

## CE 537 (Section 02) - Engineering Teaching and Learning

### **PROFESSOR**

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Dr. Shane Brown, P.E.  
Phone: (509) 335-7847

Office: Sloan 119  
E:mail: [shanebrown@wsu.edu](mailto:shanebrown@wsu.edu)

### **SUGGESTED TEXTS**

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How People Learn, National Research Council  
Talking About Learning, Seymour and Hewitt  
Classroom Assessment Techniques, Angelo and Cross, Jossey Bass  
Understanding by Design, Wiggins and McTighe, ASCD  
Rising Above the Gathering Storm, The National Academies Press

### **PURPOSE OF COURSE**

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The purpose of this course is to prepare students for careers in academia as engineering educators. Students will become familiar with best practices in engineering teaching, including curriculum design, teaching methods, and assessment of student learning; theories of learning; and how to apply these theories in the classroom.

### **COURSE OBJECTIVES AND OUTCOMES AND LIST OF TOPICS**

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The instructor will:

- encourage students to take an active role in learning;
- provide students with an atmosphere conducive to learning,
- provide students with a set of experiences and assignments to improve their knowledge and understanding of engineering teaching and learning, and
- provide appropriate and timely feedback to students allowing them to gauge their progress in reaching their educational objectives.

Following is a list of the topics that will be covered in this course. *The course outcomes, or what I expect that you will be able to do, are provided within each section in italics and bold.*

- **Importance of Teaching and Learning to Engineering Education**
  - National competitiveness
  - Retention
  - Minorities in engineering education
  - Culture and difficulty of engineering
  - *Describe the importance of engineering education to national welfare*
  - *Understand the importance of the classroom experience to engineering learning*
  - *Understand the critical issues in retention of engineering students*
  - *Describe the unique characteristics of the engineering discipline*
- **Learning Theories**
  - Social constructivism
  - Behaviorism
  - Expert-novice
  - The 2-sigma problem
  - *Recall and describe notable theories of learning*
  - *Describe the relevance of these theories to engineering education*
  - *Critically evaluate a learning theory*
- **Course Design**
  - Course objectives

- Student learning outcomes
- The course syllabus
- ***Design a course syllabus focused on learning***
- ***Understand best practices in course design***
- ***Apply best practices in course design to a mini course***
- ***Understand and apply the importance of prioritization of concepts and assessment in course design***
- **Assessment and Evaluation**
  - Formative and summative assessment
  - Difference between assessment and evaluation
  - Classroom assessment
  - Quizzes and exams
  - ***Define and differentiate between assessment and evaluation***
  - ***Develop assessments of student learning for engineering***
- **Best Practices in Engineering Pedagogy**
  - Active learning
  - Cooperative and group learning
  - Classroom formative assessment
  - Practical best practices
    - Board notes, posture, language
  - ***Define active and group learning***
  - ***Describe the reasons for best practices in teaching***
  - ***Develop active learning exercises for engineering courses***
- **Teaching Observation and Evaluation**
  - Observation techniques
  - Observation of lecture sessions
  - ***Understand and apply classroom observational techniques***
  - ***Critically evaluate engineering teaching practices***
  - ***Develop an improvement strategy for teaching***
- **Teaching Practicum**
  - Teaching demonstration to rest of class
  - ***Critically evaluate theirs and others teaching practices***
  - ***Apply theories of learning and best practices to a teaching demonstration***
  - ***Incorporate formative assessment into teaching***
  - ***Develop a personal action and improvement plan for teaching***

### ***COURSE ASSIGNMENTS AND PROJECTS***

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Students will complete weekly reading and writing assignments, a synthesis paper on an engineering education topic of their choosing, and conduct a practice teaching session

### ***ASSESSMENTS***

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Student understanding of the material is evident in in-class exercises, homework, project, and exam scores.

|                              |     |                    |     |
|------------------------------|-----|--------------------|-----|
| Attendance and Participation | 20% | Teaching Practicum | 30% |
| Weekly Assignments           | 20% | Synthesis Paper    | 30% |

## ***EVALUATION***

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Grades will be awarded based on a strict percentage scale as shown below. The scale may be adjusted up or down by the instructor. Students should NOT compete but should strive for mastery of the subject.

|               |    |              |    |
|---------------|----|--------------|----|
| 93-100% ..... | A  | 77-80% ..... | C+ |
| 90-93 .....   | A- | 73-77% ..... | C  |
| 87-90% .....  | B+ | 70-73% ..... | C- |
| 83-87% .....  | B  | 60-70% ..... | D  |
| 80-83% .....  | B- | < 60% .....  | F  |

## ***ACADEMIC HONESTY***

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All members of the University community share responsibility for maintaining and promoting the principles of truth and academic honesty. The University has a policy defining academic dishonesty and procedures to follow when dishonesty occurs. This policy applies to both undergraduate and graduate students alike. The policy and procedures can be found in the Student Handbook and on-line at [www.studentaffairs.wsu.edu](http://www.studentaffairs.wsu.edu).

## ***EXPECTATIONS***

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The goal of Washington State University is to provide students with the knowledge, skill and wisdom they need to contribute to society. Our rules are formulated to guarantee each student's freedom to learn and to protect the fundamental rights of others. People must treat each other with dignity and respect in order for scholarship to thrive. Behaviors that are disruptive to teaching and learning and that create a hostile, offensive or intimidating environment based on gender, race, ethnicity, color, religion, age, disability, marital status or sexual orientation will not be tolerated.

## ***SPECIAL NEEDS***

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**Students with Disabilities:** I am committed to providing assistance to help you be successful in this course. Reasonable accommodations are available for students with a documented disability. Please visit the Disability Resource Center (DRC) during the first two weeks of every semester to seek information or to qualify for accommodations. All accommodations **MUST** be approved through the DRC (Admin Annex Bldg, Rooms 205). Call 509 335 3417 to make an appointment with a disability counselor.