
  - Climate & Climate Change
- Biomes – Life on Earth
  - Terrestrial Biomes
  - Aquatic Biomes
  - Life Cycles
  - Adaptations & Natural Selection
- Interactions within the Earth System
  - Life and the Earth
  - Humans and the Earth
  - Living with the Earth

Tear off this sheet, fill it out, and turn in during class by Friday, August 28th.

Fall 2009

I have read the syllabus for *SCIE 203 Investigative Science III* thoroughly and I understand its content.

I understand WSU's Academic Integrity Policy.

I agree to abide by all of the policies contained within the syllabus.

Signature: _____ Date: _____

Print your Name: _____

Student Survey

1. What semester did you take SCIE 201?

2. Who were your instructors?

3. Have you taken ED 335? If so, what semester?

4. What is your major and specialty?

5. What grade level(s) do you hope to teach?

6. Where are you hoping to be certified (MN, WI, elsewhere)?

7. On the back of this sheet, please list:
    a. The science classes that you took in High School.
    b. The science classes that you have taken in College.
    c. The math classes that you took in High School.
    d. The math classes that you have taken in College.