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| **EGR 590 Course Syllabus**  **EGR 590 – Teaching Undergraduate Engineers** | |

# Fall 2019

**3 Credit Hours**

**Course Description**

This course in engineering education focuses on evidence-based pedagogical methods that improve learning for undergraduate engineering students. Other topics include engineering accreditation, diverse groups, and how to create effective teaching resources. The class will culminate with a micro-teaching module for each student. Topical areas will be supported with readings from the engineering education literature.

**Learning Outcomes**

By the end of the course students should be able to:

* Describe the attributes of effective teaching for college-level engineering courses
* Identify and apply criteria that drive engineering teaching and curriculum development
* Identify diverse characteristics of learners, and generate ideas on how to effectively teach and include different types of students in engineering
* Identify the skills and knowledge that engineering students need to develop to prepare them for successful careers
* Classify and formulate learning objectives for relevant courses in their own disciplines
* Create assessments that effectively measure student learning
* Describe and demonstrate different active teaching approaches
* Design and execute a lesson plan and learning activity for an undergraduate engineering course
* Interpret current trends and literature in engineering education

**Course Structure**

The course will be interactive, discussion-based and participatory. All students are expected to participate in class discussions and on-line discussion boards.

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| **Instructors Course Meetings** | |
|  | **Lecture** |

**Days:** TH

**Time:** 1:30pm - 2:45pm **Campus:** Main **Location:** 202 Poe Hall *This meeting is required.*

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| **Course Materials** | |
|  | **Textbooks** |

None.

**Expenses**

None.

**Materials**

None.

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| **Requisites and Restrictions** | |
|  | **Prerequisites** |

Senior or graduate standing

**Co-requisites**

None.

**Restrictions**

None.

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| **General Education Program (GEP) Information** | |
|  | **GEP Category** |

This course does not fulfill a General Education Program category.

**GEP Co-requisites**

This course does not fulfill a General Education Program co-requisite.

**Transportation**

This course will not require students to provide their own transportation. Non-scheduled class time for field trips or out- of-class activities is NOT required for this class.

**Safety & Risk Assumptions**

None.

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| **Grading** | |
|  | **Grade Components** |

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| **Component** | **Weight** | **Details** |
| **Homework** | **25%** | Homework will be assigned weekly and will usually consist of reading and summarizing or commenting on articles relevant to the subject area at hand. |
| **Projects** | **40%** | Projects will include preparing a syllabus, preparing a statement of philosophy on teaching, creating an assessment for a specific lesson and others. |
| **Participation** | **20%** | Participation in class or in online discussion boards is essential to learning the information in the class. Discussion boards will have minimum guidelines set out. |
| **Microteach** | **15%** | Students will prepare and deliver, either in person or via recording, a short 20 minute lesson on a topic of their choice. |

**Letter Grades**

**This Course uses the Following (Non-Standard) Letter Grading Scale:**

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| --- | --- | --- | --- | --- |
| 98 | ≤ | **A+** | ≤ | 100 |
| 93 | ≤ | **A** | < | 98 |
| 89 | ≤ | **A-** | < | 93 |
| 87 | ≤ | **B+** | < | 89 |
| 82 | ≤ | **B** | < | 87 |
| 80 | ≤ | **B-** | < | 82 |
| 78 | ≤ | **C+** | < | 80 |
| 70 | ≤ | **C** | < | 78 |

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| --- | --- | --- | --- | --- |
| 68 | ≤ | **D+** | < | 70 |
| 60  0 | ≤  ≤ | **D F** | < < | 68  60 |

**Requirements for Credit-Only (S/U) , Audit, Incompletes**

Students who wish to enroll in this class for credit-only should consult the instructor.

Information about and requirements for auditing a course can be found at [http://policies.ncsu.edu/regulation/reg-02-](http://policies.ncsu.edu/regulation/reg-02-20-04) [20-04](http://policies.ncsu.edu/regulation/reg-02-20-04).

If an extended deadline is not authorized by the Graduate School, an unfinished incomplete grade will automatically change to an F after either (a) the end of the next regular semester in which the student is enrolled (not including summer sessions), or (b) by the end of 12 months if the student is not enrolled, whichever is shorter. Incompletes that change to F will count as an attempted course on transcripts. The burden of fulfilling an incomplete grade is the responsibility of the student. The university policy on incomplete grades is located at <http://policies.ncsu.edu/regulation/reg-02-50-03>. Additional information relative to incomplete grades for graduate students can be found in the Graduate Administrative Handbook in Section 3.18.F at <http://www.fis.ncsu.edu/grad_publicns/handbook/>

**Late Assignments**

In general, late assignments will not be accepted.

**Attendance Policy**

For complete attendance and excused absence policies, please see [http://policies.ncsu.edu/regulation/reg-02-20-](http://policies.ncsu.edu/regulation/reg-02-20-03) [03](http://policies.ncsu.edu/regulation/reg-02-20-03)

**Attendance Policy**

None.

**Absences Policy**

Students are responsible for all material missed.

**Makeup Work Policy**

Make up work is allowed for excused absences.

**Additional Excuses Policy**

None.

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| **Academic Integrity** | |
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Students are required to comply with the university policy on academic integrity found in the Code of Student Conduct found at <http://policies.ncsu.edu/policy/pol-11-35-01>

See <http://policies.ncsu.edu/policy/pol-11-35-01>for a detailed explanation of academic honesty. Your signature on any test or assignment indicates "I have neither given nor received unauthorized aid on this test or assignment."

**Electronically-Hosted Course Components**

Students may be required to disclose personally identifiable information to other students in the course, via electronic tools like email or web-postings, where relevant to the course. Examples include online discussions of class topics, and posting of student coursework. All students are expected to respect the privacy of each other by not sharing or using such information outside the course.

**Accommodations for Disabilities**

Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with the Disability Resource Office at Holmes Hall, Suite 304, Campus Box 7509, 919-515-7653. For more information on NC State’s policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation (REG02.20.01) (<https://policies.ncsu.edu/regulation/reg-02-20-01/>).

**Non-Discrimination Policy**

NC State University provides equality of opportunity in education and employment for all students and employees. Accordingly, NC State affirms its commitment to maintain a work environment for all employees and an academic environment for all students that is free from all forms of discrimination. Discrimination based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation is a violation of state and federal law and/or NC State University policy and will not be tolerated. Harassment of any person (either in the form of quid pro quo or creation of a hostile environment) based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation also is a violation of state and federal law and/or NC State University policy and will not be tolerated. Retaliation against any person who complains about discrimination is also prohibited. NC State's policies and regulations covering discrimination, harassment, and retaliation may be accessed at <http://policies.ncsu.edu/policy/pol-04-25-05>or [http://www.ncsu.edu/equal\_op/.](http://www.ncsu.edu/equal_op/) Any person who feels that he or she has been the subject of prohibited discrimination, harassment, or retaliation should contact the Office for Equal Opportunity (OEO) at 919-515-3148.

Course topics:

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| Week 1 | Introduction to the field of Engineering Education; mapping out the course |
| Week 2 | Understanding student differences; diversity in the classroom; teaching and learning styles |
| Week 3 | Everyday examples in the classroom; using hands-on activities in an engineering classroom; engaging students |
| Week 4 | Spatial visualization; visual, verbal, rotational reasoning |
| Week 5 | Good teaching practices; linking to current events; seeking relevancy; connecting backward and forward |
| Week 6 | Problem solving and creativity; engineering habits of mind; models in the classroom |
| Week 7 | Universal Design; design-based pedagogy; multidisciplinarity |
| Week 8 | Assessment techniques |
| Week 9 | Assign microteach topics; engineering teaching resources; questioning techniques; case studies |
| Week 10 | Student development; ways of knowing; student thinking |
| Week 11 | Growth mindset; generational differences |
| Week 12 | Implicit bias; grading |
| Week 13 | Experimental teaching techniques; to flip or not to flip; classroom management |
| Week 14 | The Grand Challenges for Engineering (teaching) |