COURSE SYLLABUS

Citizen Science in the Classroom:
Engaging Students in Authentic Scientific Research

Fall 2013

Course Number: ED & HUD 795-9, 7404 (0111D)
Credits: Two (2) Graduate Credits
Prerequisite: Graduate Standing (Must have earned a bachelor’s degree); computer and high speed Internet access required for communication with the instructor and course participants in-between meeting dates.

Instructor: Julie Hein-Frank
Schedule: Saturdays, October 19 & November 2, 2013; and February 22 & April 5, 2014 (9:00 a.m.-4:00 p.m.); plus communication via the Internet in-between meeting dates.
Location: Sevastopol School District
4550 Wisconsin 57, Sturgeon Bay, WI 54235

Course Description:
This course provides opportunities for educators of grades 6-12 to learn how to engage students in authentic scientific research and address standards through the implementation of Citizen Science projects as a model of scientific practice. We will explore the history of Citizen Science and the various types of monitoring projects and organizations across disciplines; learn about and meet scientists that have developed projects that use citizen science data to address resource management issues; and discuss communication, data quality, and following protocols as examples of authentic research.

A specific focus of the course will address how the implementation of Citizen Science projects address the standards and how Citizen Science can be part of an effective strategy to address the learning opportunities and challenges of differentiation, reaching non-dominant groups, and the home and community connection.

Course participants will select a project of interest, learn how to participate using established protocol, and learn how to develop their own monitoring project by creating unique research questions applicable to their curricular needs. We will also discuss classroom assessment strategies and various opportunities for students to design their own projects, effectively analyze and communicate the information they have gathered, and consider ways students can celebrate their meaningful contributions to scientific research.
Course Emphasis:

This course will emphasize the importance of engaging in authentic scientific inquiry throughout the K-12 progression in science education as it relates to the standards and content literacy. The course will highlight opportunities for science teachers and non-science teachers to formally provide their students opportunities to participate in Citizen Science with confidence that will enhance curriculum while addressing the standards, differentiation strategies, and the changing face of science in the 21st century. With the support of the instructor, readings, discussion, activities, standards and reflections, each participant will implement an existing Citizen Science project of their choice to their grade level, develop a unique monitoring project specific to their school, or create a Team Progression Project -- a Citizen Science project with a singular focus to be implemented across grade levels within a district.

Rationale - Why Citizen Science?

“*Educational research shows that students have greater motivation to engage and learn if the subject matter is directly relevant to their lives and interests and/or if the learning process is interactive - one in which the learner can directly affect the learning process, content, or outcomes of the experience*” (Faulk 2001).

Citizen Science is the participation in scientific research and collection of scientific data by non-scientists. Students’ participation in Citizen Science connects authentic scientific research to the goals of science education and strengthens a principle goal of science education which is to “engage in scientific inquiry” and “reason in scientific context.” Student participation in Citizen Science also provides a relevant, meaningful context to the community and career readiness. Participation frames the idea of interdisciplinary teams often linking students directly to professionals within their own region providing insight into the importance of collaboration.

To date there are hundreds of existing projects across disciplines and age groups. There are online platforms, organizations, technology and professionals to support educators in the creation of their own specialized projects to fit curricular, campus and community needs. With today’s technology and support, addressing science standards and common core requirements through implementation of Citizen Science in the K-12 classroom couldn’t be more fun!

Course Objectives - Participants will:

- Investigate the history and evolution of Citizen Science and technology’s role in its advancement.
- Understand the value of Citizen Science as it relates to science education
- Become familiar with current Citizen Science projects (local, state and national) in a wide range of topics and interests, and the latest applications and online opportunities available for students
- Explore science in the classroom “Beyond Data Collection”
- Meet scientists who have implemented or manage a current program
- Develop a Citizen Science Action Plan to implement their project in their class.
- Apply science standards to a Citizen Science project
- Reflect on the strengths and drawbacks of Citizen Science as a classroom tool
- Create a basic framework for a monitoring project, field study, school yard study, classroom mock study or phenology program.
- Discuss the issue of quality assurance- how good is the data?
- Review existing Citizen Science project authentic assessment methods
- Experience multiple forms of communicating student collected scientific information

**Reading Resources to include** (available via websites or provided by instructor):

- The Next Generation Science Standards
- The Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects
- Journal articles as assigned

**Examples of required journal article readings to be provided by the instructor:**


**Recommended Readings:**


Outline of major course topics, discussion, and activities:

- The fascinating history of public participation in scientific research
- Thinking like a scientist - inquiry and Citizen Science
- Citizen Science today -- Yes, individuals CAN shape public policy!
- Local, state and national stories- support for educators
- Sources of support
- From clipboards to webcams: Data collection can be fun! Types of data collection, technology and project progressions across grade bands: Observations, Data Analysis Projects, Phenologies, Whole Organism Study, Inventories, Long Term Monitoring Projects, Student Developed Projects
- Meet a scientist and learn about their public projects
- Web Quest Assignment- explore the many existing online opportunities – computer lab
- Share ideas and potential projects of interest
- Discussion: What does a successfully implemented citizen science project look like? Are there classroom challenges to full immersion in the scientific process across grade levels or specific to grades (a process that should include study development, gathering information, collecting data, interpreting results, reporting results and asking new questions)? Can we participate in only one (i.e.: data collection) to fully understand the practice? Reflect.
- Discuss assigned readings and reflection assignments.
- Exploring the standards (NGSS, the Framework’s Seven Principles of Science and Engineering as they relate to Citizen Science and the Common Core Literacy in Science Standards- Overview
- Small group work by grade and discipline
- Share - discuss opportunities for the development of a school wide progression
- Meet a Citizen Science program coordinator
- Web Quest time continued if needed
- Differentiation Strategies and Citizen Science – activity
- Field Opportunities –Lesson opportunities across grades and disciplines
- Discuss assigned readings and reflection assignment.
- Time to select a project- discuss, develop.
- Presentations of Action Plan

Course Requirements:

- **Understanding of the Standards:** Review and have a basic understanding of the science standards as they relate to participants’ grade level and discipline and the Common Core standards as they relate to literacy in the sciences.

- **In-Class Participation:** Participants will actively engage in activities and participate in discussions.

- **Reflection/Analysis Papers:** Participants will write two reflection papers based on assigned journal articles provided by the instructor.
- **Web Quest:** Participants will perform a Citizen Science Web Quest and general searches for citizen science opportunities applicable for their grade level, discipline and curriculum.

- **Action Plan:** Participants will select a project to implement in their classrooms and develop and implement their plan of action that is aligned with the standards and includes differentiation strategies and methods of authentic assessment.

- **Presentation/Peer Exchange:** Participants will create a formal presentation or poster session that introduces their selected project, the rationale for choosing the topic and requirements/results from their action plan.

- **Follow up Reflection:** A foundation of professional development for teachers is the application of course content into the participant’s classroom. Participants will prepare a written reflection to the instructor to report on how the course content and individualized action plan was applied in the classroom. This summary may take the form of several possibilities depending on the nature of the project selected. The reflection may be a full summary of a completed project, a review of how planning and initial introductions of the project are being received or other.

**Assignments:**

- In-class participation
- Two (2) Reflection/Analysis Papers based on assigned readings
- Web Quest specific to your discipline and age group
- Develop an Action Plan that defines how you will implement the project in your classroom and includes how student learning will be evaluated
- Presentation/Peer Exchange
- Follow-up written reflection after classroom implementation

**Assessments - 200 possible points**

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<thead>
<tr>
<th>Assignment</th>
<th>Points</th>
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<tbody>
<tr>
<td>In-class Participation</td>
<td>25 pts</td>
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<tr>
<td>2 Reflection/Analysis Papers based on assigned readings (25pts each)</td>
<td>50 pts</td>
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<tr>
<td>Web Quest</td>
<td>25 pts</td>
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<tr>
<td>Action Plan and Evaluation</td>
<td>50 pts</td>
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<tr>
<td>Presentation/Peer Exchange</td>
<td>25 pts</td>
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<tr>
<td>Classroom Implementation /Reflection and Application of Course Content</td>
<td>25 pts</td>
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**Grading Scale:**

- **A** – 188-200 points
- **AB** – 176-187 points
- **B** – 168-175 points
- **BC** – 156-167 points
- **C** – 148-155 points
- **CD** – 136-147 points
- **D** – 122-135 points
- **F** – 121 points and below
Wisconsin Teacher Standards Addressed:

1. Teachers know the subjects they are teaching
2. Teachers understand that children learn differently
3. Teachers know how to manage a classroom.
4. Teachers communicate well.
5. Teachers are able to plan different kinds of lessons.
6. Teachers know how to test for student progress.
7. Teachers are able to evaluate themselves.
8. Teachers are connected with other teachers and the community.