Curriculum Course Request WES Change Course ECE 4820 - A-2018-ECE-139; effective term: 202040

Bradley J Bazuin
Thu 12/20/2018 8:37 AM

To: Raja G Aravamuthan <raja.aravamuthan@wmich.edu>; Said M Abubakr <said.abubakr@wmich.edu>
Cc: Holly Blanks <holly.blanks@wmich.edu>

2 attachments (947 KB)
ECE4820_Updated_WES_V2.pdf; ECE 4820 Assessing WMU Essential Studies Student Learning Outcomes 8.28.18_0 ECE 4820 Senior Design.pdf;

Please verify your data for New Curriculum Course Request for department: ECE; college: A.
Go to the following URL to complete your worklist items: https://bwfp1.cc.wmich.edu:7102/wbsprod

Date of request: 19-DEC-2018
Request ID: A-2018-ECE-139
College: A
Department: ECE
Initiator name: Steven Durbin
Initiator email: steven.durbin@wmich.edu
Proposed effective term: 202040
Does course need General Education approval?: Y
Will course be used in teacher education?: N
If 5000 level course, prerequisites apply to: U
Proposed course data:
WES Change Course ECE 4820
Specific Course Change type selected: WMU Essential Studies - Level 3: Connections

1. Existing course prefix and number:
ECE 4820

2. Level 3: Connections:
Indicate which course category the course should be placed in:
Local and National Perspectives

3. Indicate which ONE additional required student learning outcome the course will assess:
https://outlook.office.com/owa/?realm=WMICH.EDU&exsvurl=1&ll-cc=1033&modurl=0
specifications;
4. "effective and appropriate oral and digital communication" to describe a device or system designed to meet an identified need [WES Level III Learning Connections Local and National Perspectives Outcome];
5. an ability to provide effective documentation for an engineering design project;
6. an ability to "work both independently and in collaboration with others to achieve goals" [WES Level III Connections Local and National Perspectives Learning Outcome];
7. an ability to develop and adapt a project schedule to meet deadlines;
8. an appreciation of the importance of using notebooks to document engineering research and development work; and
9. an ability to "apply ethical, critical, and informed thought within... one discipline" [WES Level III Connections Local and National Perspectives Learning Outcome, Option 1].

G. Describe how this curriculum change is a response to student learning assessment outcomes that are part of a departmental or college assessment plan or informal assessment activities.
This change was proposed by the department undergraduate curriculum committee in response to the creation of the Western Michigan University Essential Studies process, and approved by vote of the department faculty.

H. Effect on other colleges, departments or programs. If consultation with others is required, attach evidence of consultation and support. If objections have been raised, document the resolution. Demonstrate that the program you propose is not a duplication of an existing one.
This course is only taken by ECE students (electrical engineering and computer engineering undergraduates), and so no impact on other colleges, departments or programs are anticipated.

I. Effect on your department's programs. Show how the proposed change fits with other departmental offerings.
The course is already required for both undergraduate majors offered by the department.

J. Effects on enrolled students: are program conflicts avoided? Will your proposal make it easier or harder for students to meet graduation requirements? Can students complete the program in a reasonable time? Show that you have considered scheduling needs and demands on students' time. If a required course will be offered during summer only, provide a rationale.
No changes to the ability of a student to meet graduation requirements are anticipated, as this is already a required course and offered each fall and spring (it follows ECE 4810 - Senior Design 1, a 2 credit hour course.)

K. Student or external market demand. What is your anticipated student audience? What evidence of student or market demand or need exists? What is the estimated enrollment? What other factors make your proposal beneficial to students?
All BS electrical engineering and BS computer engineering students are required to complete this course as a graduation requirement. The course is offered each fall and spring, with enrollment varying between approximately 15 and 40. Students often experience multi-faceted technical interviews when seeking employment, and ethical/professional responsibilities are becoming common contemporary topics, as well as technical competence.

L. Effects on resources. Explain how your proposal would affect department and University resources, including faculty, equipment, space, technology, and library holdings. Tell how you will staff additions to the program. If more advising will be needed, how will you provide for it? How often will course(s) be offered? What will be the initial one-time costs and the ongoing base-funding costs for the proposed program? (Attach additional pages, as necessary.)
No additional resources, or changes to existing resources, are required for the proposed modifications to this course.
The course is traditionally taught as a single section, never online, although in a non-traditional format as explained here. We note that it occasionally has an enrollment slightly larger than the target value of 30:

Enrollment Expectations

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>S16</td>
<td>23</td>
</tr>
<tr>
<td>F16</td>
<td>20</td>
</tr>
<tr>
<td>S17</td>
<td>35</td>
</tr>
<tr>
<td>F17</td>
<td>19</td>
</tr>
</tbody>
</table>

https://outlook.office.com/owa/?realm=WICH.EDU&exsvurl=1&ll-cc=1033&modurl=0 3/4
ECE 4820 ELECTRICAL/COMPUTER ENGINEERING DESIGN II

[SEMESTER] [date]

Instructor
[Instructor information]

Office Hours
[Instructor Office hours here]

WMU Catalog Description
Course Description: Senior electrical/computer engineering design project. A continuation of ECE 481[0]. A formal written report and a formal presentation is required at the end of the semester. This course meets the student learning outcomes in the Western Michigan University Essential Studies Level III – Connections, Local and National Perspectives. Prerequisite: ECE 4810.

ECE 4820 Course Objective and Learning Outcomes
Student design teams refine, implement, and validate design projects that were proposed in ECE 4810 Senior Design I under the direction of a faculty advisor. The project implementation and results are presented at the public senior design conference and documented in a detailed final report. This includes an evaluation of whether the project meets the original performance specifications. Project progress is reported by each team member via memos to the faculty advisor via the course coordinator. Each student is urged to keep a permanently bound journal/log/lab notebook in which individual contributions to the design project are recorded.

Students must demonstrate:

1. an ability to implement a device or system that meets an identified need;
2. an ability to troubleshoot hardware and/or software components of a device or system;
3. an ability to use physical and/or mathematical models to verify that a designed device or system satisfies design specifications;
4. "effective and appropriate oral and digital communication" to describe a device or system designed to meet an identified need [WES Level III Learning Connections Local and National Perspectives Outcome] (see attached official rubric);
5. an ability to provide effective documentation for an engineering design project;
6. an ability to "work both independently and in collaboration with others to achieve goals" [WES Level III Connections Local and National Perspectives Learning Outcome] (see attached official rubric);
7. an ability to develop and adapt a project schedule to meet deadlines;
8. an appreciation of the importance of using notebooks to document engineering research and development work; and
9. an ability to "apply ethical, critical, and informed thought within... one discipline" [WES Level III Connections Local and National Perspectives Learning Outcome, Option 1] (see attached official rubric).

Course Development and Acknowledgements
Dr. John Gesink developed and collected much of the material originally used in this course. Drs. Massood Atashbar, Steve Durbin, Daniel Litynski, Damon Miller, and Ralph Tanner have made subsequent improvements. Student suggestions for improvement are encouraged.
<table>
<thead>
<tr>
<th>Outcome</th>
<th>Assignment and/or Learning Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstrate effective and appropriate oral and digital communication</td>
<td>Student teams use digital communication tools to present (1) project progress reports to the class at least twice during the semester and (2) their final project design at the public senior design conference at the end of the semester.</td>
</tr>
<tr>
<td>Work both independently and in collaboration with others to achieve goals</td>
<td>Students work in teams and individually to complete their senior design project under the direction of a faculty advisor. This includes regular meetings with the advisor throughout the semester. The final design is documented in a written project report as submitted to the ECE Department. Though students work in teams, the grade of each team member is based on factors described in the Grading Basis section.</td>
</tr>
<tr>
<td>Apply ethical, critical, and informed thought within one discipline</td>
<td>Each student prepares a critical analysis of the ethical implications of their senior design project, citing an engineering code of ethics, such as those of the IEEE and NSPE. Since the majority of projects are supported by a diverse mix of internal and external sponsors, a multi-disciplinary perspective is often, but not always, required. A summary of this analysis is presented to the class by each team for feedback from fellow students and faculty. Each student then submits an updated analysis to the course coordinator for assessment.</td>
</tr>
</tbody>
</table>
Learning Outcome: Demonstrate effective and appropriate oral and digital communication abilities.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Exemplary</th>
<th>Proficient</th>
<th>Developing</th>
<th>Beginning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Adaptation</td>
<td>Distinct message adaptation to audience, channel, context, and purpose.</td>
<td>Demonstrates awareness of message adaptation to audience, channel, context, and purpose.</td>
<td>Partial awareness of message adaptation to audience, channel, context, and purpose.</td>
<td>Minimal attention of message adaptation to audience, channel, context, and purpose.</td>
</tr>
<tr>
<td>Supporting Material</td>
<td>Utilizes multiple, varied, credible and relevant sources and evidence.</td>
<td>Uses credible and relevant sources and evidence.</td>
<td>Provides minimal relevant and credible sources and evidence.</td>
<td>Presents no sources, or sources that lack relevance or credibility.</td>
</tr>
<tr>
<td>Oral presentation</td>
<td>Incorporates delivery techniques that are compelling and memorable to support the presentation's effectiveness.</td>
<td>Includes effective and appropriate delivery techniques to support the presentation.</td>
<td>Uses delivery techniques that partially support the presentation's effectiveness.</td>
<td>Use of delivery techniques that detract from the presentation's overall effectiveness.</td>
</tr>
<tr>
<td>Mediated presentation (digital)</td>
<td>Incorporates creative or production techniques that are highly effective and compelling and adheres to professional practice and norms.</td>
<td>Includes creative or production techniques that are effective and appropriate with evident attention to professional practice and norms.</td>
<td>Uses creative or production techniques that are partially effective and shows minimal attention to professional practice and norms.</td>
<td>Uses creative or production techniques that are minimally effective with no attention to professional practice and norms.</td>
</tr>
</tbody>
</table>
Learning Outcome: Apply ethical, critical, and informed thought within or across disciplines.

**NOTE:** Choose option 1 OR option 2 to meet this learning outcome.

**Option 1:** Include ethical thought, critical thought, and thinking within one discipline criteria.

**Option 2:** Include ethical thought, critical thought, and thinking across discipline criteria.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Exemplary</th>
<th>Proficient</th>
<th>Developing</th>
<th>Beginning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethical thought</td>
<td>Evaluates issues or situations based on articulated ethical priorities.</td>
<td>Analyzes issues or situations for their ethical dimensions</td>
<td>Identifies and discusses ethical thought in terms of principles, components, assumptions, or causality.</td>
<td>Identifies what ethical thought is as an approach to understanding personal/social responsibility, conduct, and consequences.</td>
</tr>
<tr>
<td>Critical thought</td>
<td>Formulates and justifies a critical position.</td>
<td>Critically analyzes issues or situations.</td>
<td>Compares different principles, components, assumptions, or modes of argument.</td>
<td>Identifies what critical thought is as an approach to understanding the world or an area of thought.</td>
</tr>
<tr>
<td>Thinking within one discipline.</td>
<td>Demonstrates command of applying disciplinary perspective to issues or situations.</td>
<td>Applies each disciplinary perspective to issues or situations.</td>
<td>Discusses each discipline in terms of foundational concepts.</td>
<td>Defines each discipline.</td>
</tr>
<tr>
<td>(Option 1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Assessing WMU Essential Studies Student Learning Outcomes
ECE 4820 Senior Design II (3 credit hrs)

Level III-Connections

**Local and National Perspectives**

<table>
<thead>
<tr>
<th>WMU Essential Studies Student Learning Outcome</th>
<th>Assignments and/or Learning Activities that meet the criteria within the rubric that is aligned with the SLO</th>
<th>When the SLO assessment will take place</th>
</tr>
</thead>
<tbody>
<tr>
<td>X Apply ethical, critical, and informed thought within and across disciplines</td>
<td>Each student prepares a critical analysis of the ethical implications of their senior design project, citing an engineering code of ethics, such as those of the IEEE and NSPE. Since the majority of projects are supported by a diverse mix of internal and external sponsors, a multi-disciplinary perspective is often, but not always, required. A summary of this analysis is presented to the class by each team for feedback from fellow students and faculty. Each student then submits an updated analysis to the course coordinator for assessment.</td>
<td>Weeks 6-8 (i.e. near midterm)</td>
</tr>
</tbody>
</table>

**Choose One Student Learning Outcome From Below**

<table>
<thead>
<tr>
<th>WMU Essential Studies Student Learning Outcome</th>
<th>Assignments and/or Learning Activities that meet the criteria within the rubric that is aligned with the SLO</th>
<th>When the SLO assessment will take place</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Apply different methods of intellectual inquiry, investigation and discovery</td>
<td>Students work in teams and individually to complete their senior design project under the direction of a faculty advisor. This includes regular meetings with the advisor throughout the semester. The final design is documented in a written project report as submitted to the ECE Department. Though students work in teams, the grade of each team member is based on factors described in the Grading Basis section.</td>
<td>Informally throughout the semester in terms of feedback on progress, both individually and as a team. Final project report due week 15.</td>
</tr>
<tr>
<td>X Work both independently and in collaboration with others to achieve goals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Develop sensitivity to diversity and inclusion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Develop practices for planetary sustainability</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Additionally, Select One Level I Student Learning Outcome From Below