Biology/Chemistry/Physics 482/482 G (WID): Science in Context
Spring 2015 Syllabus

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Science Teaching Center: http://www.wiu.edu/cas/biological_sciences/science_teaching/
Department of Biological Sciences: http://www.wiu.edu/biology/
Department of Chemistry: http://www.wiu.edu/cas/chemistry/
Department of Physics: http://www.wiu.edu/cas/physics/
Class: Section 1; Monday 4-7 p.m.; Meeting places will vary – see posting on Topic Outline
       (3 credit hours)
WID requirement: This course has been designated to meet the Writing Instruction in the Disciplines
     (WID) graduation requirement. WID courses provide instruction in the processes and
     formats for the writing content and style needed to be an effective professional in a
     student’s chosen field. See www.wiu.edu/WID/
Pre/Corequisites: senior standing in Science/Biology, Chemistry, or Physics-Teacher Certification
     option, or permission of instructor; ENG 280
Office Hours: BDP – M 1-3 ; and by appointment
              BMD – MWF 11-11:50 a.m.; Tues 10-11:30 a.m.; and by appointment
STATE ACCREDITATION POLICY INFORMATION:

“In accordance with Illinois State Board of Education certification rules, all candidates seeking teacher certification are required by Western Illinois University to obtain a grade of “C” or better in all directed general education courses, all core courses, and all courses in the option. Note: A “C-” is below a “C”.”

TPEP Vision and Mission Statements

TPEP vision statement: “Our graduates will be empowered educational professionals deeply committed to continuous learning and the empowerment of all learners.”

TPEP mission statement: “The WIU Teacher and Professional Education Program empowers candidates to become educational practitioners who engage in informed action that is grounded in knowledge and reflection; who are deeply committed to the highest standards of professional practice; who are able to adapt to emerging social, economic, and cultural landscapes; who are skilled in the use of technological tools that promote teaching and learning; and who are committed to empowering all learners.

The logo above is a summary of what you are expected to become as a professional and embodies the Vision, Mission, Values, and Conceptual Framework upon which the Teacher Education Program is designed.

For more information about the Mission, Vision, Values, and Conceptual Framework for the Teacher Education Program and the Expectations of our Candidates, see the following web sites:

http://www.wiu.edu/coehs/tpep/overview/framework.php

DISPOSITIONS for the Teacher Certification Program

“The University Teacher Education Committee at Western Illinois University believes that well prepared teacher candidates understand and can demonstrate knowledge of professional skills and dispositions. We further believe that teacher candidates must apply their knowledge skills and dispositions in school settings. The mission of Western Illinois University's Teacher Education Program is to prepare versatile teachers who appreciate the importance of our diverse population; who adapt to emerging social, economic, and demographic patterns; and who are skilled in the use of technological tools to promote teaching and learning in our nation's schools. We further believe that the disposition of our candidates is important for their success as a teacher and a professional. Candidates are evaluated at least three (3) times during their program.” One of the three times in which candidates are evaluated in the semester they complete Educ 439. The WIU Teacher Education Program Dispositions include the following categories:

- Collaboration
- Honesty and Integrity
- Respect
- Commitment to Learning
- Emotional Maturity
- Responsibility
- Fairness
- Belief that All Students Can Learn

For more information about the WIU Teacher Education Program Dispositions, please see the following web site:

http://www.wiu.edu/coehs/cpep/tep/dispositions.php
COURSE OVERVIEW

Interdisciplinary course designed to help science majors pursuing secondary certification meet the state and national standards. Students will explore science as inquiry, the unifying principles of science, and the role of social contexts and ethics in science. *This course has been designated to meet the Writing Instruction in the Disciplines (WID) graduation requirement. WID courses provide instruction in the processes and formats for the writing content and style needed to be an effective professional in a student’s chosen field.*

COURSE GOALS

This course is designed to serve science majors pursuing secondary licensure and inservice science teachers by helping them to gain and demonstrate competencies required of them by the state and national standards for science educators. Students will be expected to understand the nature of science as inquiry, a process of gaining knowledge about the world, rather than as just a body of known facts about the world. Students will also be expected to place scientific inquiry in the context of past scientific achievements, society’s expectations of technological advancement and demands for respect toward its institutions and ethics.

The major course goal is to provide preservice and inservice science teachers with appropriate experiences for growth as professional science educators.

As a result of this course, students will gain experiences in:

1. scientific inquiry including designing experiments, acquiring and analyzing data, and writing scientific papers based upon that research;
2. technological design and the practices of science;
3. determining the implication of science and technology on society;
4. examining unifying principles and concepts across all the sciences with special emphasis on evidence, models, and explanations; and
5. examining the impact of false or doubtful assertions made in the name of science on science and society.

These goals will be assessed through a variety of assignments and projects as discussed in the Course Assessment and Evaluation Section below. Among the NSTA/NCATE Accreditation Standards that are addressed at least in part by these projects are: 1b-e; 2a-c; 3a; 4a. In addition, you will be expected to implement appropriate safety standards (Standard 9a-d) when completing all projects, especially the Tech Design Project and the Inquiry Project.

(http://www.nsta.org/preservice/docs/2012NSTAPreserviceScienceStandards.pdf)
STATE and NATIONAL STANDARDS

This course is designed to help you achieve at least in part several State and National Standards as listed below. Each assignment is carefully constructed to help you demonstrate your achievement of one or more standards.

NCATE Assessments with Corresponding NSTA SPA Science Teacher Preparation Standards

<table>
<thead>
<tr>
<th>NCATE/NSTA Assessment</th>
<th>NSTA SPA Standards</th>
<th>Assessment Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment 7: Research and Investigation</td>
<td>2003 NSTA Standards 1b-c, 2a-c, 3a, 4a.; 2012 NSTA Standards 1a-c, 2a-b, 3b, 5b-c.</td>
<td>Tech Design Project Data Analysis Project Open-Inquiry Project Process of Science Essay</td>
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<tr>
<td>Assessment 8: Contextual Content</td>
<td>2003 NSTA Standards 1b-c, 2a-b, 4a, 7a; 2012 NSTA Standard 1a, 5b.</td>
<td>Process of Science Essay</td>
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Illinois Professional Teaching Standards: 2010 Version
(http://www.isbe.state.il.us/PEAC/pdf/IL_prof_teaching_stds.pdf)

<table>
<thead>
<tr>
<th>ISBE- the 9 New IPTS Standards</th>
<th>Assessment Names</th>
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<tbody>
<tr>
<td>Standard 1: Teaching Diverse Learners</td>
<td>Tech Design Project (1b) Data Analysis Project (1b) Open-Inquiry Project (1b)</td>
</tr>
<tr>
<td>Standard 2: Content Area and Pedagogical Knowledge</td>
<td>Tech Design Project (2b-c) Data Analysis Project (2b-c) Open-Inquiry Project (2b-c) Science Process Essay (2b-d)</td>
</tr>
<tr>
<td>Standard 8: Collaborative Relationships</td>
<td>Open-Inquiry Project (8b)</td>
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TEXTBOOKS

Firestein, S., (2012), Ignorance: How It Drives Science, Oxford University Press, NY. (required)
UNIVERSITY AND DEPARTMENT POLICY INFORMATION:

Below are several websites that address various University and Department Policies. You are responsible for being familiar with the information (including required forms, definitions, and time lines) contained therein. You should access these web sites and carefully read the information they contain, your instructors will hold you responsible for knowing this information. If you have questions about any of the information contained in the web sites, ask your instructor:

Student Rights and Responsibilities:  http://www.wiu.edu/provost/students.php
Academic Integrity Policy: http://www.wiu.edu/policies/acintegrity.php
Final Exam Policy: http://www.wiu.edu/policies/finexam.php
Final Exam Schedule: http://www.wiu.edu/registrar/exams.php
Grade Appeals Policy: http://www.wiu.edu/policies/gradeapp.php

COURSE POLICIES

This is a professional course and as such you will be expected to exemplify the TPEP Dispositions: **Collaboration, Honesty/Integrity, Respect, Commitment to Learning, Emotional Maturity, Responsibility, Fairness, and Belief That All Students Can Learn**

For more information, see http://www.wiu.edu/coeohs/cpep/tep/dispositions.php

You are formally evaluated regarding these dispositions three times in your program, during EIS 302, Biol 481, and STCH 480. However, you can be evaluated at other times as appropriate as well. Your exhibition of these dispositions may impact grades on projects and assignments as well as your professional development grade.

*Professional Conduct (Dispositions are exhibited through your professional conduct):*

**Attendance/Conduct:** Since this is a professional course, you are expected to be present, on time, and prepared for each class session as you would expect to be for your own classroom. In order for this class to be productive for all, everyone is expected to participate and be respectful of others and their ideas. Class attendance will be recorded. Just as you would expect to lose salary or benefits for excessive tardies or absences by a school district, you can expect to lose credit for excessive absences or tardies in this class.

(Please note: The final exam day has a unique absence policy as described below.)

- **Tardies:** Any student who has three tardies can expect their professional development grade to drop 50%; any student who has four tardies can expect their professional development grade to drop 100% (i.e. a grade of 0); any student who has five or more tardies will receive an “F” in the course.
- **Unexcused Absences:** Any student who has two unexcused absences will receive a zero (0) for their professional development grade. Any student who has three or more unexcused absences will receive an “F” in the course.
- **Total Absences:** Students who have an excessive number of absences (i.e. have five or more absences total) will receive a grade of “F” in the course.

Excused absences include those due to a personal illness, family emergency (e.g. death of an immediate family member – parent, sibling, child, grandparent), illness of a dependent, participation in a wedding as part of the wedding party (bride, groom, groomsmen, bridesmaid, etc), presenting at a professional teaching/science conference. Absences resulting from family vacations, oversleeping, working on projects, etc., routine medical check-ups, advising or similar appointments, etc., are considered unexcused. If you
know you must be absent in advance, and are unsure whether it will be considered excused or unexcused, please ask Dr. Peer or Dr. Davies. In order for an absence to be considered excused, documentation must be provided. If you are absent, it is your responsibility to find out what you missed including any assignments you missed. See the assignments policy.

**Final Exam Scheduled:** The final exam for this course is scheduled for **Monday May 11th from 4-6pm.** You are expected to be present and on time for the final exam. We will use that time for several course-related issues. Failure to be present for the final exam date/time will result in the loss of one letter grade from your course grade in addition to any penalties from absences as noted above. From a professional standpoint, missing the final exam is akin to being absent the day before a holiday – wherein in many school districts you not only lose your pay but you also have to pay the substitute. If you are ill, you will need to contact Dr. Peer or Dr. Davies ASAP and provide medical documentation from a physician.

**Assignments:** You are expected to submit all assignments in final form on the specified due dates. All work is to be typed and is to follow the accepted rules of English grammar and style (use the APA manual for your guide). Any extended prose should be double-spaced (e.g. research projects), and the font should be no smaller than that used here (typically 11 to 12 point but that does vary by font type). The final product should be able to be read without modification and should be submitted via Western Online unless otherwise noted. Most assignments are projects and will require you to appropriately budget your time. Waiting to begin projects until a week or two before they are due will generally result in poorer quality work and possibly incomplete work. Submitting work late will result in a grade reduction. Submitting work late will result in a grade reduction; the grade will be reduced by 10 points for each day late – or fraction thereof – for a maximum of five days. Any assignment submitted more than five days late will receive a grade of zero. **All assignments will be due no later than 8AM on the specified due date unless otherwise noted.** Assignment guidelines will be available via the course Western Online site found at [http://westernonline.wiu.edu](http://westernonline.wiu.edu) Please note: you are always welcome to submit assignments early.

**Academic Honesty:** Remember, any work you sign your name to will be considered your original work unless you specify otherwise. Failure to properly cite a source that you used to assist you in completing your work is considered a form of plagiarism, including failure to cite your textbook, a web site, a personal communication, etc.

**Academic Dishonesty:** The faculty of the Department of Biological Sciences ascribes to a definition of plagiarism as expressed by V. E. McMillan in *Writing Papers in the Biological Sciences* (Bedford/St. Martin’s Press, New York, pg. 16).

> “Plagiarism is the theft of someone else’s words, work, or ideas. It includes such acts as (1) turning in a friend’s paper and saying it is yours; (2) using another person’s data or ideas without acknowledgement; (3) copying an author’s exact words and putting them in your paper without quotation marks; and (4) using wording that is very similar to that of the original source but passing it off as entirely your own even while acknowledging the source.”

This includes information in textbooks, lab manuals, honors and masters theses, web sites, all writing assignments, and images. The faculty of the Department attempt to monitor student writing assignments (essay exams, papers, laboratory reports, and other writing assignments and exercises) for incidence of plagiarism.

If plagiarism or any other form of academic dishonesty (e.g. using someone else’s lessons, cheating, etc) is found, the faculty will discuss the situation with the student and indicate to the student the
penalty for this academic dishonesty. Potential penalties include those cited in the academic dishonesty section of the WIU web page for Student Rights and Responsibilities: http://www.wiu.edu/policies/acintegrity.php

Students with Disabilities: “In accordance with University policy and the Americans with Disabilities Act (ADA), academic accommodations may be made for any student who notifies the instructor of the need for an accommodation. For the instructor to provide the proper accommodation(s), you must obtain documentation of the need for an accommodation through Disability Resource Center and provide it to the instructor. It is imperative that you take the initiative to bring such needs to the instructor's attention, as he/she is not legally permitted to inquire about such particular needs of students. Students who may require special assistance in emergency evacuations (i.e. fire, tornado, etc.) should contact the instructor as to the most appropriate procedures to follow in such an emergency. Contact the Disability Resource Center at 298-2512 or disability@wiu.edu for additional services.” More information is available at http://www.wiu.edu/drc

COURSE ACTIVITIES AND EVALUATION

More detailed guidelines for each of the assignments along with rubrics as appropriate will be provided via Western Online. All written work and copies of power point presentations are to be submitted via Western Online by the date and time listed on the syllabus schedule.

1. Technological Design, Data Acquisition, Cost Analysis Project: Tech Design Proj

For this project, you will be given the task of designing an experimental procedure and apparatus for the purpose of obtaining a product. A literature review will be required to provide you with background information on the product and help you to formulate your procedure. Part 1 involves writing your experimental procedure, designing the apparatus necessary to produce the product, and carrying out the production phase. In part 2, you will develop and conduct analytical tests of your product in order to determine its properties and collect quantitative data for later analysis. This data along with your experimental procedure will be presented in the form of a technical paper along with a poster presentation. The technical paper should incorporate your literature review, experimental procedure, data, results, economic and environmental applications of the procedure as well as a cost/benefit analysis, and final conclusion. The poster presentation should focus on aspects that make your project unique, a discussion of the development and properties of your product, and a cost/benefit analysis of your method. More detailed guidelines will be provided for the written work (both technical paper and poster presentation. All references and bibliographic entries should follow APA guidelines. [20% of grade]

2. Data Analysis Project

For this project you will be seeking to identify a possible cause and effect relationship between two measurable phenomena regarding global issues for which data sets already exist. You will need to determine the appropriateness, reliability, validity and comparability of the data sets you select as well as analyze in concrete ways the nature of the relationship between the phenomena. You will be submitting parts of this project throughout the second half of the semester. The final paper should be written following APA guidelines for publishing experimental papers (journal style manuscript).
The only exception to the guidelines is that all figures, tables, etc. should be located at the appropriate place within the body of the text with appropriate titles rather than at the end of the paper. You will also be expected to discuss and answer questions about your project during a full class discussion of all projects. During this discussion, your peers will be engaging with you in the peer review process. More detailed description of the project will be provided. [20% of grade]

3. Open-Ended Lab Project: Inquiry Project

This project will be completed in groups. It will require that each group conduct an experiment from start to finish. The process will start with picking the problem from among a set of options, narrowing the problem, designing the experiment, etc. The stipulations include that the project must: (a) include both biotic and abiotic factors – i.e. it must be interdisciplinary across the life and physical sciences; (b) be able to be completed within the timeframe provided; and (c) be able to be completed with materials that are available to you. You will be required to present your project in poster format (through the Undergraduate Research Day event or Graduate Research Day event), orally to the entire class, and in writing following APA guidelines for publishing experimental papers (journal style manuscript). The only exception to the guidelines is that all figures, tables, etc. should be located at the appropriate place within the body of the text with appropriate titles rather than at the end of the paper. As with the technological design project and the data analysis project, you will be asked to submit various parts of the project for review and then use comments to improve upon the project prior to final submission. You will also be provided a more detailed description of the project. [20% of grade]

4. Process of Science Essays

Three times throughout the semester, you will be expected to write an essay regarding your understanding of the process of science. The three essays will be structured around the readings you have done from the three major sections of the Ways of Knowing book, plus other assigned readings. Those three sections are loosely organized around the three ideas of Scientific Method, the Nature of a Theory, and Contexts of Discovery. Each essay should draw specific citations from several of the readings, and also draw from your experiences in completing the other projects in the course. The essays should also address how your views have changed over the course of the academic year, and how you might help your future students develop more scientifically accurate understandings of the process of science, the work of scientists, and the impact of science on society. More detailed description of the project will be provided. [20% of grade]

5. Professional Development (Participation, Homework, etc)

To gain the most out of this course, active involvement in class discussions and activities is necessary. This involves both participation during class time and participation in group activities that must occur outside of class time. For the discussions on the readings from the Ways of Knowing book and the Ignorance book, one or more of you will be assigned to lead the discussion in class (more information about the expectations for this will be provided on Western Online). During all peer led discussions, you are expected to be an active participant. In order to be prepared for each session, you will need to have completed the associated reading and writing assignments. For reading assignments, be sure to come in prepared to discuss the ideas and implications of the ideas
from the reading. Your notes regarding the readings will be submitted via Western Online prior to each class session (more information about the style of notes will be provided on Western Online). This means you will need to take notes and think through concepts presented prior to coming to class for each reading assignment – not just the one for which you are acting as leader. You will also be asked to complete a few other short homework assignments; these will be incorporated into this part of your grade as well. (NB: This portion of your grade may also be negatively impacted by excessive absences, tardies, or lack of participation during class.) [20% of grade]

Graduate Credit

Those of you taking the course for graduate credit will be required to develop a description for how you will implement projects 1-4 in your future teaching – these descriptions should be submitted with the final project write-ups but be ready to be discussed on the day the project is discussed in class. More detailed information about these descriptions will be provided on Western Online. You will also be expected to discuss these ideas with your classmates during discussions of each of these projects – that will be included in the grade for professional development. These will not be formal presentations but instead informally discussed during the class discussion.