Spring 2022

SCED 397B: Engineering and Technology in the Elementary School

Classroom/laboratory study of engineering content and processes including effective integration of engineering in the context of national and Washington state standards in science for the elementary classroom. Focus on application of the engineering design process to find sustainable solutions to environmental and social problems. Includes a field experience component to gain experience teaching engineering to elementary students.

Prerequisites & Notes: SCED 480 or instructor permission.
Credits: 4
Grade Mode: Letter

Instructor: Josie Melton josie.melton@wwu.edu

Office Hours: Tues 10-11 or by appointment

Meeting times/location: Tues/Thurs 8-10 in SL210

Field Experience Partners: SPARK Museum OR SMATE Visitor Program

For a detailed list of activities and assignments week-by-week, see the draft course agenda at the bottom of this syllabus.

In order to be flexible and responsive to the needs and interests of the class, this syllabus and course agenda is subject to change. Changes, if any, will be announced in class and updated in Canvas. Students will be held responsible for all changes.

Course Requirements
Science Education 397B demands active participation and a willingness to learn and explore teaching and learning science. It is an investigation-intensive class and will require all students to be prepared each day. Excellent attendance is essential for success in this course.

1. The class is organized around many small and large group class activities during class sessions. Your attendance is necessary not only for your learning but also for the learning of others. In the event you will be missing class, as a professional courtesy you should notify your instructor (and group-members, if applicable) in advance and make an appointment to be informed about missed material and assignments. It is not recommended that you rely on your peers to provide you this information. Note that due to the hands-on and collaborative nature of the in-class activities, it may not be possible to 'make up' missed work in all cases. Absences, even excused absences, may result in the need for an incomplete (K) grade to be assigned. To receive a K grade, a student must print an incomplete (K) grade contract. and meet with the course instructor to negotiate a formal written agreement specifying the work done and the remaining work to complete the course and earn a grade.
2. Late work will be penalized a letter grade for each day late unless you have spoken to me about an unusual situation **PRIOR** to the due date.
3. Written assignments must model appropriate grammar, spelling, usage and punctuation. All written work is to be word-processed (double-spaced, 12 point font) unless otherwise specified.

Proofread your papers as you would if you were developing a handout for students or parents. The instructor reserves the right to return work for correction prior to grading if there are multiple mistakes in grammar, spelling, and or punctuation.

Course Goals & Objectives:
In this course, prospective teachers (you!) will:

1. **Critically examine your beliefs about engineering in relation to a vision of effective science teaching and learning**
   - *Analyze how your experiences as a learner have shaped your definition of, attitudes toward, and interest in engineering.*
   - *Critically examine your conception of engineering education, informed by your experiences as both a learner and teacher of science.*
2. **Deepen your subject matter knowledge for teaching engineering**
   - *Critically examine classroom interactions for evidence of student engagement in the engineering design process.*
   - *Articulate what elementary students should learn about engineering, and the kinds of problems that are appropriate for elementary students to solve.*
3. **Develop an understanding of learners, learning, and issues of diversity and equity in engineering education**
   - U*npack the implicit messages embedded in engineering instruction and what they convey about what engineering is and who can do engineering.*
   - *Utilize developmentally appropriate and productive approaches to meet the diverse needs, interests, and abilities of students and create inclusive and equitable science and engineering classrooms.*
4. **Develop a beginning repertoire of strategies for engineering instruction and assessment**
   - *Design activities aligned to the Next Generation Science Standards that reflect principles of effective science teaching and learning.*
   - *Design and use assessment tools appropriate for formative and summative purposes.*
5. **Develop the tools and dispositions to study and learn from teaching**
   - *Utilize feedback (from peers/instructors /cooperating teachers) to improve instruction.*
   - *Apply different lenses (e.g., instructional frameworks, research) to analyze and learn from engineering teaching and learning experiences.*

Major Assignments:

Major assignments are intended to help you meet specific objectives that align with the course goals listed above. Each assignment will be explained in detail with a rationale and evaluation criteria. Weighting of individual assignments towards the final course grade are indicated.

- Class Participation, Professionalism, & Formative Assignments (20%)
- Reading Responses (20%)
- Engineering Autobiography, pre- and post- (20%)
- Engineering Activities (20%)
- Field Experience Reflection (20%)

Minor Assignments:

Minor assignments are intended to scaffold your thinking and prepare you for success on the major assignments. Note that in addition to the graded assignments listed above, you will complete a number of assignments that will act as baseline assessments or that as 'works in progress' will not be counted towards your final grade. These activities and tasks will be explained and assigned throughout the course and will count as complete/incomplete toward your Class Participation, Professionalism, & Formative Assignments grade, or will be included in your grade towards a Major Assignment. For example, points for submitting a draft of your Engineering Lesson Plan could be included in your final grade for that Major Assignment.

Grading Scheme:

Assignments will be graded, and course grades determined as follows:

Grade	**A+**	**A**	**A-**	**B+**	**B**	**B-**	**C+**	**C**	**C-**	**D+**	**D**	**D-**	**F/Z**
4-point	4.0	3.9	3.7	3.3	3	2.7	2.3	2	1.7	1.3	1	0.7	0
100-point	100	96	93	89	86	83	79	76	73	69	66	63	63>

Texts and required materials:

- Readings and supplemental materials will be provided in class and/or in this Canvas site.
- No textbook is required.

Syllabus Policies

This course will adhere to Western's Syllabi Policies. for Academic Honesty, Accommodations, Ethical Conduct with WWU Network and Computing Resources, Equal Opportunity, Student Conduct Code, and Medical Excuse Policy.

Student Services

Western encourages students to seek assistance and support at the onset of an illness, difficulty, or crisis. As your instructor, I can be a first point of contact to help you find the campus-based resources you may need. Here are some of the resources WWU offers students:

- In the case of a **medical concern or question**, please contact the Health Center (360) 650-3400 or visit its website: https://studenthealth.wwu.edu/
- In the case of an **emotional or psychological concern or question**, please contact the Counseling Center: (360) 650-3400 or visit its website: http://www.wwu.edu/counseling/ (Links to an external site.)
- In the case of a **safety concern**, please contact the University Police: (360) 650-3555 or visit its website: http://www.wwu.edu/ps/police/
- In the case of a **family or personal crisis or emergency**, please contact the Office of Student Life (360) 650-3706 or its website: https://wp.wwu.edu/officeofstudentlife/

Spring 2022

Course Agenda

**This schedule is subject to change – The instructor reserves the right to shift topics/activities based on time constraints and the rate of student learning. Readings will be assigned as needed to support our learning and will be announced in class and on Canvas. All changes will be published on Canvas and announced in class.

Week	Theme	Key Activities	Course Goals	Major Assignments (not reading responses)
1 Tues 3/29	What is this course about?	Introductions Intro to engineering	1 2	Initial Ideas Assignment
 Thurs 3/31	Who are Engineers?	Recognizing biases Highlighting statistics	1 3	
2 Tues 4/5	Who are Engineers?, cont.	Addressing stereotypes	2 3	
Asynch Thurs 4/7	What do Engineers Do?	Exploring engineering		Asynchronous module – complete in lieu of class.
3 Tues 4/12	What do Engineers Do?, cont.	Intro to Engineering Design Process	2 3	Activity Annotation
Thurs 4/14	What do k-6 engineers do?	Analyzing activities		
4 Tues 4/19	What do k-6 engineers do?, cont.	Analyzing activities	2 3	Activity Annotation
Thurs 4/21	How does engineering differ from science?	Comparing/contrasting science & eng.		
5 Tues 4/26	What does engineering look like in grades K-2	K-2 model activity	2 3 4	Activity Annotation
Thurs 4/28	What does engineering look like in grades K-2	K-2 model activity		
6 Tues 5/3	What does engineering look like in grades 3-5?	3-5 model activity	2 3 4	Activity Annotation
Thurs 5/5	What does engineering look like in grades 3-5?	3-5 model activity		
7 Tues 5/10	How do we design eng. experiences for students?	Exploring materials	3 4	Design an Engineering Activity - draft
Thurs 5/12	How do we design eng. experiences for students?, cont.	Brainstorming activities		

8 Tues 5/17	How do we prepare an eng. experience?	Mapping out activity	3 4	
Thurs 5/19	How do we prepare an eng. experience?, cont.	Mapping out activity		
9 Tues 5/24	How do we facilitate an eng. experience?	Finalize and rehearse	4 5	Engineering Activity – teachable version
Thurs 5/26	How do we facilitate an eng. experience?, cont.	Finalize and rehearse		
10 Tues 5/31	How do we reflect on our experience as facilitators?	Presentations	5	Evidence of Learning
Thurs 6/2	Reflect and celebrate		1-5	