

Writing Plan for the Bachelor of Computer Engineering Programs

Background

This document details the writing plan for the computer engineering undergraduate program, herein referred to as the “CMPE Program”. The program is offered by the Department of Electrical & Computer Engineering (ECE).

The computer engineering program, created in Fall 2000 and continually accredited by ABET (Accreditation Board for Engineering & Technology, Inc.) since 2004, was officially the “Computer Engineering Option” within the electrical engineering program. Students in this program option received the B.E.E. degree, but their major area of study was designated by Auburn University as “computer engineering”, denoted as ECPE on the student transcript, class rolls, and other documents. This program option was the subject of a separate Computer Engineering Program self-study report for ABET. The computer engineering option transitioned to a program in its own right, the Computer Engineering Program, in Fall 2018. The first ABET review for this new program is scheduled for 2022.

Writing Related Outcomes

ABET has recently revised the student outcomes requirements. There is still a communication component to their student outcomes. ABET Criterion 3 Outcome 3 states that “Graduates of the program must demonstrate an ability to communicate effectively with a wide range of audiences.” This revision, focusing on “a range of audiences”, meshes well with Auburn University’s communication expectations.

Feedback from stakeholders in our programs—our graduates and their employers—continues to indicate that communication ability is a very important attribute. This attribute is reflected in one of our Program Educational Objectives (updated Spring 2017):

PEO#2: Graduates of the CMPE Program will be recognized as effective communicators, in a variety of communication modes, to a variety of audiences, both technical and nontechnical.

The ECE department’s strategy to achieve the writing-related portion of the ABET outcome and the PEO employs three features: (1) require writing throughout the curriculum, (2) require writing for a variety of purposes and audiences, and (3) provide feedback and opportunities for revision.

Process

Communication activities are integrated into a number of key ELEC courses in the curriculum. This is indicated in Figure 1, which maps required courses in the CMPE program that contain a significant writing component. The arrows indicate prerequisite structure. All core laboratory

Background gives pertinent information that helps those outside the discipline understand why a new writing plan is necessary.

Shows connection between external accreditation standards and Auburn’s writing initiative. Continues this linkage throughout the discussion of the program’s relevant student learning outcome.

Shows that significant writing experiences happen across the entire major.

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courses have technical writing components, leading up to the senior year capstone design experience, in which written communications is a significant component. Students receive feedback and recommendations for improvement from the faculty at all stages of these activities. Many upper-level courses also have term projects that require written and/or oral reports. These existing efforts, along with the existing assessment process, satisfy the requirements of Writing in the Majors.

In the 2019/2020 academic year, the department will phase out the existing senior design experience, ELEC 4000 Senior Design Projects, which is a single semester, 3 credit-hour course. This will be replaced by a two consecutive-semester sequence; ELEC 4010 Capstone Design I (a 1 credit course) and ELEC 4020 Capstone Design II (a 3 credit course). This change is motivated by our need for a more significant team-based design experience. The change also brings us in line with most other accredited engineering programs that have a two-semester capstone experience. Written communication is a key component of both ELEC 4010 and ELEC 4020.

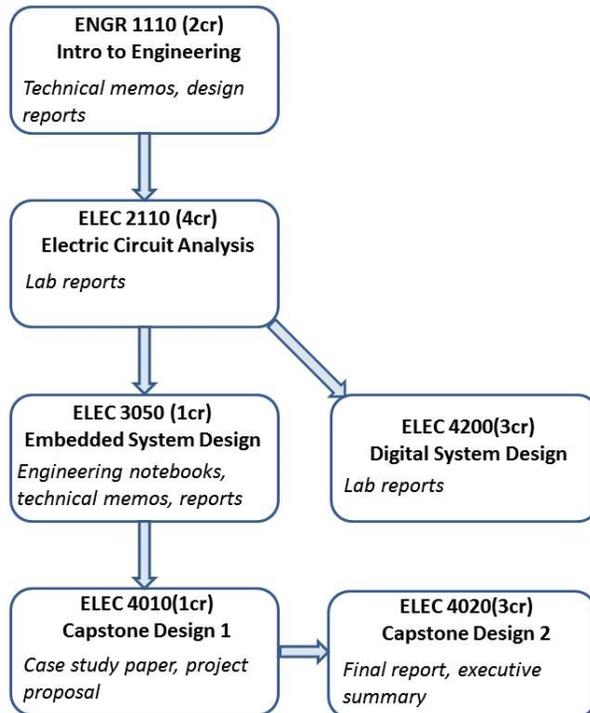


Figure 1:CMPE courses with writing component



Names more than one kind of writing that the students encounter.

Demonstrates that feedback and opportunities to revise exist across different activities and different stages.

Additional kinds of writing named showing range.

Visual representation of curriculum is easy for outsiders to follow and shows how the specific genres named earlier connect to specific courses.

Implementation of Principles in Writing Plan for CMPE Majors

1. The plan includes *more than one kind of writing*, including summary memos, technical memos, lab reports, engineering notebooks, proposals, and design reports.
 - a. ENGR 1110 students write summary/analysis memos, technical memos, and a technical design report.
 - b. ELEC 2110 students prepare laboratory reports.
 - c. ELEC 3050 students maintain engineering notebooks, write technical memos and reports.
 - d. ELEC 4200 students write reports for individual labs.
 - e. ELEC 4010 students write a case student paper dealing with engineering ethics and professionalism. They also prepare a design proposal.
 - f. ELEC 4020 students prepare a final report.
2. The plan provides for *more than one opportunity* for students to write. Student writing is a significant part of the learning experience and constitutes significant deliverables in ENGR 1110, ELEC 2110, ELEC 3050, ELEC 4200, ELEC 4010 and ELEC 4020. Every graduate in every program passes no less than six core courses that require writing.
3. The plan includes students writing for *different purposes and audiences*. Students write to summarize presentations, reflect, explain technical concepts, interpret lab results, and justify design decisions and tradeoffs. Audiences include general audiences, professors, immediate supervisors, and upper-level executives.
 - a. ENGR 1110 students write memos to a general audience to summarize and reflect, lab reports to an immediate supervisor to interpret lab results, and a design report to a supervisor along with an executive summary to nontechnical management.
 - b. ELEC 2110 students prepare laboratory reports for a technical supervisor.
 - c. ELEC 3050 students maintain engineering notebooks for a peer audience, and write memos to a technical supervisor.
 - d. ELEC 4200 students write lab reports for a technical supervisor.
 - e. ELEC 4010 students write a project proposal to a supervisor
 - f. ELEC 4020 students write a final design report to a supervisor and an executive summary of the design report for nontechnical management.
4. The plan gives students experience in *revising* their written work based on feedback from the instructor. Lab reports are given feedback and returned, and final design reports are written after feedback on a preliminary report or proposal.
 - a. ENGR 1110 students submit two professional development memos. The first one is returned with feedback so that students can improve the second one. Students who fail to write with standard written English are referred to the Miller Writing Center for remedial assistance. Lab reports are evaluated and returned to provide feedback for subsequent reports. A preliminary design report is given feedback on both the form of the report and the design plan that is incorporated into the final design report.



Provides an easy-to-follow summary of the writing principles aligned to key courses in the major. Additional detail is provided so that reviewers have both a broad understanding and specific details.

Different kinds of audiences and purposes are identified and in the list below, connected to specific courses.

- b. ELEC 3050 students submit multiple technical memos (progress reports). The cycle of feedback and improvement is similar to that in ENGR 1110.
 - c. ELEC 4200 students receive feedback on regular lab reports to help them with subsequent reports.
 - d. ELEC 4200 students receive feedback on regular lab reports to help them with subsequent reports.
 - e. ELEC 4010 students are given feedback on a proposal so that they can incorporate revisions in the form as well as the design plan of the final design report.
 - f. ELEC 4020 students are given feedback on a proposal so that they can incorporate revisions in the form as well as the design plan of the final design report.
5. The plan includes an *assessment process* that helps the faculty determine how to improve the effectiveness of the writing experience in the major. This process is detailed in the next section.

Assessment Process

Our assessment process includes procedures for collecting data relevant to writing in the major, evaluating and analyzing the data, implementing strategic modifications to improve the writing experience, and changing the assessment process itself. This process has been in place in an evolving manner for several years as part of our ABET accreditation process.

Currently, writing is assessed yearly in the following courses:

- ELEC 3050 – Final Lab Report
- ELEC 4010 – Design Project Proposal
- ELEC 4020 – Design Project Final Report

The assessments are performed using a rubric that evaluates Content, Organization, Style, Grammar, Figures/Tables, and Use of Sources. This rubric is shown in the appendix. Our success metric for these writing experiences is an average of at least 3 (defined as “meets expectations”) on each performance indicator. Other feedback, such as surveys from graduates and alumni and feedback from the ECE Industrial Advisory Board, are considered as they become available.

Continual Improvement

The Electrical & Computer Engineering Department embraces the continual improvement required for ABET-accredited programs. It has a standing curriculum and assessment committee for program assessment and improvement for ELEC, CMPE, and WIRE majors. The committee generally meets several times each semester to oversee the data collection process and then to compile and analyze the results and to consider other forms of feedback as well. Evaluation of the assessment data contributes to program improvements.

The assessment process is well explained and makes reference to a rubric that is included as an appendix. The language, tone, and level of detail conveys a good understanding of assessment processes and give reviewers confidence that this process matches actual practice in the program.



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Appendix

Student Outcome (3-w) – *Written Communication*

An ability to communicate effectively with a range of audiences..

		Rubric			
		1 – Unsatisfactory	2 – Developing	3 – Meets expectations	4 – Exceeds expectations
Performance Indicators	a. Content	Inconsistent or few details that may interfere with the meaning of the text.	Some details, but may include extraneous or loosely related material.	Provides adequate supporting detail to support solution/argument.	Provides ample supporting detail to support solution/argument.
	b. Organization	Little evidence of organization or any sense of wholeness and completeness.	Little completeness and wholeness, though organization is attempted.	Organizational pattern is logical and conveys completeness and wholeness with few lapses.	Organizational pattern is logical and conveys completeness and wholeness.
	c. Style	Limited or inappropriate vocabulary for the intended audience and purpose.	Limited and predictable vocabulary, perhaps not appropriate for intended audience and purpose.	Uses effective language and appropriate word choices for intended audience and purpose.	Uses effective language; makes engaging, appropriate word choices for audience and purpose.
	d. Grammar	Does not follow rules of standard English.	Generally does not follow the rules for standard English.	Generally follows the rules for standard English	Consistently follows the rules of standard English.
	e. Figures/Tables	Figures and tables do not support the text, or are poorly designed.	Figures and tables sometimes support the text, and sometimes well designed.	Figures and tables generally support the text, and are usually well designed.	Figures and tables always support the text, and are well designed.
	f. Use of sources	Sources consistently not cited for material used in the report.	Sources not cited for some material used in the report, or inappropriate sources cited.	Sources cited for material used in the report. Most of the sources are appropriate to support the discussion.	Sources cited for material used in the report. All sources support the discussion.

This is a rubric with specific performance indicators across a number of features. While this might not be the level of detail or the features that reviewers are familiar with from their own disciplines, there is enough detail in this rubric to give reviewers confidence that those who use it know how to recognize the differences in performance.