

**UF TEACH PROJECT-BASED INSTRUCTION/SECONDARY SCHOOL MATHEMATICS**

SMT 3664 (14F6-Sci; 14F4-Math)/MAE 5332 (007A)

Tues. 5:10pm – 8:10pm NRN 174, 2309

**Instructor (Science):** Gayle Evans. **Office Hours:** Tuesday 3:00-4:00 P.M. or by appt.

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**Instructor (Mathematics):** Gloria Weber. **Office Hours:** Tuesday 3:00-4:00 P.M. or by appt.

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**Course Website:** <http://online.education.ufl.edu>

**PREREQUISITES:**

- SMT 3100 Knowing and Learning (or permission of Instructors)
- SMT 3310 Classroom Interactions (or permission of Instructors)
- Additional Requirements: Students must be able to use a word processor, a data management program like Excel, e-mail, and a web browser capable of viewing videos and reading PDF files. If these requirements cannot be fulfilled, please see instructor.

**COURSE RATIONALE:**

Project-based instruction engages learners in exploring authentic, important, and meaningful questions of real concern to students. Through a dynamic process of investigation and collaboration and using the same processes and technologies that scientists, mathematicians, and engineers use, students work in teams to formulate questions, make predictions, design investigations, collect and analyze data, make products and share ideas. Students learn fundamental science and mathematical concepts and principles that they apply to their daily lives. Project-based instruction promotes equitable and diverse participation and actively engages students in their own learning.

**COURSE DESCRIPTION:**

PBI has three essential components:

- *Theory-driven perspective:* Students will revisit how people learn and how project-based instruction may be among our most informed classroom learning environments for bridging the gap between theory and practice.
- *Instructional Development:* Technological and pedagogical content knowledge are developed as students work toward the design of a standards-based project-based unit. Students increase their levels of competency as they read about and discuss the principles of PBI; reflect on observations of PBI learning environments in high school settings (where available); and incorporate what they are learning into the design of their problem-based lessons and ultimately, an entire project-based unit.
- *Field Experience:* An intensive field component includes observation of standards-based instruction in local schools as well as implementation of their problem-based lessons with area high school students in the classroom. Students will also investigate potential field-trip sites to assess their potential usefulness as a learning site within their PBI units.

## Course Objectives and Expectations

Course Objectives and Evidence of Student Learning	
FEAP Indicator	Evidence of Student Learning:
<b>Instructional Design and Planning</b>	
1b. Sequences lessons and concepts to ensure coherence and required prior knowledge	<u>Curriculum Topic Study</u> : I. Identify Adult Content Knowledge: Describe the enduring understandings that all adults know. II. Consider Instructional Implications: Illustrate the linkages among student learning, teaching, and classroom context. IV. Examine Research on Student Learning: Describe the misconceptions or alternative ideas that students have about this topic and what might contribute to these ideas. V. Examine Coherency and Articulation: Detail the concepts and skills that are essential to a coherent understanding.
1d. Selects appropriate formative assessments to monitor learning.	<u>PBI UNIT: Formative Assessments</u> : Outline the various levels of assessment, including examples of daily formative assessments and final project assessment/rubric.
<b>Instructional Delivery and Facilitation</b>	
3e. Relate and integrate the subject matter with other disciplines and life experiences.	<u>PBI UNIT: Topic, Rationale &amp; Driving Question</u> : The project focuses on the needs of the students/staff/community for broadest impact, not solely for the good of the person/team applying. Describes all resources – including school-based personnel and/or experts from the community at large who will share responsibility and/or support for the project.
5d. Collaborates with the home, school and larger communities to foster communication and to support student learning & continuous improvement	<u>PBI UNIT: Topic, Rationale &amp; Driving Question</u> : The project focuses on the needs of the students/staff/community for broadest impact, not solely for the good of the person/team applying. Describes all resources – including school-based personnel and/or experts from the community at large who will share responsibility and/or support for the project.

## REQUIRED BOOKS

Larmer, John & Solis, Arthur. *PBL 101 Workbook*. 2009. Navato, CA. Unicorn Printing Specialists. Buck Institute for Education. ISBN: 978-0-974034348. Can be purchase online at <http://www.bie.org/store/>

### For science majors only:

Keeley, Page. *Science Curriculum Topic Study*. 2005. Thousand Oaks, CA. Corwin Press. ISBN: 978-1-4129-0892-4.

Keeley, P. (2008). *Science Formative Assessment- 75 Practical Strategies for Linking Assessment, Instruction, and Learning* NSTA Press.

### For mathematics majors only:

Keeley, Page. *Mathematics Curriculum Topic Study*. 2006. Thousand Oaks, CA. Corwin Press. ISBN: 978-1-4129-2644-7.

Keeley, P., & Tobey, C. R. (2011). *Mathematics Formative Assessment- 75 Practical Strategies for Linking Assessment, Instruction, and Learning* NCTM & Corwin Press.

## **COURSE OBJECTIVES**

- Discuss and critique the merits of project-based instruction in terms of student's cognitive development, equity and motivation,
- Reflect on applications of educational theory as it relates to classroom practice in the area of project-based instruction,
- Distinguish between project-based instruction and other instructional approaches and decide which approach best fits instructional goals based on the benefits and limitations of each,
- Evaluate the usefulness of technology in achieving learning objectives and select appropriate resources for student use based on the relationship of salient features of the technology to learning objectives,
- Use inquiry-based teaching methods with secondary students in a problem-based setting,
- Describe examples of project-based instruction in math or science and analyze those examples in terms of several well-studied, field-tested models for PBI,
- Demonstrate skill in setting up and managing wet lab and/or field project-based environments,
- Use PBL design principles to develop an interdisciplinary, three to four-week project-based unit for secondary math and/or science courses,
- Develop alternative assessments appropriate for project-based instruction,
- Discuss lab safety and liability issues related to project based instruction and wet-lab or field environments (Occupational Safety and Health Administration (OSHA) regulations, how to read materials safety data sheets, safe disposal of chemicals, etc.),
- Use relevant technology to develop projects (e.g., concept mapping software, video editing software, etc.),
- Integrate relevant technology into curricular units (e.g., Internet, simulations, data analysis packages, modeling software, probe ware, calculators, etc.), and
- Plan instruction that promotes equitable and diverse participation so that all students have an opportunity to learn.

## **GRADING**

Student grades are based on participation in discussions, successful completion of classroom observations, field trip preparation, construction of 5E lesson plans, and a final project-based unit. Grades are determined as follows:

- Attendance and Class Participation (20%)
- School-based teaching experiences (35%)
  - Professionalism, punctuality, attendance, preparation (~2 hrs/wk for 7 weeks -14 hours). Observation notes and analyses
  - Plan and revise based on teaching two sequential lessons that are a part of the PBI unit
- Development and presentation of project based unit of instruction (40%)
- Investigation and documentation of a potential field trip site (5%)

GRADING SCALE 100-93 = A; 92-90 = A-; 89-87 = B+; 86-83 = B; 82-80 = B-; 79-77 = C+; 76-73 = C; 72-70 = C-; 69-67 = D+; 66-63 = D; 62-60 = D-; Less than 60 = F

The schedule of topics and assignments may change over the course of the semester. Any changes will be announced in class and on Canvas. Students are responsible for these changes whether or not they are present in class.

### **Completeness and Promptness**

Only assignments submitted complete and on time will be considered for full credit. Deductions of one letter grade will be taken for each day (not each class) the assignment is not turned in. Missing a class is not an excuse for not having an assignment turned in. All assignments must be typed and submitted to Canvas for grading unless otherwise instructed.

### **ASSIGNMENTS**

Additional details will be provided in class or in online course website.

#### ***School-based Teaching Experiences (35%)***

There are four components to this assignment.

*#1 Observation Notes and Analyses:* Each UFTeach student will spend 14 hours (~2 hrs/wk for 7 weeks) observing high school classes. Students will record their observations by answering specific focus questions, and then posting them to the class website. The information gathered in these observations is also used to inform the class discussions of the peer-reviewed literature on project-based instruction. With permission of the instructors, students may choose to observe a SECME club or similar project-oriented extra-curricular club or local competition in lieu of ~2 hours.

*#2 Plan, Teach, and Revise Two Sequential Lessons:* Each UFTeach teaching group will create a 5E lesson plan that incorporates a part of their PBI unit. This 2-day lesson will be presented in their mentor teacher's class during the weeks of March 16-20 or March 30-April 3 or other date specified by host teacher. The lesson must include a pre-test, formative assessment at the end of day 1, and a summative assessment at the completion of the 2-day lesson. Each UFTeach teaching group will revise their 2-day 5E lesson based on the experience in the classroom and their findings from their formative and summative assessments. The rubric for the lesson and the revision are described on a separate handout entitled "Lesson Plan Rubric and Revision".

*#3 Professionalism, Punctuality, Attendance, Preparation:* UFTeach students must remember that they are representing not only themselves but the University of Florida and the UFTeach program any time they are out in the schools conducting observations and teaching lessons. All Alachua County / PKYonge policies must be observed at all times when on campus. These include (but are not limited to):

- Students must check in to the front office with a picture ID (driver's license or passport) each time they enter campus.
- Students must arrive on time for all observed classes, be professionally dressed, and conduct themselves in a manner that is not disruptive to the Mentor teacher's class.
- No cell phones / tablets may be visible or used while in the schools unless it is at the specific request of the mentor teacher and serves the requirements of the lesson.
- If, for any reason, an observation or teach needs to be rescheduled, students must notify the Mentor teacher and appropriate Master Teacher as soon as they are aware of the conflict- at least two school days in advance. If the absence is due to an unforeseen illness or emergency, appropriate documentation (doctor's note, etc.) will be necessary for the absence to be excused.

***Development and Presentation of Project-Based Unit of Instruction (40%)***

Each UF Teach student works in a group to prepare a PBI unit. The unit should be a minimum of 10 days but may be longer depending on the topic chosen. There are no extra points for more days. The unit must be well constructed based on criteria presented in class. The unit will be prepared to meet curricular objectives and state and national standards. The unit will include components as described on a separate handout entitled “Final PBI Unit Checklist”. The final unit will be presented to the class.

***Investigation and Documentation of a Potential Field Trip Site (5%)***

Student groups will be required to visit one site or investigate a potential site that could be used as a field trip site for their PBI unit. Several locations will be suggested or they may discuss an alternative location with their instructor. They must visit this site and document how it could be a suitable location to utilize as a part of their PBI unit. Students must provide evidence that the site would support the teaching of the standards in the PBI unit. All sites must be approved in advance.

***Attendance, Class Participation (in class and online), and Overall Professionalism (20%)***

- Prepare for and participate in class discussions and activities. Be prepared to discuss any assigned readings.
- Attend class each day and work in teams as directed by instructor.
- **Excused Absences** are allowed **only** if students communicate one of the following to the instructor via e-mail:
  - **One week** prior to class, religious holidays **or** conflicts with required absences due to UF Teach sponsored events.
  - Illness should be communicated as soon as possible and, if lasting more than one class period, a doctor’s note should be provided when the student returns to class.
  - Unexcused absences and lateness to class are not acceptable and will be reflected in your grade.
  - As a courtesy to your teaching partner, please notify them as well if you will be absent from a class, observation or teach.

**COURSE REQUIREMENTS AND EVALUATION:**

All formal communication, including the submission of assignments and schedule changes are done through Canvas. Students are required to check regularly. All communication via email must be conducted with the official UFL account, and this email should be checked daily, and emails responded to in a timely manner.

**STUDENTS WITH DISABILITIES**

Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.

For more information consult the university policy found at [http://www.dso.ufl.edu/stg/Stud with Disabilities.htm/](http://www.dso.ufl.edu/stg/Stud_with_Disabilities.htm/)

**STATEMENT ON ACADEMIC HONESTY**

Students are required to be honest in all of their university class work.

In the fall of 1995, the UF student body enacted a new honor code and voluntarily committed itself to the highest standards of honesty and integrity.

The Honor Code: We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity. On all work submitted for credit by students at the university, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment."

Because we, as educators and future educators, are held to a higher ethical standard as teachers, the School of Teaching & Learning takes infringements of academic honesty very seriously. For the first violation of academic dishonesty in a course, the student will receive a zero on that assignment and no opportunity for make up. If the student has an additional violation in the course, the student will fail the course and meet with the Director to establish a Performance Improvement Plan that will need to be completed before the student can enroll in additional coursework.

The University of Florida also has a formal process for addressing issues associated with academic dishonesty that you are also welcome to use. You can learn more about this formal process at: <http://www.dso.ufl.edu/judicial/academic.php>

### **STATEMENT ON PLAGIARISM**

Plagiarizing has become easier and more prevalent in today's educational systems. Recent events indicate this is a problem at all levels of the educational system— in K-12 and in higher education. The University of Florida Academic Honesty policy covers plagiarism. In STL, we want to emphasize this policy to ensure students are aware of what plagiarism is and steps to take in avoiding plagiarism. Merriam-Webster's Online Dictionary states that to plagiarize is: transitive senses: to steal and pass off (the ideas or words of another) as one's own: use (another's production) without crediting the source intransitive senses: to commit literary theft: present as new and original an idea or product derived from an existing source.

Examples of plagiarism/academic dishonesty include:

- Using words, sentences, ideas, and/or organization from a source (book, webpage, etc.) without providing the proper citation
- Submitting the same paper for multiple classes
- Submitting an assignment obtained from commercial firms, websites, fraternity or sorority files, or any other group or individual.

Often education students believe they can use materials that are not their own by claiming their actions are protected by the Fair Use section of the Copyright Laws. This is often not the case. All materials put in a tangible form after January 1, 1978 are copyrighted. A work does not need the copyright symbol © to be copyrighted. In the 1976 Copyright Act, educators have been given fair use guidelines. In order to be able to claim fair use, you must meet all four of the following factors:

1. Purpose of the use is for nonprofit educational reasons
2. The nature of the work and spontaneity
3. Amount and substance of the work
4. Financial impact on the market

Additional information about Copyright can be found at the Copyright Office (<http://www.copyright.gov/>), Stanford University Fair Use website (<http://fairuse.stanford.edu>), and the University of Texas at Austin (<http://www.utsystem.edu/ogc/intellectualproperty/cprtindx.htm>).

The University of Florida Library system has a website for students about plagiarism (<http://web.uflib.ufl.edu/msl/subjects/Physics/StudentPlagiarism.htm>).