

Experiential Learning Course Proposal Cover Sheet

Program/Department/School Submitting Proposal Applied Engineering Date Submitted 1/20/2016

Contact Person Brian T. Gardner E-mail btgardne@kent.edu Phone 330-672-3968

Course Number/Title TECH 46000 Computer Engineering Technology Capstone # of Credits 3

Check one:

- New Proposal Resubmission with Revision (Date of Original Submission: _____)
 Renewal of Approved ELR Section

Check one:

- Request for Section and Full Course Approval Request for Full Course Approval Only
 Request for Section Approval Only

Select Appropriate Experiential Learning Category/Categories: [] Civic Engagement,
[] Creative/Artistic Activities, [] Practical Experiences, [] Research, [] Study Abroad/Away

INFORMATION NEEDED FOR SECTION APPROVAL ONLY:

Faculty Member of Record: Brian T. Gardner

CRN: 20957 Section #: 001 Semester/Yr: Fall / 2016

APPROVAL ROUTING: Check one and obtain associated signatures

Kent Campus and Regional Campus- FULL-COURSE approval if housed on Kent Campus

Chair/Director: _____ Date: _____

Date Approved by College Curriculum Committee: 23rd October 2015

Dean: _____ Date: _____

Kent Campus and Regional Campus, Section Approval ONLY

Chair/Director: _____ Date: 11th February 2016

URCC College Representative: _____ Date: 11th February 2016

RC ONLY:

Asst. or Assoc. Dean: _____ Date: _____

REGIONAL COLLEGE SECTION AND FULL-COURSE Approval

Asst. or Assoc. Dean: _____ Date: _____

RC Assoc. Provost & Dean: _____ Date: _____

SECTION ONLY:

URCC College Representative: _____ Date: _____

Supplement to ELR Course Proposal Cover Sheet

Course Subject/Number/Title: TECH 46000 – Computer Engineering Technology Capstone

Credit Hours: 3

Prerequisite(s): A minimum grade of C in TECH 46330 or an equivalent object oriented programming language, senior standing.

1. Describe how the course provides opportunities for students to:

- **Connect ideas, concepts, and skills developed at the university with their applications to new and different contexts;**
- **Demonstrate how this experience has broadened their understanding of the discipline, the world, or themselves as learners; and**
- **Reflect on the meaning of the experience for their current and future learning.**

The course, TECH 46000, guides the successful student learner through an integrative experience, applying aspects of the student's required coursework in Computer Engineering Technology (CET), requiring them to draw on their experiences to succeed. This course provides students with the experience needed to develop requirements engineering specifications for a practical problem in networking and or telecommunications related projects within the CET area of concentration that ultimately lead to a paper mock-up of an integrated system.

By uniting the various topics learned in CET coursework, the student learner can see the entire Computer Engineering Technology field as a single entity in its completed, functional state. By placing real-world expectations on the final integrated system, the student learner extends the technical experience into one that serves the needs of an ideal organization. This aspect of the course drives the student to understand the human interaction with a system fully in order for the system to meet the requirements set forth by the ideal organization.

Students will also complete a reflective essay. The essay is an opportunity for students to reflect on the meaning of their capstone experience for their current and future learning. Questions which should be answered in the reflective essay include (but are not limited to)

1. Which part of the process for course assignments did you put the most effort into? Which part of the process for course assignments do you wish you had spent more time on?
2. What was the *most* difficult part of this course? Were there topics/courses that were missing from your previous coursework which could have better prepared you for this class?
3. What was the biggest problem you encountered during this course? How successful were you in solving that problem? What tools did you use? What might you have done better if experiencing a similar situation in the future?
4. What did you learn about yourself as an Applied Engineering major (or about Computer Engineering Technology in general) in the process of completing this course?
5. How does the completion of this course prepare you for future career opportunities?
6. How do you feel the ideas, concepts and skills developed throughout the course have prepared you for new experiences in Computer Engineering Technology?
7. How do you feel this course has broadened your understanding of Computer Engineering Technology, the world, or yourself as a learner?

2. Explain how the three learning outcomes will be assessed:

- **Connect ideas, concepts, and skills developed at the university with their applications to new and different contexts;**
- **Demonstrate how this experience has broadened their understanding of the discipline, the world, or themselves as learners; and**
- **Reflect on the meaning of the experience for their current and future learning.**

Students should be able to apply systems engineering and design principles to develop the conceptual design of an integrated computing environment. Students should also be able to estimate technology system performance and cost to select appropriate hardware and designs. These will be evaluated as part of the preliminary design review.

Students will develop a written report that fully describes and illustrates the conceptual design and the design system performance characteristics and capabilities that will be assessed in the final report of the developed system.

Students will complete a graded reflective essay documenting how this course shaped their understanding of the discipline and its effects on their current and future learning.

3. In what ways will your unit communicate expectations described in this proposal to faculty who will be teaching this course? In what ways will your unit maintain standards across multiple sections and over time as instructors change?

The unit will maintain an approved list of full time qualified faculty who are aware of the scope of the Computer Engineering Technology concentration, from bookend course to bookend course. These faculty will remain aware of current trends in industry and will communicate course adjustments to meet these changes to other approved faculty. Faculty teaching multiple sections shall meet once prior to the beginning of each semester to exchange ideas and thoughts on the topics within the course that will facilitate a sufficiently concerted effort on the part of all involved faculty. A periodic BDS review every three years will integrate the incremental updates developed by the group of involved faculty.

SYLLABUS
Computer Engineering Technology Capstone TECH 46000
College of Applied Engineering, Sustainability and Technology - Fall AY 2016-17

Instructor:	Brian T. Gardner	Office:	ATB 220X
Phone:	330-672-3968	Email:	btgardne@kent.edu
Meeting Times:	TBA	Office Hours:	TBA

Course Title, Number

Computer Engineering Technology Capstone TECH 46000

Description

TECH 46000, Computer Engineering Technology (CET) Capstone provides students with an integrative experience, applying aspects of the student's required coursework in CET. This course provides students with the experience to develop requirements engineering specifications for a practical problem in networking and or telecommunications related projects within the computer engineering technology concentration. This course will address emerging issues, capabilities, and challenges in the current field of study.

Course Prerequisites

Senior standing and a minimum grade of C in TECH 46330 – Visual Basic Programming in Engineering or an equivalent object oriented programming language. Students attending the course who do not have the proper prerequisite will risk being deregistered from the class.

Course Objectives

This course is the significant culminating learning experience in the Computer Engineering Technology concentration. It applies the critical thinking, mathematics, and scientific principles learned during the student's program of study to generate an initial design concept of a fully integrated and networked computing environment that meets required specifications. It also incorporates student exposure to some of the non-engineering aspects of engineering design: value proposition, regulatory compliance, program management, etc.

This supports the university mission to discover, create, apply, and share knowledge, as well as allowing students to expand their intellectual horizons. The course also supports the program mission statement to prepare students to enter the field of computer engineering technology with an emphasis placed on the application of scientific and engineering knowledge, combined with technical skills and practical experiences.

Students should have a firm grasp of how to accomplish the following at the conclusion of the course:

- How to identify and work with stakeholders
- Requirements elicitation using a variety of techniques
- Requirements modeling, prototyping, validation, management, communication and specification
- How to functionally integrate the various overlapping computer engineering technologies learned thus far

Course Requirements

- Class participation and attendance
- A firm understanding of Computer Engineering Technology material covered thus far

Required Textbook

Title: Systems Engineering Principles and Practice

Authors: Kossiakoff, Sweet, Seymour, & Biemer

Publisher: Wiley (most recent edition)

ISBN 13: 978-0-470-40548-2

Course Content Outline

1	1/23	Course Introduction
2	1/30	RE in Context
3	2/6	RE Overview
4	2/13	Elicitation Techniques
5	2/20	Modeling & Prototyping
6	2/27	Specification & Validation
7	3/5	Prioritization & Negotiation
8	3/12	Interdependency & Traceability
9	3/19	Communication
--	3/26	SPRING BREAK – NO CLASS
10	4/2	Documentation
11	4/9	Special Topics & Case Study Presentations
12	4/16	Problem & Solution Domains & Case Study Presentations
13	4/23	Quality Assurance & Review
14	4/30	Change & Management
15	5/7	Final Presentation

Attendance Policy

The content of this course builds upon itself. Failure to participate will put a student at a severe disadvantage for the remainder of the class. If you miss, or know that you will miss a session, you must notify the instructor as soon as possible. Unexcused absences will result in a reduction of the Attendance and Participation portion of the student's overall grade.

Evaluation Criteria

This is a design course and intended to serve as the capstone experience in the Computer Engineering Technology program. There are no scheduled examinations. There are two oral presentations. The first is a case study. The second is a cumulative and comprehensive design report, which serves as the course final examination. The report is limited to 100-pages of double-spaced text, using a Times New Roman or Calibri font, 11 or 12-point. The final report is due no later than 3:00p.m. on the Tuesday of Finals Week: May 10, 2016.

A goal of this course is to produce an integrative computer networking system that reflects the scaled design requirements of various enterprise class organizations.

Students will also complete a reflective essay. The reflective essay must be 2-3 double-spaced pages; Times New Roman, 11 or 12-point font. The essay is an opportunity for the student to reflect on the meaning of their capstone experience for their current and future learning.

Questions which should be answered in the reflective essay include (but are not limited to)

1. Which part of the process for course assignments did you put the most effort into? Which part of the process for course assignments do you wish you had spent more time on?
2. What was the *most* difficult part of this course? Were there topics/courses that were missing from your previous coursework which could have prepared you better for this class?
3. What was the biggest problem that you encountered during this course? How successful were you in solving that problem? What tools did you use? What might you have done better if experiencing a similar situation in the future?
4. What did you learn about yourself as an Applied Engineering major (or about Computer Engineering Technology in general) in the process of completing this course?
5. How does the completion of this course prepare you for future career opportunities?
6. How do you feel the ideas, concepts and skills developed throughout the course have prepared you for new experiences in Computer Engineering Technology?
7. How do you feel this course has broadened your understanding of Computer Engineering Technology, the world, or yourself as a learner?

Grading system:

Course graded requirements and their weights are presented in the following table. Homework is an individual effort, unless otherwise specified. Design reviews and project reports are group efforts; however, student grades will be assigned based upon an individual's contribution to the overall effort.

Requirement	Points	Weight
Reflective Essay	50	5.0%
Class Participation	100	10.0%
Case Study	50	5.0%
Requirements Analysis	100	10.0%
Preliminary Design Review	150	15.0%
Final Design Review	150	15.0%
Homework Submissions	150	15.0%
Final Report – Research Project	250	25.0%
Total	1000	100%

A maximum of 100 points will be assigned for participation. The final class participation grade will mainly be calculated as a percentage of classes attended.

Grading Scale

A+ 966.7 – 1000 (4.00)	C+ 766.7 – 799.9 (2.33)
A 933.3 – 966.6 (4.00)	C 733.3 – 766.6 (2.00)
A- 900.0 – 933.2 (3.67)	C- 700.0 – 733.2 (1.67)
B+ 866.7 – 899.9 (3.33)	D+ 666.7 – 699.9 (1.33)
B 833.3 – 866.6 (3.00)	D 633.3 – 666.6 (1.00)
B- 800.0 – 833.2 (2.67)	F 599.9 and below (0.00)

Case Study

The case study will be a work of original research conducted by each student working alone. There are no group options here. The case study will focus on one complete computer engineering project from an outside source. Each student will submit their top five choices of engineering projects that they would be interested in studying. Students should use library search resources to find material with which to study. The case study is worth 30% of the total course grade.

Research Project and Presentation

The research project will be a work of original research conducted by each student group. The research project will have the students present a paper mock-up of a complete computer engineering project, from conception to completion. The projects will be assigned by the instructor in the second week of class when the groups are chosen. The research project and its presentation is worth 30% of the course grade. The research project will conform to the following criteria if a student expects to achieve full points for their work:

- The paper will be no less than 12 pages, not including the bibliography, title page and table of contents
- The paper will include a title page, table of contents, body and bibliography
- The body of the paper will have at least four diagrams
- The diagrams should not occupy more than 25% of the space of the body of the paper
- The paper will conform to current APA or IEEE formatting rules
- The paper will be submitted before Friday at midnight of the 13th week of class.
- The presentations will begin in the 14th week and continue until complete
- The paper will contain original work that elucidates the following:
 1. What high level design approach is used to create the end result?
 2. What steps were taken to bring the design from concept to implementation?
 3. What human capital structure is required to implement the end result?
 4. What human capital structure is required to maintain/operate the end result?
 5. What steps were taken to ensure that the requirements were properly elicited?

Course Learning Objectives	Supports General Program Outcomes	Experiential Learning Requirement
<p>1. Students should be able to apply systems engineering and design principles to develop the conceptual design of an integrated computing environment. <i>(Assessment: homework, design reviews, final report).</i></p>	<ul style="list-style-type: none"> a. Ability to apply knowledge of mathematics, science and applied sciences to information technology disciplines b. Ability to analyze and interpret data d. An understanding of professional and ethical decision-making h. An ability to use the techniques, skills, and modern technology necessary for professional practice j. An ability to apply pertinent knowledge in identifying and solving problems 	<p>1. Connect ideas, concepts, and skills developed at the university with their applications to new and different contexts.</p>
<p>2. Students should be able to estimate technology system performance and cost to select appropriate hardware and designs. <i>(Assessment: homework, design reviews).</i></p>	<ul style="list-style-type: none"> a. Ability to apply knowledge of mathematics, science and applied sciences to information technology disciplines b. Ability to analyze and interpret data j. An ability to use the techniques, skills, and modern technology necessary for professional practice 	<p>1. Connect ideas, concepts, and skills developed at the university with their applications to new and different contexts.</p>
<p>3. Students should be able to apply knowledge of computer and network systems from previous coursework to determine the optimum design solution to satisfy RFP requirements. <i>(Assessment: homework, design reviews, final report).</i></p>	<ul style="list-style-type: none"> a. Ability to apply knowledge of mathematics, science and applied sciences to information technology disciplines b. Ability to analyze and interpret data d. An understanding of professional and ethical decision-making f. A recognition of the need for, and an ability to engage in, life-long learning g. A knowledge of contemporary issues h. An ability to use the techniques, skills, and 	<p>1. Connect ideas, concepts, and skills developed at the university with their applications to new and different contexts.</p>

Course Learning Objectives	Supports General Program Outcomes	Experiential Learning Requirement
	<p>modern technology necessary for professional practice</p> <p>j. An ability to apply pertinent knowledge in identifying and solving problems</p>	
<p>4. Students should be able to work as a member of an Integrated Product Team (IPT) to identify and solve design and implementation problems. <i>(Assessment: design reviews, final report).</i></p>	<p>b. Ability to analyze and interpret data</p> <p>c. Ability to work effectively on multi-disciplinary & diverse teams</p> <p>d. An understanding of professional and ethical decision-making</p> <p>e. An ability to communicate effectively, using both written and oral communication skills</p> <p>g. A knowledge of contemporary issues</p> <p>j. An ability to apply pertinent knowledge in identifying and solving problems</p>	<p>1. Connect ideas, concepts, and skills developed at the university with their applications to new and different contexts.</p> <p>2. Describe how this experience has broadened their understanding of the discipline, the world, or themselves as learners.</p>
<p>5. Students will develop a written report that fully describes and illustrates the conceptual design and the design system performance characteristics and capabilities. <i>(Assessment: final report).</i></p>	<p>e. An ability to communicate effectively, using both written and oral communication skills</p>	<p>1. Connect ideas, concepts, and skills developed at the university with their applications to new and different contexts.</p>
<p>6. Students will complete a reflective essay documenting how this course shaped their understanding of the discipline and its effects on their current and future learning. <i>(Assessment: reflective essay).</i></p>	<p>f. A recognition of the need for, and an ability to engage in, life-long learning</p> <p>g. A knowledge of contemporary issues</p> <p>h. An ability to use the techniques, skills, and modern technology necessary for professional practice</p>	<p>2. Describe how this experience has broadened their understanding of the discipline, the world, or themselves as learners</p> <p>3. Reflect on the meaning of the experience for their current and future learning</p>

Notice of Copyright and Intellectual Property Rights:

Any intellectual property (IP) displayed or distributed to students during this course (including but not limited to slides, notes, quizzes, and examinations by the professor remains the (IP) of the same. This means that the student may not distribute, publish or provide such IP to any other person or entity for any reason, commercial or otherwise, without the express written permission of the professor.

Academic Honesty

Cheating means to misrepresent the source, nature, or other conditions of your academic work (e.g., tests, papers, projects, assignments) so as to get underserved credit. The use of the intellectual property of others without giving them appropriate credit is a serious academic offense. The University considers cheating and plagiarism very serious offenses and provides for sanctions up to and including dismissal from the University or revocation of a degree. The University's administrative policy and procedures regarding student cheating and plagiarism can be found in the University Policy Register, Chapter 3 - 01.8. By submitting any material in this (or any other class) you are certifying that it is free of plagiarism. If you would like more information on plagiarism, what it is, and how to avoid it, please visit the following site: <http://www.kent.edu/academics/resources/plagiarism/>

- Students must complete all individually assigned work ALONE, unless otherwise noted.
- If the submitted work is the result of a collaborative effort, names of all members and contributors must be clearly indicated.
- If references are used, proper citation is necessary. I prefer a paper full of cited references than one with plagiarized material.
- **Students cannot receive academic credit for this course unless they have submitted a signed honor contract.**

Withdrawal Deadline

For Fall and Spring semesters, the course withdrawal deadline is always the Sunday following the 10th week of the semester. For Intersession, the course withdrawal deadline is always the Sunday following the second week (of three total). For Summer I and III, the course withdrawal deadline is usually the Sunday following the second week (of five total). For Summer II, the course withdrawal deadline is usually the Sunday following the fourth week (of eight total). More information is available on the University Registrar's web site <http://www.kent.edu/registrar/index.cfm>

Students with Disabilities

University policy 3-01.3 requires that students with disabilities be provided reasonable accommodations to ensure their equal access to course content. If you have a documented disability and require accommodations, please contact the instructor at the beginning of the semester to make arrangements for necessary classroom adjustments. Please note, you must first verify your eligibility for these through Student Accessibility Services (contact 330-672-3391 or visit www.kent.edu/sas for more information on registration procedures).

Proper Enrollment

Students have responsibility to ensure they are properly enrolled in classes. You are advised to review your official class schedule (using Student Tools in FlashLine) during the first two weeks of the semester to ensure you are properly enrolled in this class and section. Should you find an error in your class schedule, you have until (*date will be provided by the Undergraduate Office in advance*) to correct the error with your advising office. If registration errors are not corrected by this date and you continue to attend and participate in classes for which you are not officially enrolled, you are advised now that you will not receive a grade at the conclusion of the semester for any class in which you are not properly registered.