Syllabus for ELT-495

ELECTRONICS ENGINEERING TECHNOLOGY CAPSTONE

COURSE DESCRIPTION

The **Electronics Engineering Technology (EET) Capstone** is an in-depth, student-centered activity that requires the integration of theory and practical experience. Students will apply the skills and techniques they have learned to a specific project. In this Capstone course teams of students will design a project based on past academic, professional, and personal learning experiences that involves conducting research on a problem, issue, event, developing technology, or case study in the electronics engineering technology field. On successful completion of the course, students will have met the learning outcomes of the EET degree program.

Prerequisite: Completion of ELT-490: Electronic Assessment/Career Planning.

COURSE OBJECTIVES

After completing this course, you should be able to:

1. Review the criteria for accreditation by ABET's Technology Accreditation Commission, match them to the student outcomes of the electronics engineering technology program, and generate a capstone project that demonstrates mastery of the outcomes.
2. Design a capstone project based on past academic, professional, and personal learning experiences that involves conducting research on a problem, issue, event, developing technology, or case study in the electronics engineering technology field.
3. Demonstrate proficiency as an independent learner and critical thinker by preparing a comprehensive research paper on a problem, issue, event, developing technology, or case study.
4. Research, interpret, and critically analyze literature pertaining to the capstone project.
5. Synthesize research findings, theories, and practice into a comprehensive explanation and resolution of the problem, issue, event, developing technology, or case study.
6. Communicate effectively by making technical presentations in English using language appropriate to peers and other audiences.
7. Summarize the historical development, current state, and future direction of their field of study as related to the capstone project.
8. Function effectively as a team member with an understanding of cultural diversity.
9. Critique the professional, ethical, and social responsibilities in the electronics engineering technology field as it applies to the capstone project.

10. Submit an ethically responsible final project in an academic, professional format that serves as a bridge to their future work or employment.

COURSE MATERIALS

You will need the following materials to complete your coursework. Some course materials may be free, open source, or available from other providers. You can access free or open-source materials by clicking the links provided below or in the module details documents. To purchase course materials, please visit the University's textbook supplier.

- There are no textbooks required for the course.

Internet resources are included in each module for recommended readings and points to start Web searches for supporting information.

COURSE STRUCTURE

Electronics Engineering Technology Capstone is a four-credit online course, consisting of **six** modules. Modules include an overview, topics, learning objectives, study materials, and assignments. Module titles are listed below.

- **Module 1: Course Overview and EET Student Outcomes**
Course objectives covered in this module: CO1

- **Module 2: Organizing into Teams and Identifying a Capstone Project**
Course objectives covered in this module: CO2, CO8, CO9

- **Module 3: Research Methods and Literature Review**
Course objectives covered in this module: CO3, CO4, CO5

- **Module 4: Outline and Progress Report**
Course objectives covered in this module: CO1, CO2, CO3, CO4, CO5, CO8

- **Module 5: Presentation of Capstone Project Paper**
Course objectives covered in this module: CO6

- **Module 6: Submission of the Final Capstone Project Paper**
Course objectives covered in this module: CO7, CO10

BEFORE YOU START YOUR RESEARCH

One or more of the assignments in this course may involve original research. Research on persons other than yourself may require approval by the Institutional Review Board (IRB) of Thomas Edison State University prior to beginning your research. Examples of research types that may need IRB review are questionnaires, surveys, passive observation of individuals, interviews, and experimental procedures. Research involving vulnerable populations will always need IRB review. An IRB review is designed to protect research subjects from potential harm.

The following links fully explain the purpose of the Institutional Research Board as well as how to determine if your research requires IRB review. If you are in doubt, always ask for guidance from the University.

- Institutional Review Board (general)
- Types of IRB Review
- IRB Forms
- Policies and Procedures
- FAQs and Resources

ASSESSMENT METHODS

For your formal work in the course, you are required to participate in six discussion forums and complete three written assignments.

For your benefit in successfully completing the ELT-495 Capstone course keep the following key points in mind – **Student Outcomes** and **Course Calendar**.

1. The final Capstone Project / Paper will be graded by how well you fulfill each of the 12 **Student Outcomes** (SOs) denoted in the Course Rubric. It is imperative that you construct your Project/Paper from the outset with this goal in mind. The capstone project research effort needs to encompass each element of the criteria down to the sub-SO level where given, and the written report/research paper needs to reflect unambiguous statements regarding student demonstration of achievement and mastery of the EET SOs or sub-elements. To effectively demonstrate this linkage, you should list the ELT-495 Student Outcomes including the sub-elements, as an **Appendix** of the final paper, and then **note using superscripts** where each SO and sub-element is addressed within the body of the paper. Examples: use (SO 4.b) or (SO 8.a) in the superscript font to indicate where those sub-elements of the Student Outcomes are covered in the paper. In most cases it will be obvious within the context of the report where to reference the associated outcome. However, in some cases it may seem odd to include text in the body of the paper to address a specific SO, examples and suggestions follow. The bottom line is that ALL SOs and sub-elements must be referenced in the final Paper.

    - SO # 3 - “Demonstrate the ability to conduct standard tests and measurements in the lab or in the field …”. These sub-elements can be referenced in the paper as you report on your results of assimilating data and statistics.

    - SO # 5 - “Demonstrate effective leadership and participation as a member of a technical team”. These sub-elements should be described and appropriately footnoted in the Introduction of the paper.

    - SO # 9 - “Demonstrate the need for and commitment to engage in self-directed continuing professional development…”. This SO can be discussed and referenced in the Introduction or Conclusion of the paper. Consider including perspectives from each student.

    - SO # 12 - “Demonstrate a commitment to quality, timeliness, and continuous improvement…”. Each sub-element of this SO can be discussed and appropriately footnoted in the Introduction or Conclusion of the paper.

2. It is imperative that each student must complete all assignments of the course, including Discussion Forums and Written Assignments. If an individual does not submit an assignment, they will not receive a passing grade for the course. Completion of all assignments is necessary for mentors to evaluate your performance in all **Student Outcomes** and sub-elements designated for this course.

3. The **Course Calendar** is available from the course main menu. The Calendar is available in pdf or Excel format. The Course Calendar provides dates to start

each module and complete each assignment. It is important to complete each assignment before or by the due date to attain full credit. To stay current with all your assignments, I highly recommend that you maintain a copy of the Calendar with the week-by-week dates on it. Submitting assignments late adversely impacts your grades.

Promoting Originality

One or more of your course activities may utilize a tool designed to promote original work and evaluate your submissions for plagiarism. More information about this tool is available in this document.

Discussion Forums

This course requires you to participate in **six** graded discussion forums.

DF 1: Top Ranked Methods for Capstone Courses
DF 2: TESU and ABET Program and Student Outcomes
DF 3: Teaming
DF 4: Final Team Problem Statement
DF 5: Oral Project Presentation
DF 6: Project Presentation; Discussion and Constructive Critique

The following Group Discussion Board forums are required but ungraded. They contribute to your overall grade, however, because your mentor takes them into account when using the ELT-495 Grading Rubric to assess your work in this course.

Team Forum 1: Research Methodology and Team Participation
Team Forum 2: Progress Report 1
Team Forum 3: Progress Report 2

Members of your team will also participate in other discussion forums at various points in the course in order to complete course requirements.

Deadlines for posting discussion threads on the class Discussion Board are given in the Course Calendar.

For posting guidelines and additional help with discussion board assignments please see the Online Student Handbook located within the General Information section of the course Web site.

Written Assignments

You are required to complete three written assignments. The written assignments are steps in completing your final project paper, and in fact the last assignment is the project paper itself. These formal written assignments are supplemented by the discussion forums throughout the developmental stages of the project paper.

- WA 1: Problem Statement
- WA 2: Capstone Project Paper Outline
- WA 3: Final Capstone Project Paper

Before submitting your first assignment, check with your mentor to determine whether your word processing software is compatible with your mentor's software. If so, you can submit

your work as you prepared it. If it is not compatible, save your assignment as a rich-text (.rtf) file, using the Save As command of your software program. Rich text retains basic formatting and can be read by any other word processing program.

Final Written Assignments need to be posted in the Gradebook and/or Class Discussion Board only. Use the Group Discussion Board and File Exchange as the locations to post and critique draft documents.

See the Online Student Handbook for additional help regarding preparing and submitting assignments located within the General Information section of the course website.

Final Capstone Project Paper

You are required to complete a final project as a group for this capstone course. The ability to work effectively in a team is one of the program outcomes that each student should achieve. This course requires students to form a group and work collaboratively to select a final project topic and problem statement, research and identify the resources and references, draft the paper, present the paper, and finalize and submit the final paper as a group. The Groups area in this course provides you an online forum to discuss, share, critique, and elaborate among your group members. It is also an online space for you to demonstrate how well your group works together to complete your final paper.

Your final project includes five phases: select a problem statement, prepare a paper outline with bibliography, complete two progress reports, post an oral presentation as a video file, and submit the final paper. You are also required to post discussion comments and constructive criticism of other students' oral presentations on discussion forums.

As part of your final paper grade, you are also required to rate your team members' efforts in completing your final research paper. This will be an anonymous peer evaluation that requires you to download and complete a group evaluation form in Module 6. The mentor will average your peers' ratings, which will count toward 30 percent of your individual final paper grade. The mentor's grading of your team's final paper counts toward 70 of your individual final paper grade.

Your final paper should be 25 to 30 pages long excluding references and attachments. To review a sample final project paper (not in this subject area), go to the Resources area of the course site.

GRADING AND EVALUATION

Your grade in the course will be determined using the ELT-495 rubric. Be sure to review each element of the Rubric to understand the criteria and details that will be used to assess your final grade. You will find this rubric in the Rubrics area of the course Web site.

Key elements of the course that will be used to determine your final grade include:

- **Problem Statement**—5%
- **Paper Outline**—10%
- **Paper Presentation and Discussions**—20%
- **Other Class Discussions**—15%
- **Final Project**—50%

Keep in mind that the final project paper will count as 50% of your final course grade. The remaining 50% of your course grade will be determined by your class interactions, products, discussion forums, and written assignments.

Overall course evaluation will be based on the attached rubric which is based on TESU and ABET guidelines and approved Student Outcomes of the TESU EET Program. All 12 Student Outcomes described in the rubric will be used to evaluate each student. Each student will be evaluated on each Student Outcome based on the quality, quantity, participation, and responses they employ to satisfy the specific course objectives and assignments.

1. Student Outcome 1: Demonstrate a fundamental mastery of the knowledge, techniques, skills and modern tools required for electronics and/or related fields.
2. Student Outcome 2: Demonstrate an ability to understand and apply current concepts in the areas of mathematics, science, engineering, and technology to problems / issues encountered using proper application of principles and applied procedures or methodologies.
3. Student Outcome 3: Demonstrate the ability to conduct standard tests and measurements in the lab or in the field; similarly, to conduct, analyze, and interpret experiments; and apply results to resolve technical challenges and improve processes.
4. Student Outcome 4:Demonstrate the ability to design or redesign systems, components or processes appropriate for the challenges encountered.
5. Student Outcome 5: Demonstrate effective leadership and participation as a member of a technical team.
6. Student Outcome 6: Demonstrate a capability to solve technical problems through proper identification, research, and systematic analysis of the issue.
7. Student Outcome 7: Demonstrate proficiency in oral, written, and graphical communications in a technical and non-technical setting utilizing standard English.
8. Student Outcome 8: Demonstrate an ability to identify and use appropriate technical literature, documents and procedures.
9. Student Outcome 9: Demonstrate the need for and commitment to engage in self-directed continuing professional development and lifelong learning in one's discipline.
10. Student Outcome 10: Demonstrate professional, ethical, and social responsibilities within the electronics field, while recognizing differences due to culture and diversity.
11. Student Outcome 11: Demonstrate recognition of the impacts of electronics technology solutions in an expanding societal and global context.
12. Student Outcome 12: Demonstrate a commitment to quality, timeliness, and continuous improvement in professional activities.

Based on your demonstrated accomplishments and score for each Student Outcome, your results will be entered into the EET 495 Course Rubric.

All activities will receive a numerical grade of 0–100. You will receive a score of 0 for any work not submitted. Your final grade in the course will be a letter grade. Letter grade equivalents for numerical grades are as follows:

A	= 93–100	C+	= 78–79
A–	= 90–92	C	= 73–77
B+	= 88–89	C–	= 70–72
B	= 83–87	D	= 60–69
B–	= 80–82	F	= Below 60

To receive credit for the course, you must earn a letter grade of C or better (for an area of study course) or D or better (for a course not in your area of study), based on the weighted

average of all assigned course work (e.g., exams, assignments, discussion postings, etc.).

STRATEGIES FOR SUCCESS

First Steps to Success

To succeed in this course, take the following first steps:

- Read carefully the entire Syllabus, making sure that all aspects of the course are clear to you and that you have all the materials required for the course.
- Take time to read the entire Online Student Handbook. The Handbook answers many questions about how to proceed through the course and how to get the most from your educational experience at Thomas Edison State University.
- Familiarize yourself with the learning management systems environment—how to navigate it and what the various course areas contain. If you know what to expect as you navigate the course, you can better pace yourself and complete the work on time.
- If you are not familiar with Web-based learning be sure to review the processes for posting responses online and submitting assignments before class begins.

Study Tips

Consider the following study tips for success:

- To stay on track throughout the course, begin each week by consulting the Course Calendar. The Calendar provides an overview of the course and indicates due dates for submitting assignments, posting discussions, and scheduling and taking examinations.
- Check Announcements regularly for new course information.

ACADEMIC POLICIES

To ensure success in all your academic endeavors and coursework at Thomas Edison State University, familiarize yourself with all administrative and academic policies including those related to academic integrity, course late submissions, course extensions, and grading policies.

For more, see:

- University-wide policies
- Undergraduate course policies and regulations
- Graduate academic policies
- Nursing student policies
- Academic code of conduct