THE OHIO STATE UNIVERSITY

College of Engineering

Undergraduate Education & Student Services

122 Hitchcock Hall
2070 Neil Avenue
Columbus, OH 43210-1278

614-292-2651 Phone
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engineering.osu.edu

Memo

To: Randy Smith, Vice Provost for Academic Programs, Office of Academic Affairs

From: Rosie Quinzon-Bonello, Assistant Dean for Curriculum and Assessment

Date: April 20, 2020

Re: Program Change Proposal: Bachelor of Science in Electrical and Computer Engineering (BSECE)

Attached is a curriculum change proposal submitted by the Department of Electrical and Computer Engineering. This proposal consists of a redesign of its *Capstone I* (3901 1hr to 3905 3hrs) and *Capstone II* (4900 to 4905/4905H) courses, and a redistribution of credit hours.

While there is a two credit hour increase in the *Capstone I* course, this will be offset by a decrease of two credit hours in the programs' directed elective courses in both the Electrical and Computer Engineering programs, therefore maintaining credit neutrality. The department would like to implement this change effective Autumn Semester 2021 for all students. A transition plan has been provided.

On April 17, 2020.The College of Engineering Curriculum Committee on Academic Affairs reviewed the new course requests, and voted unanimously to approve the new course requests and program change proposal.

If you have additional questions or require additional information, please feel free to contact me.

Yours sincerely,

Rosie Quinzon-Bonello

THE OHIO STATE UNIVERSITY

Department of Electrical and Computer Engineering

205 Dreese Labs
2015 Neil Avenue
Columbus, OH 43210

614-292-2572 Phone
614-292-7596 Fax
ece.osu.edu

March 24, 2020

Vice Provost W. Randy Smith
Council on Academic Affairs
Office of Academic Affairs
203 Bricker Hall
190 North Oval Mall
Columbus, OH 43210

Re: Proposal to expand the Capstone Design requirement for the BSECE degree

Dear Vice Provost Smith:

The faculty of the Department of Electrical and Computer Engineering have proposed to change the ECE core courses required for the Bachelor of Science in Electrical and Computer Engineering degree (both Electrical Engineering program of study and Computer Engineering program of study).

Briefly, we propose to expand our Capstone Design requirement from one and a half semesters (4 credits) to two full semesters (6 credits total). We propose to take the two extra credits from electives, such that the number of credits to degree remains the same, at 128.

Sincerely,

DocuSigned by:
Hesham El Gamal
Hesham El Gamal
Department Chair
Electrical and Computer Engineering

cc: Betty Lise Anderson, Associate Chair

Program change proposal: Bachelor of Science in Electrical and Computer Engineering (BSECE)

March 18, 2020

Executive Summary

We propose to increase our Capstone Design requirement from two courses, four credits, to two courses, six credits. Additionally, students will start a design in one semester and finish it the second semester, allowing for a more comprehensive design experience. The credits to degree will reaming the same at 128. The extra credits for Capstone will be taken from electives.

Contact:

Betty Lise Anderson, Associate Chair, Electrical and Computer Engineering
Anderson.67@osu.edu

Motivation/Rationale

The Department of Electrical and Computer Engineering (ECE) currently has a 1.5 semester Capstone Design requirement, consisting of:

- ECE 3900 Capstone Design I (1 credit)
- ECE 4900 Capstone Design II (3 credits)

Currently, in the first capstone course, students learn the design process, how to determine specifications, learn to use engineering standards, and consider multiple constraints. However, they apply these concepts to artificial projects, not ones they will actually implement. In Capstone II, students are assigned teams, choose a project, and design, build, troubleshoot, and document that project in one semester. They cannot do as complete a job as we would like, in part because ordering parts takes so long, and in part because they typically don't realize how quickly they have to dive in to complete everything before the end of the semester. The learning experience is not as good as we feel it could be, and the quality (depth) of the projects could also be better.

Proposal

We propose to increase the capstone design experience to a full year (two semesters, six credits) in which they start a real design in semester one and then continue the same project, with the same teams. The new courses would be:

- ECE 3905 Capstone Design I (3 credits)
- ECE 4905 Capstone Design II (3 credits)

This is similar to what many other engineering programs do. The first course will be progress-graded, so that students don't get the grade for the first course until they have completed the sequence. We will form student teams during the first course, and expect students to stay with those teams for both courses and continue the same project. Thus, as they learn the design process, they are applying it to a real design. They will be required to

achieve a milestone such as a first part order, by the end of semester one. This will force them to make significant progress early, and give them more time for building and debugging, and allow them to build more sophisticated projects. We feel these changes will significantly improve the capstone learning experience. Feedback from students, alumni, faculty, and our Industrial Advisory Board indicates that this would be an improvement to our curriculum.

Although we plan to "require" students to stick with the same groups and projects from one semester to the next, we understand that there will inevitably be cases where that can't happen, due to illness for example. This happens in real life, too, and will be handled in the same way- teams will have to adapt to departing or incoming team members.

Reassignment of Credit Hours

The proposed change results in two additional credit hours in our core. We propose to keep the number of credit hours to degree the same and reduce the credit hours in our "Directed Electives" category by two credits. Directed Electives are a special category of classes unique to ECE, and generally include: courses required for entry into other engineering majors; required and technical elective courses in other engineering majors; pre-med courses; business or entrepreneurship courses; math, statistics, physics and chemistry courses at higher level than required in the ECE core; and other physical science or biological science courses. Directed Electives are optional and can replace a subset of Technical Electives. For Electrical Engineering Program of Study (EES), the 29 hours of technical electives are ECE courses, and for our Computer Engineering Program of Study (CES), the 18 hours of technical electives also include some Computer Science and Engineering courses.

For CES students, the number of Directed Electives decreases from 9 to 7.
For EES students, the number of Directed Electives increases from 13 to 11.

Effective Date

Although normally a program change takes effect for students starting at OSU the following autumn, we are requesting special permission to make it **effective starting Autumn 2021** for all ECE students in the program (see Transition Plan, next). We feel strongly that a two-semester Capstone is better for students, and students tell us they would prefer it, so we don't want to wait four years for it to actually happen.

Transition Plan

For students who are already in the major but have not yet started the (old) Capstone sequence, starting Autumn 2021 they would be required to take the new one.

For students who are in the major, and who have already taken the original ECE 3900 Capstone I, we will continue to run sections of the old ECE 4900 Capstone II Autumn 2021 and Spring 2022 to flush most of those students out of the system. Any students remaining after that who have taken the old 3900 will be allowed to join a team in the new ECE 4905 Capstone Design II.

Special Cases

We also currently have two special Capstone Design courses:

ECE 4901 Capstone Design Special: A design team works directly with a faculty member (who is typically not one of the Capstone instructors), usually on a design related to that person's research. Currently these students take 3900 to get standardized instruction in the design process, etc, and in the second semester apply that knowledge on the special project under the guidance of a faculty member who is not one of the Capstone instructors. Under the new system, the team would take the (new) ECE 3905/4905 sequence, but the faculty member would act as a sponsor of the project (the same way corporate sponsors provide projects). Thus, students get the same instruction, capstone faculty do the grading, but the faculty advisor/sponsor provides technical guidance.

ECE 4900H Honors Capstone: Students can fulfill their capstone and honors thesis requirements simultaneously. Currently honors students stake 3900 with everyone else, and can then count ECE 4900H for both capstone and one semester of their honors research project, provided it meets our strict requirements for being a real design project (not just research), that they have an approved team (to fulfill the capstone teamwork requirement), and that they complete all the same kinds of design documentation. The key difference is that the team may consist of others in the research group, rather than other undergraduate seniors. We therefore propose that under the new system, honors students take ECE 3905 with everyone else, then drop off their teams and take new Capstone Design Honors ECE 4905H.

Attachments

2019-2020
***EES**/GE*

***Major:** Electrical and Computer Engineering* ***Program of Study:** Electrical Engineering*
***Degree**: Bachelor of Science in Electrical and Computer Engineering (BSECE)* Hrs. **128**

Name:_____ ID: _____ **New to OSU**:_____

email: _____@ osu.edu Phone number: _____ http://www.ece.osu.edu

CORE (76 HRS)

***Bold** courses are required for entry into major*

	AU			SP	
Engr (Survey)	1100	1	***Engr (Fund. Of Engr II)***	1182	2
Engr (Fund. Of Engr I)	1181	2	***Math (Engr. Calculus II)***	1172	5
Math (Calculus I)	1151	5	*Physics II*	1251	5
Physics I	1250	5	*CSE (Programming C/C++)*	1222	3
Yr. 1					
Chemistry for Engineers	1250	4	Math (Ord&Part Diff Eqns)	2415	3
Math (Linear Algebra)	2568	3	ECE (Discrt Time Sig&Sys)	2050	3
ECE (Digital Logic)	2060	3	ECE (Analog Sys&Circuits)	2020	3
Yr. 2			ECE (Microcontrollers)	2560	2
ECE (RF&Optical Engr.)	3010*	3	Stat (Prob&Stat)	3470	3
ECE (Intro to Electronics)	3020*	3	ECE (Electronics Lab)	3027	1
ECE (Semicndctr ElctrncDev)	3030*	3	ECE (Energy&PowerSys. I)	3040*	3
ECE (Signals&Systems)	3050*	3			
Yr. 3					
ISE (Engr. Econ.)	2040	2	ECE (Capstone Design)	4900	3
ECE (Tech. Writing)	3090	1			
ECE (Capstone Design)	3900	1	**Yr. 4**	☐4901 syllabus	

** Recommendation: Complete all five of these courses by end of junior year to allow technical electives based on them to be taken senior year. The order may be swapped.*

ELECTIVES (29 HRS)

- ❑ At least 16 hours of the Electives must be ECE Technical Electives.
  - ❑ Must take a concentration of 6 hours in one of the domains below.
  - ❑ Must take at least 3 hours in each of two other domains below.
  - ❑ Must include at least one 5000 level ECE Technical Elective.
  - ❑ At least one ECE Technical Elective course must be a lab.
- ❑ Up to 13 hours of the Electives may be Directed Electives from the ECE approved list. Directed Electives generally include: courses required for entry into other engineering majors; required and technical elective courses in other engineering majors; pre-med courses; business or entrepreneurship courses; math, statistics, physics and chemistry courses at higher level than required in the ECE core; and other physical science or biological science courses. For physical science or biological science courses a maximum of 7 hours numbered below 2000 may be counted as Directed Electives.

COMM/DSP

Lectures
ECE 4300 3 ____
ECE 5000 3 ____
ECE 5101 3 ____
ECE 5200 3 ____
ECE 5206 3 ____
ECE 5400 3 ____

Labs
ECE 5007 0.5 ____
ECE 5207 0.5 ____
TOTAL (____)

COMPUTER

Lectures
ECE 3561 3 ____
ECE 5362 3 ____
ECE 5460 3 ____
ECE 5462 3 ____
ECE 5463 3 ____
ECE 5465 3 ____
ECE 5560 3 ____

Labs
ECE 3567 1 ____
TOTAL (____)

ELECTRONICS

Lectures
ECE 4021 3 ____
ECE 5020 3 ____
ECE 5021 3 ____
ECE 5022 3 ____
ECE 5120 3 ____
ECE 5194.12 3 ____

Labs
ECE 5027 4 ____
ECE 5227 4 ____
TOTAL (____)

ELECTROMAGNETICS & OPTICS

Lectures
ECE 5010 3 ____
ECE 5011 3 ____
ECE 5012 3 ____
ECE 5013 3 ____
ECE 5510 3 ____

Labs
ECE 5017 4 ____
TOTAL (____)

SOLID STATE ELECTRONICS & PHOTONICS

Lectures
ECE 5031 3 ____
ECE 5033 3 ____
ECE 5131 3 ____
ECE 5132 3 ____
ECE 5194.07 3 ____
ECE 5194.09 3 ____
ECE 5194.10 3 ____
ECE 5194.14 3 ____
ECE 5530 3 ____
ECE 5832 3 ____
ECE 5833 3 ____

Labs
ECE 5037 4 ____
ECE 5237 4 ____

ENERGY & POWER

Lectures
ECE 5025 3 ____
ECE 5041 3 ____
ECE 5042 3 ____
ECE 5043 3 ____

Labs
ECE 3047 1 ____
ECE 5047 3 ____
ECE 5127 1 ____
TOTAL (____)

CONTROL

Lectures
ECE 3551 3 ____
ECE 5194.11 3
ECE 5550 3 ____
ECE 5551 3 ____
ECE 5553 3 ____
ECE 5554 3 ____
ECE 5759 3 ____

Labs
ECE 3557 1 ____
ECE 5557 2 ____
TOTAL (____)

General Education (24 HRS)

One GE must be a US Social or Global Diversity Course. ☐

Must take PHILOS 1332 for GE Ethics

English & Comm Skills (6 hr)
English 1110.xx 3 ____
2367 2nd writing 3 ____

Social Sciences (6 hrs)
Only one course per Social Science group may count
Grp 3 ____
Grp 3 ____

Literature
____ 3 ____

Visual & Performing Arts
____ 3 ____

Historical Study
____ 3 ____

2nd Hst. Stdy. or Culture & Ideas
Philos 1332 3 ____

DIRECTED ELECTIVES

_____
_____
_____
_____
_____
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_____
_____
_____

Total Directed Electives (____)

OTHER ECE TECHNICAL ELECTIVES

_____
_____
_____
_____
_____
_____
_____

Total Other ECE Electives (____)
Total ECE Domain Electives (____)
TOTAL ECE Tech Electives (____)

☐ Lab ☐ 5000-level

Hours Req'd for Degree: **128**
Earned Hours to Date: _____
Total Proposed Hours: _____

Transfer students:
30 OSU ECE hrs? ☐
Math & B. Science:
32 hrs? ☐

Final CPHR: _____ **Final MGPA:** _____

OK to Graduate? Yes No _____

Program Approved:

_____
Advisor's Signature Date

2021-2022
EES/GE

Major: *Electrical and Computer Engineering* ***Program of Study:*** *Electrical Engineering*
Degree*: Bachelor of Science in Electrical and Computer Engineering (BSECE)* Hrs. **128**

Name:_____ ID: _____ **New to OSU**:_____

email: _____@ osu.edu Phone number: _____ http://www.ece.osu.edu

CORE (76 HRS)

Bold courses are required for entry into major

	AU			SP	
Engr (Survey)	1100	1		***Engr (Fund. Of Engr II)***	1182	2
Engr (Fund. Of Engr I)	1181	2		***Math (Engr. Calculus II)***	1172	5
Math (Calculus I)	1151	5		*Physics II*	1251	5
Physics I	1250	5		*CSE (Programming C/C++)*	1222	3
Yr. 1						
Chemistry for Engineers	1250	4		Math (Ord&Part Diff Eqns)	2415	3
Math (Linear Algebra)	2568	3		ECE (Discrt Time Sig&Sys)	2050	3
ECE (Digital Logic)	2060	3		ECE (Analog Sys&Circuits)	2020	3
Yr. 2				ECE (Microcontrollers)	2560	2
ECE (RF&Optical Engr.)	3010*	3		Stat (Prob&Stat)	3470	3
ECE (Intro to Electronics)	3020*	3		ECE (Electronics Lab)	3027	1
ECE (Semicndctr ElctrncDev)	3030*	3		ECE (Energy&PowerSys. I)	3040*	3
ECE (Signals&Systems)	3050*	3				
Yr. 3						
ISE (Engr. Econ.)	2040	2		ECE (Capstone Design)	4905	3
ECE (Tech. Writing)	3090	1				
ECE (Capstone Design)	3905	3		**Yr. 4**	☐ ~~4901 syllabus~~	

** Recommendation: Complete all five of these courses by end of junior year to allow technical electives based on them to be taken senior year. The order may be swapped.*

ELECTIVES (27 HRS)

- ❑ At least 16 hours of the Electives must be ECE Technical Electives.
  - ❑ Must take a concentration of 6 hours in one of the domains below.
  - ❑ Must take at least 3 hours in each of two other domains below.
  - ❑ Must include at least one 5000 level ECE Technical Elective.
  - ❑ At least one ECE Technical Elective course must be a lab.
- ❑ Up to 11 hours of the Electives may be Directed Electives from the ECE approved list. Directed Electives generally include: courses required for entry into other engineering majors; required and technical elective courses in other engineering majors; pre-med courses; business or entrepreneurship courses; math, statistics, physics and chemistry courses at higher level than required in the ECE core; and other physical science or biological science courses. For physical science or biological science courses a maximum of 7 hours numbered below 2000 may be counted as Directed Electives.

COMM/DSP

Lectures
ECE 4300 3 ____
ECE 5000 3 ____
ECE 5101 3 ____
ECE 5200 3 ____
ECE 5206 3 ____
ECE 5400 3 ____

Labs
ECE 5007 0.5 ____
ECE 5207 0.5 ____
TOTAL (____)

COMPUTER

Lectures
ECE 3561 3 ____
ECE 5362 3 ____
ECE 5460 3 ____
ECE 5462 3 ____
ECE 5463 3 ____
ECE 5465 3 ____
ECE 5560 3 ____

Labs
ECE 3567 1 ____
TOTAL (____)

ELECTRONICS

Lectures
ECE 4021 3 ____
ECE 5020 3 ____
ECE 5021 3 ____
ECE 5022 3 ____
ECE 5120 3 ____
ECE 5194.12 3 ____

Labs
ECE 5027 4 ____
ECE 5227 4 ____
TOTAL (____)

ELECTROMAGNETICS & OPTICS

Lectures
ECE 5010 3 ____
ECE 5011 3 ____
ECE 5012 3 ____
ECE 5013 3 ____
ECE 5510 3 ____

Labs
ECE 5017 4 ____
TOTAL (____)

SOLID STATE ELECTRONICS & PHOTONICS

Lectures
ECE 5031 3 ____
ECE 5033 3 ____
ECE 5131 3 ____
ECE 5132 3 ____
ECE 5194.07 3 ____
ECE 5194.09 3 ____
ECE 5194.10 3 ____
ECE 5194.14 3 ____
ECE 5530 3 ____
ECE 5832 3 ____
ECE 5833 3 ____

Labs
ECE 5037 4 ____
ECE 5237 4 ____

ENERGY & POWER

Lectures
ECE 5025 3 ____
ECE 5041 3 ____
ECE 5042 3 ____
ECE 5043 3 ____

Labs
ECE 3047 1 ____
ECE 5047 3 ____
ECE 5127 1 ____
TOTAL (____)

CONTROL

Lectures
ECE 3551 3 ____
ECE 5194.11 3
ECE 5550 3 ____
ECE 5551 3 ____
ECE 5553 3 ____
ECE 5554 3 ____
ECE 5759 3 ____

Labs
ECE 3557 1 ____
ECE 5557 2 ____
TOTAL (____)

General Education (24 HRS)

One GE must be a US Social or Global Diversity Course. ☐

Must take PHILOS 1332 for GE Ethics

English & Comm Skills (6 hr)
English 1110.xx 3 ____
2367 2nd writing 3 ____

Social Sciences (6 hrs)
Only one course per Social Science group may count
Grp 3 ____
Grp 3 ____

Literature
____ 3 ____

Visual & Performing Arts
____ 3 ____

Historical Study
____ 3 ____

2nd Hst. Stdy. or Culture & Ideas
Philos 1332 3 ____

DIRECTED ELECTIVES

____
____
____
____
____
____
____
____
____
Total Directed Electives (____)

OTHER ECE TECHNICAL ELECTIVES

____
____
____
____
____
____
____
Total Other ECE Electives (____)
Total ECE Domain Electives (____)
TOTAL ECE Tech Electives (____)

☐ Lab ☐ 5000-level

Hours Req'd for Degree: **128**
Earned Hours to Date: ____
Total Proposed Hours: ____
Final CPHR: ____ **Final MGPA:** ____
OK to Graduate? Yes No ____
Program Approved:

Transfer students: 30 OSU ECE hrs? ☐
Math & B. Science: 32 hrs? ☐

Advisor's Signature Date

2019-2020
CES/GE

Major: *Electrical and Computer Engineering* ***Program of Study:*** *Computer Engineering*
Degree*: Bachelor of Science in Electrical and Computer Engineering (BSECE)*

Hrs. **128**

Name:_____ ID: _____ **New to OSU**:_____

email: _____@ osu.edu Phone number: _____ http://www.ece.osu.edu

CORE (87 HRS)

Bold courses are required for entry into major

	AU			SP	
Engr (Survey)	1100	1	***Engr (Fund. Of Engr II)***	1182	2
Engr (Fund. Of Engr I)	1181	2	***Math Engr. (Calculus II)***	1172	5
Math (Calculus I)	1151	5	*Physics II*	1251	5
Physics I	1250	5	*CSE (Programming C/C++)*	1222	3
Yr. 1					
Chemistry for Engineers	1250	4	CSE (Foundations I)	2321	3
Math (Linear Algebra)	2568	3	ECE (Discrt Time Sig&Sys)	2050	3
ECE (Digital Logic)	2060	3	ECE (Analog Sys&Circuits)	2020	3
CSE (Dev Software I)	2221	4	ECE (Microcontrollers)	2560	2
			CSE (Dev Software II)	2231	4
Yr. 2			CSE (Adv Prog In C)	2451	2
ECE (Electronics)	3020	3	Stat (Prob&Stat)	3470	3
Math (Ord & Part Diff EQNS)	2415	3	ECE (Electronics Lab)	3027	1
(Adv. Digital Design)	3561	3	ECE (Comp. Arch. Design)	5362	3
ECE (Microcontrollers Lab)	3567	1	CSE (Sys II/OS)	2431	3
Yr. 3					
ISE (Engr. Econ.)	2040	2	ECE (Capstone Design II)	4900	3
ECE (Tech. Writing)	3090	1			
ECE (Capstone Design I)	3900	1	☐ 4901 syllabus		
Yr. 4					

General Education (24 HRS)

One GE must be a US Social or Global Diversity Course. ☐

Must take Philos 1332 for ethics

English & Comm Skills (6 hr)
English 1110.xx 3 _____
2367 2nd writing 3 _____

Social Sciences (6 hrs)
Only one course per Social Science group may count
Grp 3 _____
Grp 3 _____

Literature
_____ 3 _____

Visual & Performing Arts
_____ 3 _____

Historical Study
_____ 3 _____

2nd Hst. Stdy. or Culture & Ideas
Philos 1332 3 _____

ELECTIVES (18 HRS)

- ❑ At least 9 hours of the Technical Electives must be ECE or CSE courses selected from the lists below.
- ❑ Must include at least one 5000 level ECE or CSE Technical Elective.
- ❑ Up to 9 hours of the Electives may be Directed Electives from the ECE approved list. Directed Electives generally include: courses required for entry into other engineering majors; required and technical elective courses in other engineering majors; pre-med courses, business or entrepreneurship courses; math, statistics, physics and chemistry courses at higher level than required in the ECE core; and other physical science or biological science courses. For physical science or biological science courses a maximum of 7 hours numbered below 2000 may be counted as Directed Electives.

VLSI (Very Large Scale Integrated Circuits) & Computer Aided Design
ECE 5020 (3) ____ ECE 5560 (3) ____

Microprocessor Based Systems
ECE 5465 (3) ____

Digital Design and Computer Architecture
ECE 5462 (3) ____

Computer Networks
ECE 5101 (3) ____ CSE 3461 (3) ____

Signals and Systems
ECE 3050 (3) ____

Robotics and Control for Automation
ECE 3551 (3) ____ ECE 5463 (3) ____ ECE 5554 (3) ____

Digital Signal Processing/Image Processing/Machine Learning
ECE 5200 (3) ____ ECE 5206 (3) ____ ECE 5460 (3) ____
One of ECE 4300 or CSE 5523 (3) ____

Numerical Analysis
CSE 5361 (3) ____

Database/Algorithms
CSE 3241 (3) ____ CSE 5242 (3) ____

High Performance Computing
CSE 5441 (3) ____

_____
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_____

CSE DIRECTED ELECTIVES

_____
_____
_____
_____
_____
_____

Total CSE Directed Elec. (_____)

OTHER ECE TECH ELECTIVES

_____
_____
_____
_____
_____

Total Other ECE TE. (_____)
Total Short List TE. (_____)
Total ECE &CSE Elec. (_____)

NON-CSE DIRECTED ELECTIVES

_____
_____
_____
_____
_____

Total Non-CSE DE (_____)

☐ 5000-level

Hours Req'd for Degree: **128**
Earned Hours to Date: _____
Total Proposed Hours: _____

Transfer students:
30 OSU ECE hrs? ☐
Math & B. Science:
32 hrs? ☐

Final CPHR: _____ **Final MGPA:** _____

OK to Graduate? Yes No _____

Program Approved:

_____
Advisor's Signature Date

2021-2022
CES/GE

Major: *Electrical and Computer Engineering* ***Program of Study:*** *Computer Engineering*
Degree*: Bachelor of Science in Electrical and Computer Engineering (BSECE)*

Hrs. **128**

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email: _____@ osu.edu Phone number: _____ http://www.ece.osu.edu

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ECE (Digital Logic)	2060	3	ECE (Analog Sys&Circuits)	2020	3
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			CSE (Dev Software II)	2231	4
Yr. 2			CSE (Adv Prog In C)	2451	2
ECE (Electronics)	3020	3	Stat (Prob&Stat)	3470	3
Math (Ord & Part Diff EQNS)	2415	3	ECE (Electronics Lab)	3027	1
(Adv. Digital Design)	3561	3	ECE (Comp. Arch. Design)	5362	3
ECE (Microcontrollers Lab)	3567	1	CSE (Sys II/OS)	2431	3
Yr. 3					
ISE (Engr. Econ.)	2040	2	ECE (Capstone Design II)	4905	3
ECE (Tech. Writing)	3090	1			
ECE (Capstone Design I)	3905	3	☐ ~~4901 syllabus~~		
Yr. 4					

General Education (24 HRS)

One GE must be a US Social or Global Diversity Course. ☐

Must take Philos 1332 for ethics

English & Comm Skills (6 hr)
English 1110.xx 3 _____
2367 2nd writing 3 _____

Social Sciences (6 hrs)
Only one course per Social Science group may count
Grp 3 _____
Grp 3 _____

Literature
_____ 3 _____

Visual & Performing Arts
_____ 3 _____

Historical Study
_____ 3 _____

2nd Hst. Stdy. or Culture & Ideas
Philos 1332 3 _____

ELECTIVES (16 HRS)

- ❑ At least 9 hours of the Technical Electives must be ECE or CSE courses selected from the lists below.
- ❑ Must include at least one 5000 level ECE or CSE Technical Elective.
- ❑ Up to 7 hours of the Electives may be Directed Electives from the ECE approved list. Directed Electives generally include: courses required for entry into other engineering majors; required and technical elective courses in other engineering majors; pre-med courses, business or entrepreneurship courses; math, statistics, physics and chemistry courses at higher level than required in the ECE core; and other physical science or biological science courses. For physical science or biological science courses a maximum of 7 hours numbered below 2000 may be counted as Directed Electives.

VLSI (Very Large Scale Integrated Circuits) & Computer Aided Design
ECE 5020 (3) _____ ECE 5560 (3) _____

Microprocessor Based Systems
ECE 5465 (3) _____

Digital Design and Computer Architecture
ECE 5462 (3) _____

Computer Networks
ECE 5101 (3) _____ CSE 3461 (3) _____

Signals and Systems
ECE 3050 (3) _____

Robotics and Control for Automation
ECE 3551 (3) _____ ECE 5463 (3) _____ ECE 5554 (3) _____

Digital Signal Processing/Image Processing/Machine Learning
ECE 5200 (3) _____ ECE 5206 (3) _____ ECE 5460 (3) _____
One of ECE 4300 or CSE 5523 (3) _____

Numerical Analysis
CSE 5361 (3) _____

Database/Algorithms
CSE 3241 (3) _____ CSE 5242 (3) _____

High Performance Computing
CSE 5441 (3) _____

_____
_____
_____
_____
_____
_____
_____

CSE DIRECTED ELECTIVES

_____
_____
_____
_____
_____
_____

Total CSE Directed Elec. (_____)

OTHER ECE TECH ELECTIVES

_____
_____
_____
_____
_____

Total Other ECE TE. (_____)
Total Short List TE. (_____)
Total ECE &CSE Elec. (_____)

NON-CSE DIRECTED ELECTIVES

_____
_____
_____
_____
_____

Total Non-CSE DE (_____)

☐ 5000-level

Hours Req'd for Degree: **128**
Earned Hours to Date: _____
Total Proposed Hours: _____

Transfer students: 30 OSU ECE hrs? ☐
Math & B. Science: 32 hrs? ☐

Final CPHR: _____ **Final MGPA:** _____

OK to Graduate? Yes No _____

Program Approved:

_____
Advisor's Signature Date

ECE 3900: Capstone Design I

Course Description
Fundamentals of the engineering design process. Design principles and methodology. Project management during design.

Transcript Abbreviation: Capstone Design 1
Grading Plan: Letter Grade
Course Deliveries: Classroom, Greater or equal to 50% at a distance
Course Levels: Undergrad
Student Ranks: Senior
Course Offerings: Autumn, Spring
Flex Scheduled Course: Never
Course Frequency: Every Year
Course Length: 7 Week
Credits: 1.0
Repeatable: No
Time Distribution: 2.0 hr Lec
Expected out-of-class hours per week: 4.0
Graded Component: Lecture
Credit by Examination: No
Admission Condition: No
Off Campus: Never
Campus Locations: Columbus
Prerequisites and Co-requisites: Prereq: Sr standing and enrollment in the ECE major. Prereq or concur: 3090.
Exclusions: Not open to students with credit for 4900, 4900H, 4901, or 582, or Engr 4901, 4903, 5901.01 or 5901.02H.
Cross-Listings:

Course Rationale: Split lecture content out of 4900 into previous semester to allow more time for capstone

design project completion in 4900.

The course is required for this unit's degrees, majors, and/or minors: Yes
The course is a GEC: No
The course is an elective (for this or other units) or is a service course for other units: No

Subject/CIP Code: 14.1001
Subsidy Level: Baccalaureate Course

Programs

Abbreviation	Description
CpE	Computer Engineering
EE	Electrical Engineering

Course Goals

Be competent with the principles and issues of engineering design such as problem statements, requirement and objectives analysis, engineering and technical specifications, system models and representation, generation and selection of design concepts
Be familiar with principles and tools for management of a design project

Demonstrate competence in writing technical design and project management documentation
Demonstrate competence in a team-based environment
Be exposed to the purpose, development, and use of engineering standards
Be familiar with the need to consider multiple realistic constraints (e.g. economic, environmental, sustainability, manufacturability, ethical, health and safety, social and political issues) in engineering design
Be familiar with test and validation planning and execution, debugging of prototypes, and the risks and types of failures

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Engineering design methodology	5.0							
Project management (Gantt charts, task breakdowns, budgets, etc)	4.0							
Engineering standards	1.0							
Test and validation plan development	1.0							
Debugging, failure and risk analysis and management	1.0							
Resources for design and implementation of projects	1.0							
Group dynamics and effective professional teams	1.0							

Representative Assignments

Problem statements, analysis of specifications and requirements, design concepts, test plans, task lists, Gantt chart and scheduling, and budget exercises.
Quizes covering lecture material.
Case studies and critiques.

Grades

Aspect	Percent
Homeworks	40%
Quizes	30%
Final project	30%

Representative Textbooks and Other Course Materials

Title	Author
Design for Electrical and Computer Engineers: Theory, Concepts and Practice	Ralph M. Ford and Chris S. Coulston

ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
*	a	An ability to apply knowledge of mathematics, science, and engineering.
*	b	An ability to design and conduct experiments, as well as to analyze and interpret data.
***	c	An ability to design a system, component, or process to meet desired needs.
*	d	An ability to function on multi-disciplinary teams.
**	e	An ability to identify, formulate, and solve engineering problems.
*	f	An understanding of professional and ethical responsibility.

Course Contribution		College Outcome
**	g	An ability to communicate effectively.
*	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
*	i	A recognition of the need for, and an ability to engage in life-long learning.
*	j	A knowledge of contemporary issues.
**	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

CpE ABET-EAC Criterion 9 Program Criteria Outcomes

Course Contribution		Program Outcome
**	1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
**	2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
**	3	an ability to communicate effectively with a range of audiences
*	4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
***	5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
*	6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
**	7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

EE ABET-EAC Criterion 9 Program Criteria Outcomes

Course Contribution		Program Outcome
**	1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
**	2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
**	3	an ability to communicate effectively with a range of audiences
*	4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
***	5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
*	6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
**	7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Additional Notes or Comments

Course goals updated based on Sp17 review
Add ENGR 5901.01 & 5910.02H to exclusion clause. Remove qtr courses. gjv 6/2/17.

Added course goal on teamwork and contributions to new ABET student outcomes per Sp19 review. 5/23/19.

Prepared by: George Valco

ECE 4900: Capstone Design II

Course Description
Application of design principles and methodology to conceptual and detailed technical design, implementation, and testing of a capstone project.

Prior Course Number: 682
Transcript Abbreviation: Capstone Design 2
Grading Plan: Letter Grade
Course Deliveries: Classroom
Course Levels: Undergrad
Student Ranks: Senior
Course Offerings: Autumn, Spring
Flex Scheduled Course: Never
Course Frequency: Every Year
Course Length: 14 Week
Credits: 3.0
Repeatable: No
Time Distribution: 3.0 hr Lab
Expected out-of-class hours per week: 6.0
Graded Component: Laboratory
Credit by Examination: No
Admission Condition: No
Off Campus: Never
Campus Locations: Columbus
Prerequisites and Co-requisites: Prereq: Option 1: 2560, 3010, 3020, 3027, 3030, 3040, 3050, 3090, and 3900, and Sr standing, and enrollment in Electrical Engineering Program of Study (EES subplan) of the ECE major. Prereq or concur: 3080 or PHILOS 1332. Option 2: 2050 or 2100; 3020, 3027, 3090, 3561, 3567, 3900, CSE 2231, and 2451, and Sr standing, and enrollment in Computer Engineering Program of Study (CES subplan). Prereq or concur: 3080 or PHILOS 1332, and 5362.
Exclusions: Not open to students with credit for 4900H, 4901, or Engr 4903 or 5902.01.
Cross-Listings:

Course Rationale: Existing course being revised to allow focus on design, implementation and testing aspects of capstone project with new course 3900 taken prior term.

The course is required for this unit's degrees, majors, and/or minors: Yes
The course is a GEC: No
The course is an elective (for this or other units) or is a service course for other units: No

Subject/CIP Code: 14.1001
Subsidy Level: Baccalaureate Course

Programs

Abbreviation	Description
CpE	Computer Engineering
EE	Electrical Engineering

General Information

The scheduled recitation time will be used for team presentations for progress reports and final project reporting; and for team meetings both with the instructor and amongst team members.

Course Goals

Demonstrate competence applying engineering design methods
Demonstrate competence in the management of a project
Demonstrate competence in a team-based environment
Demonstrate mastery in technical writing and presentation skill
Design, build, demonstrate, and report on a major project, integrating material learned
Be exposed to relevant engineering standards
Demonstrate familiarity in considering multiple realistic constraints (e.g. economic, environmental, sustainability, manufacturability, ethical, health and safety, social and political issues) while carrying out their design

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Senior project design								
Project execution, test, and analysis								
Documentation of project								

Representative Assignments

Project proposal document, with problem definition statement, requirements and systems specifications, project implementation and test plan, Gantt charts and budget estimates.
Working prototype.
Final presentation.
Final report.

Grades

Aspect	Percent
Design proposal/ planning presentation	15%
Design proposal/planning report	20%
Regular progress/status reports	15%
Preliminary and final demonstrations	15%
Final presentation	15%
Final report	20%
+/- one letter grade from team grade based on individual and teamwork assessment	0%

Representative Textbooks and Other Course Materials

Title	Author
Design for Electrical and Computer Engineers: Theory, Concepts and Practice	Ralph M. Ford and Chris S. Coulston

ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
***	a	An ability to apply knowledge of mathematics, science, and engineering.
**	b	An ability to design and conduct experiments, as well as to analyze and interpret data.
***	c	An ability to design a system, component, or process to meet desired needs.
***	d	An ability to function on multi-disciplinary teams.
***	e	An ability to identify, formulate, and solve engineering problems.
*	f	An understanding of professional and ethical responsibility.
***	g	An ability to communicate effectively.
**	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
**	i	A recognition of the need for, and an ability to engage in life-long learning.
*	j	A knowledge of contemporary issues.
***	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

CpE ABET-EAC Criterion 9 Program Criteria Outcomes

Course Contribution		Program Outcome
***	1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
**	2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
***	3	an ability to communicate effectively with a range of audiences
*	4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
***	5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
**	6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
***	7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

EE ABET-EAC Criterion 9 Program Criteria Outcomes

Course Contribution		Program Outcome
***	1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
**	2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
***	3	an ability to communicate effectively with a range of audiences
*	4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
***	5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
**	6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
***	7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Additional Notes or Comments

Added quarter equivalents of prereqs. Add 4901 to exclusions. Update press and exclusions to university format.
update prereqs to 3561 instead of 3567 for CpE 4/23/12

corrected prereq to show 5362 only required of CES subplan. 4/27/12

changed text to Ford and Coulston 3/27/13

Added ENGR 4903 to exclusions.

Update course goals, lectures, grading, and Criterion 3 outcomes 5/8/14

Correct ABET outcome f to two stars 7/2/14

Update course for program change splitting lecture content into ECE 3900 10/7/14

Added ENGR 5902.01 to exclusions. BLA 2/25/15

Removed ECE 3027 from prerequisites (temporarily) due to transition issues for the ECE program change. Need to add it back when the majority of students in the program have been required to take ECE 3027. Approved by CCAA with 3027 removed today. GJV 9/3/15

Added 3027 to prereqs for both programs of study; removed quarter course references. add 2050 to CE prereqs 6/21/2018 BLA

Added contributions to new ABET student outcomes per Sp19 review. 5/23/19 GJV

Get rid of recitations in there by mistake 8/21/19 BLA

add Philosophy 1332 to prereqs 8/26/2019 BLA

Prepared by: Betty Lise Anderson

ECE 4900H: Design II with Honors Thesis Project

Course Description

Application of design principles and methodology to conceptual and detailed technical design, implementation and testing, culminating in a capstone design project.

Prior Course Number: 683H
Transcript Abbreviation: Hon Thesis Des 2
Grading Plan: Letter Grade
Course Deliveries: Classroom
Course Levels: Undergrad
Student Ranks: Senior
Course Offerings: Autumn, Spring
Flex Scheduled Course: Never
Course Frequency: Every Year
Course Length: 14 Week
Credits: 3.0
Repeatable: No
Time Distribution: 3.0 hr Lab
Expected out-of-class hours per week: 6.0
Graded Component: Laboratory
Credit by Examination: No
Admission Condition: No
Off Campus: Never
Campus Locations: Columbus
Prerequisites and Co-requisites: Prereq: Honors standing, and permission of department, and: Option 1: 2560, 3010, 3020, 3027, 3030, 3040, 3050, 3090, 3900 and Sr standing, and enrollment in Electrical Engineering Program of Study (EES subplan) of the ECE major. Prereq or concur: 3080. Option 2: 2050 or 2100; 3020,3027, 3090, 3561, 3567, 3900, CSE 2231, CSE 2451, and Sr standing, and enrollment in Computer Engineering Program of Study (CES subplan). Prereq or concur: 3080 and 5362.
Exclusions: Not open to students with credit for 4900, 4901, or 682, or Engr 4903 or 5902.01.
Cross-Listings:

Course Rationale: Existing course being revised to allow focus on design, implementation and testing aspects of capstone project with new course 3900 taken prior term.

The course is required for this unit's degrees, majors, and/or minors: No
The course is a GEC: No
The course is an elective (for this or other units) or is a service course for other units: Yes

Subject/CIP Code: 14.1001
Subsidy Level: Baccalaureate Course

Programs

Abbreviation	Description
CpE	Computer Engineering
EE	Electrical Engineering

General Information

The marked recitation time indicates time for oral presentations and for meetings with the research advisor and other collaborators e.g. other honors students, graduate students, faculty, research staff.

Course Goals

Demonstrate competence applying engineering design methods
Demonstrate competence in the management of a project
Demonstrate competence in a team-based environment. Student design is part of a larger research effort with others beyond the research advisor, e.g. other honors students, graduate students, faculty, research staff
Demonstrate mastery in technical writing and presentation skills
Design, build, demonstrate, and report on a major project, integrating material learned
Be exposed to relevant engineering standards
Demonstrate familiarity in considering multiple realistic constraints (e.g. economic, environmental, sustainability, manufacturability, ethical, health and safety, social and political issues) while carrying out their design

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Senior project design								
Project execution, test, and analysis								
Documentation of project (Honor's Thesis document)								
Final presentation (Honor's Thesis defense)								

Representative Assignments

Project proposal document, with problem definition statement, requirements and systems specifications, project implementation and test plan, Gantt charts and budget estimates.
Working prototype.
Final presentation (Honors Thesis defense).
Final report (Honors Thesis Document).

Grades

Aspect	Percent
Design proposal.	25%
Final report (Honors Thesis Document).	35%
Final presentation (Honors Thesis Defense)	30%
Demonstration of Collaboration	10%

Representative Textbooks and Other Course Materials

Title	Author
Design for Electrical and Computer Engineers: Theory, Concepts and Practice	Ralph M. Ford and Chris S. Coulston

ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
***	a	An ability to apply knowledge of mathematics, science, and engineering.

Course Contribution		College Outcome
**	b	An ability to design and conduct experiments, as well as to analyze and interpret data.
***	c	An ability to design a system, component, or process to meet desired needs.
***	d	An ability to function on multi-disciplinary teams.
***	e	An ability to identify, formulate, and solve engineering problems.
*	f	An understanding of professional and ethical responsibility.
***	g	An ability to communicate effectively.
**	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
**	i	A recognition of the need for, and an ability to engage in life-long learning.
*	j	A knowledge of contemporary issues.
***	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Additional Notes or Comments

Update prereqs to include quarter versions of courses. Add 4901 to exclusions.

Updated course goals to match university format,

Update prereqs to include 3561 instead of withdrawn course 3367 4/23/12

added permission of department to prereqs 10/31/12

Reworded prerqs to include Honors standing for both sub plans, and then rearranged to make it fit the character limit. July 31, 2012

Added "and honors standing."

Added "and permission of department"11/9/12

Change text to Ford and Coulston 3/27/ 13

Added ENGR 4903 to exclusions 11/15/13

Rewrite course goals for consistency with ECE 4900 and 4901 4/29/14 BLA

Update course for program change splitting lecture content into ECE 3900 10/14/14 GJV

Added ENGR 5902.01 to exclusions

Removed ECE 3027 from prerequisites (temporarily) due to transition issues for the ECE program change. Need to add it back when the majority of students in the program have been required to take ECE 3027. Approved by CCAA with 3027 removed today. GJV 9/3/15

Correct exclusions to 4900 instead of 4900H

Updated prereqs to include ECE 3027 for both programs, and add 2050 to CE program June 21, 2018

Prepared by: Betty Lise Anderson

ECE 3905 (Proposed): Capstone Design I

Course Description

Fundamentals of the engineering design process. Application of design principles and methodology to conceptual and detailed technical design.
Project management during design.

Prior Course Number: 3900
Transcript Abbreviation: Capstone Design 1
Grading Plan: Progress - Letter
Course Deliveries: Classroom
Course Levels: Undergrad
Student Ranks: Senior
Course Offerings: Autumn, Spring
Flex Scheduled Course: Never
Course Frequency: Every Year
Course Length: 14 Week
Credits: 3.0
Repeatable: No
Time Distribution: 1.0 hr Lec, 2.0 hr Lab
Expected out-of-class hours per week: 6.0
Graded Component: Laboratory
Credit by Examination: No
Admission Condition: No
Off Campus: Never
Campus Locations: Columbus
Prerequisites and Co-requisites: Option 1: Prereq or concur: 3080 or PHILOS 1332; 2560, 3010, 3020, 3027, 3030, 3040, 3050, 3090, and Sr standing, and enrollment in Electrical Engineering Program of Study (EES subplan) of the ECE major.

Option 2: Prereq or concur: 2050 or 2100; 3080 or PHILOS 1332; 3020, 3027, 3090, 3561, 3567, CSE 2231, and 2451, and Sr standing, and enrollment in Computer Engineering Program of Study (CES subplan).
Exclusions: Not open to students with credit for 3900, 4900, 4900H, 4901, or ENGR 5901.01, 5901.01H, 5902.01 or 5902.01H.
Cross-Listings:

Course Rationale: Existing course being revised to support the Design and Documentation aspects of a

continuous two semester capstone program/project.

The course is required for this unit's degrees, majors, and/or minors: Yes
The course is a GEC: No
The course is an elective (for this or other units) or is a service course for other units: No

Subject/CIP Code: 14.1001
Subsidy Level: Baccalaureate Course

Programs

Abbreviation	Description
CpE	Computer Engineering
EE	Electrical Engineering

General Information

Teams will be formed in ECE3905 and members will be required to stay together and register for the same section (time slot) for ECE4905 to allow team to work on same project start to finish.

Course Goals

Be competent with the principles and issues of engineering design such as problem statements, requirement and objectives analysis, engineering and technical specifications, system models and representation, generation and selection of design concepts
Demonstrate competence with principles and tools for management of a design project
Demonstrate competence in writing technical design and project management documentation
Demonstrate competence in a team-based environment
Be exposed to the purpose, development, and use of engineering standards
Be familiar with the need to consider multiple realistic constraints (e.g. economic, environmental, sustainability, manufacturability, ethical, health and safety, social and political issues) in engineering design

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Course introduction, team forming survey and Intellectual Property/ Technology Commercialization Office	1.0							
Formal etiquette, group dynamics, effective professional teams and communications	2.0							
Engineering design methodology and requirements	2.0							
Project management (Gantt charts, task breakdowns, budgets, etc), problem definitions, preliminary design, and critical design.	3.0							
Engineering standards, systems engineering life cycle process	2.0							
Resources for design and implementation of projects, writing center, purchasing and lab safety	1.0							
Independent laboratory work			17.0					

Representative Assignments

Written assignments on: program management, problem definitions, analysis of specifications and requirements, requirements development, design concepts, preliminary design, detail design, task lists, Gantt chart and scheduling, and budget.
Presentations: Problem definition, preliminary design review and critical design review
Quiz covering lecture material.

Grades

Aspect	Percent
Oral Presentations	30%
Written Assignments	45%
Peer Evaluation	10%
Instructor / Advisor Evaluations	10%
In class Quiz	5%

Representative Textbooks and Other Course Materials

Title	Author
Design for Electrical and Computer Engineers: Theory, Concepts and Practice	Ralph M. Ford and Chris S. Coulston

ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
*	a	An ability to apply knowledge of mathematics, science, and engineering.
*	b	An ability to design and conduct experiments, as well as to analyze and interpret data.
***	c	An ability to design a system, component, or process to meet desired needs.
*	d	An ability to function on multi-disciplinary teams.
**	e	An ability to identify, formulate, and solve engineering problems.
*	f	An understanding of professional and ethical responsibility.
**	g	An ability to communicate effectively.
*	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
*	i	A recognition of the need for, and an ability to engage in life-long learning.
*	j	A knowledge of contemporary issues.
**	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

CpE ABET-EAC Criterion 9 Program Criteria Outcomes

Course Contribution		Program Outcome
**	1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
**	2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
**	3	an ability to communicate effectively with a range of audiences
*	4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
***	5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
*	6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
**	7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

EE ABET-EAC Criterion 9 Program Criteria Outcomes

Course Contribution		Program Outcome
**	1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
**	2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
**	3	an ability to communicate effectively with a range of audiences

Course Contribution		Program Outcome
*	4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
***	5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
*	6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
**	7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Additional Notes or Comments

Should be scheduled as two 85-minute sessions per week- one for lab, one for lecture

Prepared by: Haskell Fought

ECE 4905 (Approved): Capstone Design II

Course Description
Application of project management, design principles and methodology to conceptual and detailed technical design, implementation, and testing of a capstone project.

Prior Course Number: 4900
Transcript Abbreviation: Capstone Design 2
Grading Plan: Letter Grade
Course Deliveries: Classroom
Course Levels: Undergrad
Student Ranks: Senior
Course Offerings: Autumn, Spring
Flex Scheduled Course: Never
Course Frequency: Every Year
Course Length: 14 Week
Credits: 3.0
Repeatable: No
Time Distribution: 1.0 hr Lec, 2.0 hr Lab
Expected out-of-class hours per week: 6.0
Graded Component: Laboratory
Credit by Examination: No
Admission Condition: No
Off Campus: Never
Campus Locations: Columbus
Prerequisites and Co-requisites: Prerequisites: ECE 3905
Exclusions: Not open to students with credit for 4900, 4900H, 4901, or ENGR 5901.01, 5901.01H, 5902.01, or 5902.01H.
Cross-Listings:

Course Rationale: Existing course being revised to allow focus on implementation and testing aspects of

capstone project covering two semesters.

The course is required for this unit's degrees, majors, and/or minors: Yes
The course is a GEC: No
The course is an elective (for this or other units) or is a service course for other units: No

Subject/CIP Code: 14.1001
Subsidy Level: Baccalaureate Course

Programs

Abbreviation	Description
CpE	Computer Engineering
EE	Electrical Engineering

Course Goals

Demonstrate competence applying engineering design methods
Demonstrate competence in the management of a project
Demonstrate competence in a team-based environment

Demonstrate mastery in technical writing and presentation skills
Design, build, demonstrate, and report on a major project, integrating material learned
Be exposed to relevant engineering standards
Demonstrate familiarity in considering multiple realistic constraints (e.g. economic, environmental, sustainability, manufacturability, ethical, health and safety, social and political issues) while carrying out their design
Demonstrate the ability to develop test plan and document the results

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Course re-introduction, formal etiquette, group dynamics, effective professional teams and communications	1.0							
Project execution, test, test procedure, test and analysis reports	1.0							
Final report	1.0							
Work on team project			18.0					
Team assessment meeting			5.0					
Final presentation	1.0							

Representative Assignments

Test plan, test report, updated detailed design and status reports.
Working prototype.
Final presentation.
Final report.

Grades

Aspect	Percent
Oral Presentations	30%
Written Assignments	45%
Peer Evaluations	10%
Instructor / Advisor Evaluations	10%
Final project	5%

Representative Textbooks and Other Course Materials

Title	Author
Design for Electrical and Computer Engineers: Theory, Concepts and Practice	Ralph M. Ford and Chris S. Coulston

ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
***	a	An ability to apply knowledge of mathematics, science, and engineering.
**	b	An ability to design and conduct experiments, as well as to analyze and interpret data.
***	c	An ability to design a system, component, or process to meet desired needs.
***	d	An ability to function on multi-disciplinary teams.

Course Contribution		College Outcome
***	e	An ability to identify, formulate, and solve engineering problems.
*	f	An understanding of professional and ethical responsibility.
***	g	An ability to communicate effectively.
**	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
**	i	A recognition of the need for, and an ability to engage in life-long learning.
*	j	A knowledge of contemporary issues.
***	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

CpE ABET-EAC Criterion 9 Program Criteria Outcomes

Course Contribution		Program Outcome
***	1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
**	2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
***	3	an ability to communicate effectively with a range of audiences
*	4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
***	5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
**	6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
***	7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

EE ABET-EAC Criterion 9 Program Criteria Outcomes

Course Contribution		Program Outcome
***	1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
**	2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
***	3	an ability to communicate effectively with a range of audiences
*	4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
***	5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
**	6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
***	7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Prepared by: Haskell Fought

ECE 4905H (Proposed): Design II with Honors Thesis Project

Course Description

Application of design principles and methodology to conceptual and detailed technical design, implementation and testing, culminating in a capstone design project.

Prior Course Number: 4900H
Transcript Abbreviation: Hon Thesis Des 2
Grading Plan: Letter Grade
Course Deliveries: Classroom
Course Levels: Undergrad
Student Ranks: Senior
Course Offerings: Autumn, Spring
Flex Scheduled Course: Never
Course Frequency: Every Year
Course Length: 14 Week
Credits: 3.0
Repeatable: No
Time Distribution: 3.0 hr Lab
Expected out-of-class hours per week: 6.0
Graded Component: Laboratory
Credit by Examination: No
Admission Condition: No
Off Campus: Never
Campus Locations: Columbus
Prerequisites and Co-requisites: Prereq: Honors standing, and permission of department, and ECE 3905
Exclusions: Not open to students with credit for 4900, 4900H, 4901, or 682, or ENGR 5902.01., 590.01H, 5902.01, or 5902.01H.
Cross-Listings:

Course Rationale: Existing course being revised to allow focus on design, implementation and testing aspects of capstone project with new course 3905 taken prior term.

The course is required for this unit's degrees, majors, and/or minors: No
The course is a GEC: No
The course is an elective (for this or other units) or is a service course for other units: Yes

Subject/CIP Code: 14.1001
Subsidy Level: Baccalaureate Course

Programs

Abbreviation	Description
CpE	Computer Engineering
EE	Electrical Engineering

General Information

The marked recitation time indicates time for oral presentations and for meetings with the research advisor and other collaborators e.g. other honors students, graduate students, faculty, research staff.

Course Goals

Demonstrate competence applying engineering design methods
Demonstrate competence in the management of a project
Demonstrate competence in a team-based environment. Student design is part of a larger research effort with others beyond the research advisor, e.g. other honors students, graduate students, faculty, research staff
Demonstrate mastery in technical writing and presentation skills
Design, build, demonstrate, and report on a major project, integrating material learned
Be exposed to relevant engineering standards
Demonstrate familiarity in considering multiple realistic constraints (e.g. economic, environmental, sustainability, manufacturability, ethical, health and safety, social and political issues) while carrying out their design

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Senior project design								
Project execution, test, and analysis								
Documentation of project (Honor's Thesis document)								
Final presentation (Honor's Thesis defense)								

Representative Assignments

Project proposal document, with problem definition statement, requirements and systems specifications, project implementation and test plan, Gantt charts and budget estimates.
Working prototype.
Final presentation (Honors Thesis defense).
Final report (Honors Thesis Document).

Grades

Aspect	Percent
Design proposal.	25%
Final report (Honors Thesis Document).	35%
Final presentation (Honors Thesis Defense)	30%
Demonstration of Collaboration	10%

Representative Textbooks and Other Course Materials

Title	Author
Design for Electrical and Computer Engineers: Theory, Concepts and Practice	Ralph M. Ford and Chris S. Coulston

ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
***	a	An ability to apply knowledge of mathematics, science, and engineering.
**	b	An ability to design and conduct experiments, as well as to analyze and interpret data.

Course Contribution		College Outcome
***	c	An ability to design a system, component, or process to meet desired needs.
***	d	An ability to function on multi-disciplinary teams.
***	e	An ability to identify, formulate, and solve engineering problems.
*	f	An understanding of professional and ethical responsibility.
***	g	An ability to communicate effectively.
**	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
**	i	A recognition of the need for, and an ability to engage in life-long learning.
*	j	A knowledge of contemporary issues.
***	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

CpE ABET-EAC Criterion 9 Program Criteria Outcomes

Course Contribution		Program Outcome
***	1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
**	2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
***	3	an ability to communicate effectively with a range of audiences
*	4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
***	5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
**	6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
***	7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

EE ABET-EAC Criterion 9 Program Criteria Outcomes

Course Contribution		Program Outcome
***	1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
**	2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
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**	6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
***	7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Prepared by: Betty Lise Anderson