Division: Teacher Education
Program Area: Science Education

Course Information: Mthds&Mtl: Scnd Sci 1 – SCE 5060 001 CRN: 25709
Mthds&Mtl: Scnd Sci 2 – SCE 5070 001 CRN: 24292

Duration: January 12, 2015 – May 05, 2015
Course Credit: Three Semester Hours
Term/Year: Winter 2015
Course Location: Room 253, College of Education
Days: Wednesdays
Time: 5:00-7:45 PM

Science Educator: Dr. Jazlin Ebenezer
Office Address: Room 299, College of Education
Office Hours: Wednesdays 3:00 – 5:00 PM
Call 313/577-0991 for appointments

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Fax: 313/577-4091
Email: aj9570@wayne.edu
Website: http://blackboard.wayne.edu/
Course Description

Innovations and improvements in school science teaching and learning. Exploration of appropriate areas of study, development and selection of learning activities and materials.

Course Outcome

As a result of the learning activities in this course, the students should be able to:

1. Articulate the key principles and ideas that underpin contemporary science education by critically analyzing “A Framework for K-12 Science Education” (NRC, 2012) and Next Generation Science Standards (Achieve, 2013).

2. Design conceptual change inquiry lesson sequences comprised of rich, relevant, rigorous, recursive lesson plans that make the Next Generation Science Standards accessible to all students.

3. Gather teaching and learning materials that depict the scientific enterprise—the nature of science and scientific inquiry; science and math; engineering design; and the interdependence of science, technology, society, and environment, contributing to college and career readiness.

Required Reading


Next Generation Science Standards (Achieve, 2013)


Course Requirements and Assessment Criteria:

Assignment 1: Discussion Paper (20 points)
Write a discussion paper based on the afore-mentioned readings to frame your lesson sequence outlined in assignment 2. The paper should be 5 pages long, double spaced without references; Font Times New Roman, size 12; with complete citations and references in APA format. Submit a printed copy of your conceptual paper.

You will be graded based on the evidence of your in-depth understanding of the reform documents and science education literature.

Assignment 2: Conceptual Change Inquiry Lesson Sequence (80 points)

Design a technology and assessment-embedded Conceptual Change Inquiry Lesson Sequence consisting of seven lessons that reach all students:

- Lesson Plan 1: Exploring and Categorizing students’ ideas of a science topic with formative assessment/points. Chart students’ ideas with NGSS.

- Lesson Plans 2 and 3: Constructing and Negotiating students’ ideas with formative assessment/points

- Lesson Plans 4 and 5: Translating and Extending students’ scientific understanding to shape a socio-scientific issue and to find plausible solutions through scientific inquiry; formative assessment/points

- Lesson Plans 6 and 7: Translating and Extending—Write a design brief and develop a prototype based on engineering design principles and processes that support STEM knowledge to solve a real world problem. Include formative assessment/points.

- Summative Assessment: Develop a final test with a point-system

Write detailed lesson plans that support the three dimensions specified in NRC 2012 and STEM content and processes outlined in the standards document Achieve, 2013.

Your lesson plans will be graded based on your knowledge and understanding of conceptual change inquiry. The lesson plans and design prototype should characterize the expectations of grade appropriate content and pedagogical practices outlined and discussed in NRC (2012) and Achieve (2013).

You will do a class presentation outlining your conceptual change inquiry lesson sequence. You will demonstrate at least one of the activities within the sequence. You will also demonstrate your prototype.

Submit a printed version of your lesson plans, including design brief.
Class Policies:

Communication

Class communication will utilize Blackboard and the class e-mail list. Students must be able to access the course Blackboard site to retrieve important information about the course, as well as email messages. This syllabus will be posted on the Blackboard site, along with assignment details and other communications. The site may be entered through http://wayne.edu and then clicking on WSU Pipeline. WSU provides free email and Internet accounts for students.

Attendance

Because each class session is almost three hours long, and so much material is covered in each session, class attendance and timely arrival to class is expected and required. When circumstances do occur, students must communicate with the professor in advance of any anticipated absence or late arrival to class.

Attendance will be taken at the beginning of each class. If you come to class after 10 minutes of the scheduled time, you will be marked tardy. Three late arrivals to class or early departures from class will count as one absence.

Absences will be excused under certain circumstances such as illness and death in the family. However, you are responsible for providing me with such evidence. Absentees are responsible for: (1) getting any handouts passed out during the missed class, (2) any in-class announcements, (3) changes in syllabus, and (4) material discussed in class. There will be no make-up of activities missed.

Please come to class on time. Any class announcements are usually given at the beginning of class, which you will miss if you arrive late. Late arrivals and early departures are also disruptive to everyone in class.

Absence will significantly affect your grade, your learning, and ultimately your grade.

Cell Phone

PLEASE TURN OFF YOUR CELL PHONES BEFORE ENTERING THE CLASS. Under no circumstances are cell phones to be used inside the classroom.

Academic Dishonesty/Plagiarism:

The College of Education has a “zero tolerance” approach to plagiarism and other forms of academic dishonesty. (See Student Code of Conduct http://doso.wayne.edu/assets/student-code-of-conduct-brochure.pdf). Plagiarism includes copying material (any more than 5 consecutive words) from outside texts or presenting outside information as if it were your own by not crediting authors through citations. It can be deliberate or unintended. Specific examples of academic dishonesty, including what constitutes plagiarism, can be found in the University’s Undergraduate Bulletin (http://bulletins.wayne.edu/ubk-output/index.html) and Graduate Catalog
(http://www.bulletins.wayne.edu/gbk-output/index.html) under the heading “Student Ethics.” These university policies are also included as a link on Blackboard within each course in which students are enrolled. It is every student’s responsibility to read these documents to be aware which actions are defined as plagiarism and academic dishonesty. Sanctions could include failure in the course involved, probation and expulsion, so students are advised to think carefully and thoroughly, ask for help from instructors if it is needed, and make smart decisions about their academic work.

**Topics and Class Schedule (Tentative):**

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Preparation for the Scientific Enterprise and STEM Career readiness</th>
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</thead>
<tbody>
<tr>
<td>January 14</td>
<td>Introduction to course *CILS--Exploring and Categorizing Assessment and Reflecting Dimension 3</td>
<td>Everyday task(s) and second-order questions to explore students’ ideas, models, and funds of knowledge Children as modelers Intellectual empathy for children’s ideas and models Discussion of lesson plan 1 Assignment: Student writing lesson plan 1; e-mail feedback</td>
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<tr>
<td>January 24</td>
<td>CILS—Constructing and Negotiating Assessment and Reflecting Dimension 3</td>
<td>Expert explanations/models and modeling Classroom talk (small peer group; teacher-students’ large group interpretive discussion for scientific sense-making; teacher-student power balance) Formal or logical reasoning, argumentation, Information communication tools—threaded discussion Evidence-based portfolio Discussion of lesson plans 2 and 3 Assignment: Student writing lesson plans 2 and 3; e-mail feedback</td>
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<tr>
<td>Date</td>
<td>Dimension/Activity</td>
<td>Details</td>
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<tr>
<td>January 28</td>
<td>CILS—Constructing and Negotiating Assessment and Reflecting Dimension 3</td>
<td>Knowledge Development and Organization Tools--concept mapping and Vee diagramming; Discussion of lesson plans 2 and 3; Assignment: Student writing lesson plans 2 and 3; e-mail feedback</td>
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<tr>
<td>February 04</td>
<td>Dimension 3</td>
<td>Disciplinary core ideas: Life sciences; Physical sciences; Earth and space sciences; Pre-service teacher modeling</td>
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<tr>
<td>February 11</td>
<td>Dimension 3</td>
<td>Disciplinary core ideas: Life sciences; Physical sciences; Earth and space sciences; Pre-service teacher modeling</td>
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<td>February 18</td>
<td>CILS--Translating and Extending Assessment and Reflecting Dimensions 1 &amp; 2</td>
<td>The interdependence of science, technology, society, and environment; Scientific and engineering practices; Crosscutting concepts; Innovative technology-embedded inquiry on socio-scientific issue—short and long-term characterizing STEM; informal reasoning, decision-making, action taking; Discussion of lesson plans 4 and 5; Assignment: Student writing lesson plans 4 and 5; e-mail feedback</td>
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<tr>
<td>February 25</td>
<td>Dimensions 1 &amp; 2</td>
<td>Innovative technology-embedded inquiry on socio-scientific issue; Pre-service teacher modeling</td>
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<tr>
<td>March 04</td>
<td>CILS--Translating and Extending Assessment and Reflecting Dimension 3</td>
<td>Disciplinary core ideas: Engineering and Technology; Engineering design: defining and delimiting engineering problems; designing solutions to engineering problems; and optimizing the design solution</td>
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<tr>
<td>March 11</td>
<td>CILS--Translating and Extending</td>
<td>Engineering design</td>
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<td>Assessment and Reflecting</td>
<td>Pre-service teacher modeling</td>
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<td></td>
<td>Dimension 3</td>
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<td>March 18</td>
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<td>CILS Preparation</td>
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<td>March 25</td>
<td>CILS</td>
<td>Student presentation</td>
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<td>April 01</td>
<td>CILS</td>
<td>Student presentation</td>
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<td>April 08</td>
<td>CILS</td>
<td>Student presentation</td>
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<td>April 15</td>
<td>CILS</td>
<td>Student presentation</td>
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<td>April 22</td>
<td>Diversity and Equity (social</td>
<td>Guest</td>
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<td>Assignments 2 due</td>
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<td>Emerging technologies</td>
<td>Course Evaluation</td>
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*Conceptual Change Inquiry Lesson Sequence*

**Grades will be assigned as follows:**

- 93-100 % = A
- 90-92 % = A-
- 87-89% = B+
- 83-86 % = B
- 80-82 % = B-
- 77-79 % = C+
- 73-76 % = C
**University Policies:**

**Enrollment/Withdrawal Policy**

Students must add classes no later than the end of the first week of classes. This includes online classes. Students may continue to drop classes (with full tuition cancellation) through the first two weeks of the term.

Students who withdraw from a course after the end of the 5th week of class will receive a grade of WP, WF, or WN.

- WP will be awarded if the student is passing the course (based on work due to date) at the time the withdrawal is requested
- WF will be awarded if the student is failing the course (based on work due to date) at the time the withdrawal is requested
- WN will be awarded if no materials have been submitted, and so there is no basis for a grade

Students must submit their withdrawal request on-line through Pipeline. The faculty member must approve the withdrawal request before it becomes final, and students should continue to attend class until they receive notification via email that the withdrawal has been approved.

Beginning the fifth week of class students are no longer allowed to drop but must withdraw from classes. The last day to withdraw will be at the end of the 10th full week of classes. The withdrawal date for courses longer or shorter than the full 15-week terms will be adjusted proportionately. See the university webpage for full details: http://reg.wayne.edu/students/information.php

**Attention Students with Disabilities**

If you have a documented disability that requires accommodations, you will need to register with Student Disability Services (SDS) for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-202-4216 (video phone). Once you have your accommodations in place, I will be glad to meet with you privately during my office hours to discuss your special needs. Student Disability Services’ mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University.

Please be aware that a delay in getting SDS accommodation letters for the current semester may hinder the availability or facilitation of those accommodations in a timely manner. Therefore, it is in your best interest to get your accommodation letters as early in the semester as possible.
**Religious Observance Policy**

Because of the extraordinary variety of religious affiliations represented in the University student body and staff, the Wayne State University calendar makes no provision for religious holidays. It is University policy, however, to respect the faith and religious obligations of the individual. Students who find that their classes or examinations involve conflicts with their religious observances are expected to notify their instructors well in advance so that alternative arrangements as suitable as possible may be worked out.

**Resources**

Wayne State University Writing Center:

The Writing Center (2\textsuperscript{nd} floor, UGL) provides individual tutoring consultations free of charge for students at Wayne State University. While the center serves both graduate and undergraduate students, undergraduate students in General Education courses, including composition courses, receive priority for tutoring appointments. The Writing Center serves as a resource for writers, providing tutoring sessions on the range of activities in the writing process – considering the audience, analyzing the assignment or genre, brainstorming, researching, writing drafts, revising, editing, and preparing documentation. The Writing Center is not an editing or proofreading service; rather, students are guided as they engage collaboratively in the process of academic writing, from developing an idea to correctly citing sources. To make an appointment, consult the Writing Center website: [http://www.clas.wayne.edu/writing/](http://www.clas.wayne.edu/writing/).

To submit material for online tutoring, consult the Writing Center HOOT website (Hypertext One-on-One Tutoring) [http://www.clas.wayne.edu/unit-inner.asp?WebPageID=1330](http://www.clas.wayne.edu/unit-inner.asp?WebPageID=1330).