COURSE SYLLABUS – Summer 2014

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

*Geared towards K-12 educators!*

**Instructor:** Julie Hein-Frank

**Schedule:** Monday, June 23 and Thursday, June 26, 2014 (9:00 a.m.-4:30 p.m.)

**Location:** Sevastopol School District, 4550 Wisconsin 57, Sturgeon Bay, WI 54235

**Choose from Two Enrollment Options:**

<table>
<thead>
<tr>
<th><strong>One (1) Graduate Credit</strong></th>
<th><strong>Noncredit</strong></th>
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<td><strong>Course #</strong> ED &amp; HUD 795-6, 7405 (#0174D)</td>
<td><strong>Program #</strong> 0174ND</td>
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<td><strong>Prerequisite:</strong> Graduate Standing (Must have earned a bachelor’s degree)</td>
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**Course Description:**

Student observations and data are used by scientists in this emerging trend of Citizen Science as a model of scientific practice in the classroom. This course provides opportunities for educators of grades K-12 to engage their students in authentic scientific inquiry through observation, study development, information gathering, and data collection, interpreting results, reporting results and asking new questions. Learn about school friendly projects that engage students in the scientific process at all grade levels and across disciplines. Discover strategies to involve students in the practices of scientists; from observation to the development of their own questions and the communication of their results. We will also discuss the importance of scientific literacy, the communication of ideas, data quality, and following protocols as examples of authentic research and inquiry.

A specific focus of the course will include how the implementation of Citizen Science projects in the classroom address standards and how Citizen Science can be part of an effective strategy that provides support opportunities for incorporating science content literacy, differentiation, reaching non-dominant groups, and the home and community connection.

Course participants will select an existing Citizen Science project of interest to participate in or learn how to implement their own inquiry or monitoring project by creating unique research questions applicable to their curricular needs. We will also discuss classroom assessment strategies and various opportunities for your students to design their own projects, effectively analyze and communicate the information they have gathered, and consider ways they can celebrate, disseminate and publish their meaningful contributions to real scientific research.
Course Emphasis:
This course will emphasize the importance of engaging students in authentic scientific inquiry throughout the K-12 progression in science education while addressing the changing face of science in the 21st century. The course will highlight ways that teachers can provide opportunities for their students to participate in scientific inquiry and explore content literacy through a Citizen Science project with confidence. We will use the scientific method and the eight practices of science and engineering as a framework while we explore Citizen Science projects across disciplines. With the support of the instructor, readings, discussion, activities, standards and reflections, each participant will create an Action Plan for an existing Citizen Science project of their choice to their grade level, or develop a unique project specific to their school, or create a Team Progression Project – an inquiry based project with a singular focus for implementation 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.

Citizen Science opportunities by their nature prepare students for active citizenship. Many existing projects also incorporate scientific literacy, college and career readiness standards, and differentiation strategies. All projects engage in the practices of scientists at varying levels of rigor.

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 an Action Plan for how you would implement a classroom project, field study, or school yard study.
- Reflect on the strengths and drawbacks of Citizen Science as a classroom tool
- Review existing Citizen Science project authentic assessment methods
- Analyze multiple forms of communicating student data and projects

**Required Readings:**

- Journal articles as assigned
- Educational standards as required by your district

**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
- Local, state and national stories and sources of support for educators
- 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, Historical Projects and more.
- Online Research to explore the many existing opportunities for inquiry– computer lab
- Share ideas and potential projects of interest

*(over)*
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
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
Field Opportunities –Lesson opportunities across grades and disciplines
Time to select a project- discuss, develop.

Peer Exchange of Action Plan

Course Requirements, Evaluation, and Assessment:

Graduate Credit Students – 125 possible points

- In-Class Participation: Participants will actively engage in activities and participate in discussions. (25 pts)
- Reflection/Analysis Paper: Participants will write one reflection paper based on assigned journal articles provided by the instructor. (25 pts)
- Action Plan: Participants will select a project they would like to implement in their classroom and develop a plan of action that is aligned with the standards and includes differentiation strategies and methods of authentic assessment. (50 pts)
- Peer Exchange of Action Plan: A foundation of professional development for teachers is the application of course content into the participant’s classroom. Participants will research and prepare an Action Plan for the implementation of scientific inquiry in their classroom. Participants will introduce the selected elements of their action plan project to their peers and the instructor using a format of their choice. (25 pts)

Graduate Credit Grading Scale:

A 117-125 pts
AB 110-116 pts
B 105-109 pts
BC 97-104
C 92-96
CD 85-91
D 76-84
F 75 and below
Noncredit Students

- Attendance and In-Class Participation: Participants will attend all sessions, actively engage in activities, and participate in discussions.

- Reflection Paper: Participants will write one reflection paper regarding how information from this course will be used in their classroom.

Certificate of Completion: Noncredit students will earn a certificate of completion upon satisfaction of the noncredit requirements.

The following Wisconsin Teacher Standards are addressed for the Noncredit Students and assessed for the Graduate Students:

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

Last updated February 27, 2014 - CL