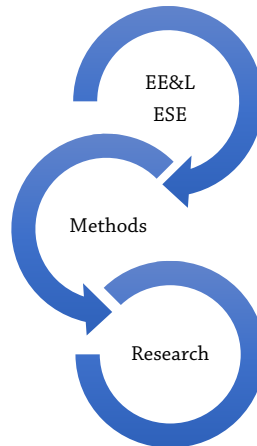


## Research Methods in Environmental Science & Engineering Education & Leadership

Working Syllabus/Draft Subject to Change: Version 202410

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**Welcome to our course!** Glad we have the opportunity to participate together in this adventure. Let's commend you on enrolling for this course.

In engineering and science, we tend to focus on our technical research; yet engineering and science education research can be equally rewarding and have as much or more impact on our fields. A well-rounded professional engineer and scientist will provide service as both a researcher, and educator; and these fields of endeavor come together in engineering and science education research – we might call it STEAM Education or STEAM-E research, since it involves *sciences, technology, engineering, arts and mathematics educational practices*.

Research is essentially a pathway to building new knowledge that helps others. We will explore the basics of research methods by paying particular attention to environmental science and engineering education and leadership research. This course will help us advance thinking and processing of research practices.

We will be exploring the basics of research methods paying particular attention to environmental science and engineering education and leadership applications. This course will assist in building a stronger more inclusive professional engineering and science research self. It is appropriate at this time as we commence the fall semester to reflect on the words of MLK:

*" The function of education is to teach one to think intensively and to think critically. Intelligence plus character - that is the goal of true education."*

Those words can help guide us to sustain our thinking, our enterprise, and our hopes for bettering the lives of our loved ones, our friends, our colleagues, and our world.

**Catalog Course Description:** In this course, we will learn about the necessary tools used in research, primarily through hands-on activities. The course is an introduction to the different research methods and will be a very 'experiential' endeavor. We will be selecting a topic of your own interest for research and will target research assignments to learning more about that topic. This course will help analyze and evaluate research reports, and if you are in honors undergraduate or graduate studies this provide you with an excellent opportunity to advance progress towards your proposal, dissertation or thesis, and help you prepare for future research in general.

**Learning Objectives/Competencies and Assessment Methods:** By the end of the semester, students will be able to:

- Articulate strengths and weaknesses of quantitative, qualitative and mixed methods research approaches
- Develop and evaluate the quality of engineering education research questions
- Design appropriate projects to answer engineering education research questions
- Critique engineering education research designs
- Describe measures of quality in engineering education research, and
- Describe ethical considerations in the conduct and reporting of human subjects engineering education research.

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**Research Methods: ESE 6320 / EEL 5320 Course Organization & Requirements:**

Textbooks & Required Materials: Instructors will provide links to Course material to include case studies, online media sources for big ideas/concepts, and modules related to course topics.

Sources include:

Walliman, N. (2011). *Research Methods: The Basics*. New Yourk, NY: Routledge.

Ritchie, J. & Lewis, J. (2003). *Qualitative Research Practice*, Thousand Oaks, CA: Sage Publications.

McEwan, E. K., & McEwan, P. J. (2003). *Making sense of research*. Thousand Oaks, CA: Sage Publications.

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches*. Thousand Oaks, CA: Sage Publications.

Maxwell, J. A. (2013). *Qualitative research design: An interactive approach*. (3rd ed.). Thousand Oaks: SAGE.

- Merriam, S. B., & Tisdell, E. J. (2016). *Qualitative research: A guide to design and implementation*. (4th ed.). San Francisco: Jossey-Bass.
- Johnson, R. B., & Christensen, L. B. (2015). *Educational research: Quantitative, qualitative, and mixed approaches*. (5th ed.). Thousand Oaks: SAGE.
- Krueger, R. A., & Casey, M. A. (2009). *Focus groups: A practical guide for applied research* (4th ed.). Thousand Oaks, CA: SAGE Publications.
- Locke, L. F., Silverman, S. J., & Spirduso, W. W. (2010). *Reading and understanding research*. (3rd ed.). Thousand Oaks: SAGE.
- Rocco, T. S., & Plakhotnik, M. S. (2009). Literature reviews, conceptual frameworks, and theoretical frameworks: Terms, functions, and distinctions. *Human Resource Development Review*, 8(1), 120-130.
- Salkind, N. J. (2014). *Statistics for people who (think they) hate statistics*. (5th ed.). Los Angeles: SAGE.
- Stringer, E. T. (2014). *Action Research*. (4th ed.). Los Angeles: SAGE

**Course Organization:** The course content is divided into units, and this content will be covered in 15 weeks. There will be weekly discussions, individual and group activities, a final project, project presentation, and presentation feedback.

Detailed information about each activity will be provided within each unit at the beginning of each week. New units will be available to students on Saturdays and will remain open until Sunday night of the following week. Assignments are typically due Sundays at the end of the day [11:59 PM] unless otherwise noted.

**Class Time and Contact:** Class time and/or contact hours weekly: Contact time for the course is 3 hours. Contact time will be largely met by online asynchronous learning (faculty and invited readings, reviews, videos, moderated discussion forums, journals, blogs and quizzes). The class meets once a week for two hours in a live session. Students are expected to be present throughout the live sessions with both audio and video functionality. We will attempt also to test using a live-session, online synchronous activity (may include live class meetings, live office hours, or guided student discussion) with the course taught based on the flipped classroom design and a workshop mode. This design is based on research that clearly demonstrates that learning is enhanced when working actively as opposed to listening passively (as in a lecture). In order to make as much time as possible for active work in an asynchronous class, you are expected to prepare for class by doing all the reading, watching all the videos, and completing all required tasks (if any) before you attend class.

**Course Participation and Attendance:** Students enrolled in this course are required to read all current assignments and complete all other exercises and projects required for each lesson each class where the lesson is discussed. Since we are working asynchronously, your out-of-class assignments will be a substantive part of your work. The out-of-class workload for this course is approximately 6 hours and 30 minutes per week. Out-of-class assignments include: Readings (approximately 3 hours weekly), recorded lectures, videos, and quizzes (approximately 1 hour weekly), and written assignments (approximately 2.5 hours weekly).

**Online Discourses – also called Course Discussions:** We will get to know one another initially and then proceed to online course discussions, to provide a rich course experience for students. Online course discussions will be based on assigned material, such as readings and videos. Because some issues may be contentious, it is essential we respect each other's perspectives, so that everyone feels comfortable to share points of view; otherwise we limit our learning. However, as engaged students we must be prepared to substantiate our assertions, which can include appropriate referencing. The course discussions will take place to give students practice in discussing and working with colleagues in addressing real-world engineering design and systems issues. Also, it is common knowledge that students learn better and more when they discuss and apply information, especially with others. Refer to the course schedule for the topics that will be addressed.

Course discussions, journaling and blogs will account for 30% of the final grade, calculated by averaging all of the course discussions. The maximum number of points that a student can earn per discussion is 30 points if quality expectations are met. At a minimum, each student must post their answer and at least three replies per discussion. Students can respond to questions raised by either the instructors or classmates. Students can also raise their questions to both the instructor and the rest of the class. Quality expectations will be met if a student demonstrates at minimum one of the following:

- Learned from a reading, video or other content format provided
- Made a connection between a content/reading and current or future practice
- Substantiated his/her assertion
- Asked a critical question, or
- Provided a different perspective.

If a student participates but does not meet quality expectations, the student will earn no more than minimum credit per discussion. Whether or not a student meets quality expectations will be determined by the instructors' professional judgment. If a student does not participate, the student will not earn any points for the particular discussion.

As a beginning, discussions, journals and blogs will open on Saturdays, when the readings become available, and the first post is due by Wednesday and replies are due by the next Saturday, with the unit postings closing finally on Sunday close-of-day. The instructor will assess each posting as he/she reviews them for up three postings. Students are not limited to three postings, and the instructor will make every effort to review and respond to most postings.

**Additional Requirements for Online Discussions:**

1. Take time to think, reflect, and critically analyze questions and postings.
2. Simply agreeing or disagreeing with classmates using one sentence responses will NOT count as participation. Whether you agree or disagree, you must elaborate as to HOW and WHY you agree or disagree.
3. Be sure to proofread your writing before posting, reading the statement aloud to yourself before posting helps.
4. Be precise, concise, and clear on your postings.
5. Assertions must include at minimum a supportive argument and/or reference.
6. Limit your postings to a brief paragraph which is approximately five sentences or 10 lines of text or what usually fits in a screen.
7. Avoid asking “yes or no” discussion questions. Instead, ask questions of degree, questions of how, or why.
8. If you are addressing a question or response to a specific student or the instructor be sure to indicate so. Likewise, if you are directing your question or response to the instructor AND the whole class, indicate that, too.
9. Avoid use of jargon, acronyms, colloquialisms, hyperbole, insults, and personal attacks in your questions and responses. It is expected that there will be disagreement; however one does not need to be disagreeable. Participation must be centered on the readings and other course material.

**Note on Assignments:**

Assignments may be individual or group activities. Specifics on each assignment will be provided in each unit as needed. Make sure to write documents utilizing APA style and give credit to sources utilized.

**Quizzes:**

At the end of each course segment, there may on occasion be a Quiz. Quizzes are multiple choice. Questions are randomized.

**Course Grading Criteria:**

<b>Course Requirement</b>	<b>Percent</b>
Weekly discussions, Journals, Blogs	30%
Individual & Group Assignments & Quizzes	35%

End of Course Report	
[[Written Research Reports – {Doctoral Students: ADDED REQUIREMENTS*} ]]	20%
Final Presentation	10%
Final Presentation Feedback Forms	5%
<b>Total</b>	<b>100%</b>

**Notes:**

- The dates for research analyses, presentations, and the due date for report submission will be provided at least two weeks in advance.
- Communicating in written communications (reports) is critical
- Due referencing is an important aspect of graduate studies. When using articles, texts, websites of agencies or looking for information on the internet, reports, or any publication; written responses need to include references. Use *Times New Roman* font style, 12-point font size and double space.
- \* Doctoral Students will be responsible to complete full drafts of publishable journal documents. Undergraduates will complete second drafts of competently communicated and referenced documents.

**End of Course Case Study / Project:**

Students will be required to complete a final project, which will begin early in the semester with the weekly assignments. The End-of-Course Project should highlight your newly found experiences and outlooks about the topic in an APA-Style report. As the pieces of the project come together, the final deliverables include an APA-style plan and a multimedia presentation. More information will be provided as needed.

**Final Presentation and Feedback:** Each student or team will take their project and convert it into an online multimedia presentation. The presentation must address the appropriate student audience. Students are encouraged to use various media to share their ideas. These include, but are not limited to PowerPoint/Prezi Presentations, videos, and downloadable brochures. The presentation amounts to 100 points or 10% of the final course grade. Peer presentation feedback account for 5% of the final course grade.

The presentations must be uploaded to the appropriate discussion area so that the whole class can view the presentations. The following is the grading criteria for the presentations:

<b>Criteria</b>	<b>Max Points</b>
Effectively described the purpose and significance	20
Effectively provided the background and context	20
Effectively explained the proposed key items	20
Effectively addresses the subject and lessons learned	20
Effectively used audio/visual aids and addressed questions arising	20
<b>Total</b>	<b>100</b>

Rating Scale: Excellent=40, Very Good =35, Good= 30, Fair =25, Poor =20, Not Evident = 0

### Course Grading Scale:

Letter Grade	Percent
A	90%-100%
B	80%-89%
C	70%-79%
D	60%-69%
F	0%-59%

*Extra Credit:* The number of extra credit points and opportunities will be at the sole discretion of the instructor. Graduate students are excluded from extra credit opportunities.

**Students with Special Abilities | Students with Disabilities:** If you have or believe you have a disability that you may wish to self-identify in order to receive accommodations; you can do so by providing documentation to the Center for Accommodations and Support Services. Please, call 747-5148 or visit Room 106 of the Student Union East. You can also e-mail [cass@utep.edu](mailto:cass@utep.edu). Appropriate accommodations may then be provided for you.

**Incompletes:** An incomplete (“I”) will be given only when there is a documented medical or family emergency and only if the student has passed the first half of the course. If an incomplete is given, the student must make arrangements to complete the course with the instructors within five working days after the end of the term. If the student does not make arrangements with the instructors within five working days after the end of the term, an “F” for the course will be submitted.

**Drop Deadlines:** The last day to drop the course is March 29, 2018. Students are responsible for dropping the course or withdrawing from the university.

**Academic Integrity:** Cheating and plagiarism are graves breaches of standards of academic integrity. Any use of unauthorized assistance on exams, papers, homework assignments, or other course work constitutes cheating. Knowingly allowing other students to copy one's work is also a severe form of academic dishonesty.

Plagiarism consists of submitting written work that has been developed wholly or partially by someone else. Submitting written work in which the ideas of others have been duplicated or even paraphrased without proper reference to the author is also a form of plagiarism. The acquisition of term papers or other assignments from another source and subsequent presentation of these materials as the student's work is also considered plagiarism.



## Acceptable and Unacceptable Use of AI

The use of generative AI tools (e.g. ChatGPT, Dall-e, etc.) is permitted in this course for the following activities:

- Brainstorming and refining your ideas;
- Fine tuning your research questions;
- Finding information on your topic;
- Drafting an outline to organize your thoughts; and
- Checking grammar and style.

The use of generative AI tools is not permitted in this course for the following activities:

- Impersonating you in classroom contexts, such as by using the tool to compose discussion board prompts assigned to you or content that you put into a discussion board or chat.
- Completing group work that your group has assigned to you, unless it is mutually agreed upon that you may utilize the tool.
- Writing a draft of a writing assignment.
- Writing entire sentences, paragraphs or papers to complete class assignments.

You are responsible for the information you submit based on an AI query (for instance, that it does not violate intellectual property laws, or contain misinformation or unethical content).

Your use of AI tools must be properly documented and cited in order to stay within university policies on academic honesty. For example,

[https://owl.purdue.edu/owl/research\\_and\\_citation/apa\\_style/apa\\_formatting\\_and\\_style\\_guide/reference\\_list\\_basic\\_rules.html](https://owl.purdue.edu/owl/research_and_citation/apa_style/apa_formatting_and_style_guide/reference_list_basic_rules.html) for our disciplines. See these resources for APA guidance, and for other citation formats. Any assignment that is found to have used generative AI tools in unauthorized ways will lead to being dropped from this course. When in doubt about permitted usage, please ask for clarification.

The use of generative AI tools (such as ChatGPT, DALL-E, etc.) are not permitted in this class; therefore, any use of AI tools for work in this class may be considered a violation of Temple University's Academic Honesty policy and Student Conduct Code, since the work is not your own. The use of unauthorized AI tools will result in [insert the penalty here\*].

**Late Work Statement:** Every day that an assignment is late, the assignment may be reduced by a letter grade until the grade of "F" is reached. Late assignments may not be revised and resubmitted for a better grade.

**Course Evaluations:** Both a mid-course and final course evaluation will be conducted. Themed-course evaluation will be used to enable the instructors to make adjustments to the remainder of the course. The final evaluation is to evaluate the instructors and enable them to improve the course in subsequent semesters. Please, take the time to provide sufficient and constructive feedback. Thank you for your help!

**Grades at Midterm:** Students will be given an indication of their standing in the course on a regular basis via Blackboard and through the return of graded work on a timely basis, usually



within seven (7) days of a due date. Grades via Blackboard are only visible to the individual student, the instructors, and authorized graduate assistants.

**Technical Requirements:** For technical requirements for this course, please refer to the Getting Started link in the left side navigation. Technical Support For technical assistance, or support, for this course, please refer to the Technical Support link in the left side navigation.

**Course Copyright Notice:** Many of the materials that are posted within this course are protected by copyright law. These materials are only for the use of students enrolled in this course and only for this course. They may not be further retained or disseminated.