NOTE: Changes to programs may require course changes, which must be processed electronically. Any questions should be directed to Associate Provost David Reinhold at 7-4564 or david.reinhold@wmich.edu

DEPARTMENT: Electrical and Computer engineering (ECE) COLLEGE: Engineering and Applied Sciences (CEAS)
PROPOSED EFFECTIVE FALL YEAR: Fall 2019

PROPOSED IMPROVEMENTS: Academic Program Proposed Improvements
☐ New degree* ☐ New minor*
☐ New major* ☐ Deletion*
☐ New curriculum* ☐ Revised major
☐ New concentration* ☐ Revised minor
☐ New certificate*

☐ Other (explain**)
** Other:

Title of degree, curriculum, major, minor, concentration, or certificate: Doctor of Philosophy in Electrical and Computer Engineering (Ph.D. in ECE)

Chair, Department Curriculum Committee: ___________________________ Date 12/18/18

CHECKLIST FOR DEPARTMENT CHAIRS/DIRECTORS
☐ For new programs and other changes that have resource implications, the dean has been consulted.
☐ When appropriate, letters of support from department faculty are attached.
☐ When appropriate, letters of support from other departments in the same college are attached.
☐ When appropriate, letters of support from other college deans, whose programs/courses may be affected by the change, are attached.
☐ The proposal has been reviewed by HIGE for possible implications for international student enrollment.
☐ The proposal is consistent with the departmental assessment plan, and identifies measurable learning outcomes for assessment.
☐ Detailed resource plan is attached where appropriate.
☐ All questions attached have been completed and supporting documents are attached.
☐ The proposal is written and complete as outlined in the Faculty Senate guidelines and the curriculum change guides.

Chair/Director: ___________________________ Date 12/19/2018

CHECKLIST FOR COLLEGE CURRICULUM COMMITTEE
☐ The academic quality of the proposal and the faculty involved has been reviewed.
☐ Detailed resource plan is attached where appropriate.
☐ Consistency between the proposal and the relevant catalog language has been confirmed.
☐ The proposal has been reviewed for effect on students transferring from Michigan community colleges. Detailed information on transfer articulation must be included with undergraduate proposals.
☐ Consistency between the proposal and the College and department assessment plans has been confirmed.
☐ Consistency between the proposal and the College and department strategic plans has been confirmed.
☐ All questions attached have been completed and supporting documents are attached.
☐ The proposal is written and complete as outlined in the Faculty Senate guidelines and the curriculum change guides.

Chair, College Curriculum Committee: ___________________________ Date 12/20/2018

Revised Sept. 2018. All previous forms are obsolete and should not be used.
CHECKLIST FOR COLLEGE DEANS

☐ For new programs and proposed program deletions, the provost has been consulted.
☐ For new programs, letter of support from University Libraries Dean indicating library resource requirements have been met.
☐ When appropriate, letters of support from other college faculty and/or chairs are attached.
☐ When appropriate, letters of support from other college deans, whose programs/courses may be affected by the change, are attached.
☐ The proposal has been reviewed for implications for accreditation, certification, or licensure.
☐ Detailed resource plan is attached where appropriate.
☐ All questions attached have been completed and supporting documents are attached.
☐ The proposal is written and complete as outlined in the Faculty Senate guidelines and the curriculum change guides.

Dean: [Signature] Date 12/20/2018

FOR PROPOSALS REQUIRING REVIEW BY:
GSC/USC; EPGC, GRADUATE COLLEGE, and/or FACULTY SENATE EXECUTIVE BOARD

☐ Return to Dean
☐ Forward to: Curriculum Manager: Date:

☐ Approve ☐ Disapprove *needs review by
Chair, GSC/USC: Date

☐ Approve ☐ Disapprove Chair, EPGC: Date

☐ Approve ☐ Disapprove Graduate College Dean: Date:

☐ Approve ☐ Disapprove Faculty Senate President: Date

☐ Approve ☐ Disapprove *needs review by Provost: Date

Revised Sept. 2018. All previous forms are obsolete and should not be used.
1. Explain briefly and clearly the proposed improvement:

This proposal allows Bachelor of Science graduates to apply directly to the Doctor of Philosophy in Electrical and Computer Engineering (Ph.D. in ECE) program. It also provides minor catalog improvements in the program and department description.

2. Rationale. Give your reason(s) for the proposed improvement.

While multiple departments and programs at WMU and in CEAS have allowed Bachelor of Science graduates to apply to their doctoral programs, the Electrical and Computer Engineering Department has not followed this direction until now. The proposed changes will make ECE admission similar to other CEAS departments and programs, particularly, Mechanical Engineering, Computer Science, and Industrial Engineering.

There are some near-term opportunities to admit fully funded, reportedly highly prepared international students, but the program only supports B.S. graduates that can directly apply to a U.S. Ph.D. program. The ECE department would like the opportunity to enroll these students. However, the proposal applies to all potential B.S. graduates and applicants and is not limited to international students.

The current ECE application process focuses on admitting B.S. graduates into the M.S. program. The M.S. is dominated by students completing our coursework only M.S. degree option, and therefore, there is limited research production and a limited number that continue on to the doctoral program. It is hoped that by allowing B.S. graduates to directly enter the doctoral program, they will be available for and focus on research over a longer period of time.

Students will be advised to follow the graduate catalog's "Acquiring a Master's Degree on route to the Doctoral Degree" procedure in order to receive a thesis based M.S. and be advised to perform research as soon as possible, but it is not a requirement. If the advice is followed, it could be expected that from one to two years of additional research involvement could result.

3. 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.

No effect on other colleges, departments or programs is expected.

4. Effect on your department's programs. Show how the proposed change fits with other departmental offerings.

The proposed change could increase the number of highly qualified Ph.D. students. Admitted students will be available for research for a longer period of time (one to two years) and, thereby, research productivity should increase.

There is currently capacity in the graduate program and courses for additional students; however, with increased Ph.D. enrollment there may be an increased demand for new or additional 6000-level advanced topic course not currently offered or available.

5. Alignment with college's and department's strategic plan, mission, and vision.

There is a continuing effort and significant administrative encouragement to increase graduate enrollment in ECE and to increase research productivity and output. This proposal supports both of these goals.

6. 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.

The proposal should have no effect on current students. The proposal is making no change to the program for students entering with a master's degree. For students entering with a bachelor's degree there is no change for those who would take the MS thesis option followed by the PhD. There is a reduction of 3 credit hours for bachelor's degree students that would take the MS coursework option followed by the PhD.

Revised Sept. 2018. All previous forms are obsolete and should not be used.
7. 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?

There are regularly one to two students per year who attempt to apply to the doctoral program with only a bachelor's degree. They are informed of our admission policies and limitations and, when qualified, they are currently admitted to the master's program.

The CEAS and HIGE have been contacted by the Iraqi Cultural Attaché and informed that the Iraq Ministry of Higher Education has launched a new program to fund and send 200 qualified students to US universities to study for their doctoral degrees. One stipulation is that the qualified students hold B.S. degrees and are admitted to Ph.D. programs. One specific student has been identified, but it is possible that additional students from the 200 may apply.

With current B.S. applications and the available Iraq opportunity, it is expected that at least one and possibly from 4 to 8 students may be interested in this change.

8. Effects on resources. Explain how your proposal would affect department and University resources, including faculty, equipment, space, technology, and library holdings. If proposing a new program, include a letter and/or email of support from the university libraries affirming that the library resource issues have been reviewed. Tell how you will staff additions to the program. If more advising will be needed, how will you provide for it? What will be the initial one-time costs and the ongoing base-funding costs for the proposed program? (Attach additional pages, as necessary.)

There is no currently anticipated effect on resources. If there is an increase in Ph.D. enrollment and/or students requiring additional courses based on the BS to PhD course credits required, there may be an increased demand for new or additional 6000-level advanced topic course not currently offered or available.

9. List the learning outcomes for the revised or proposed major, minor, or concentration. The department will use these outcomes for future assessments of the program.

The proposal has no effect on learning outcomes or assessment activities performed at the graduate level.

10. Describe how this change is a response to assessment outcomes that are part of a department or college assessment plan or informal assessment activities.

The proposed change is in response to an external constituent request made to CEAS and HIGE.

11. (Undergraduate proposals only) Describe in detail how this change affects transfer articulation for Michigan community colleges. For new majors or minors, describe transfer guidelines to be developed with Michigan community colleges. For revisions to majors or minors, describe necessary revisions to Michigan community college guidelines. Department chairs should seek assistance from college advising directors or from the admissions office in completing this section.

Not applicable.

12. Please offer both "Current Catalog Language" and "Proposed Catalog Language" if there is to be a change in the catalog description for a given program. For the "current" language, please copy and paste relevant language from the most current catalog and for the "proposed" language, please share the exact proposed new catalog language. As possible, bold or otherwise note the key changes in the new proposed catalog language.

Please see the following pages.
New Proposed Catalog Description

Doctor of Philosophy in Electrical and Computer Engineering

Advising: Department Chair or a Faculty Member/Advisor listed on Admission Letter B-236 Floyd Hall (Parkview Campus)

The Doctor of Philosophy in Electrical and Computer Engineering is designed to provide students advanced electrical/computer engineering education and research opportunities. The program will engage doctoral students in independent research in the field of electrical/computer engineering which will prepare them for research and development positions in the rapidly growing information and electronics sectors.

Current research areas in the department include real-time embedded systems, computer architecture and systems, biomedical engineering, signal processing, image processing, sensors and nanotechnology, biological neural networks, fuzzy logic, energy conversion, power electronics systems, communications and networking, semiconductor materials and devices, printed electronics and devices, flexible hybrid electronics, and control systems. The department has seven instructional laboratories in electric circuits, digital logic, energy conversion systems, microcomputer systems, programmable digital systems, senior design, and digital and analog electronics. In addition, there are eight labs for student and faculty research. These labs include a digital image and signal processing lab, a power equipment simulation and design lab, a computer architecture and system research lab, a neurobiology and non-linear systems engineering lab, a RF communications and RFID lab with radio frequency shield rooms, an intelligent fuzzy controllers lab, molecular and beam epitaxy lab and a smart sensors and structures lab.

Admission Requirements

To be admitted to the Ph.D. program, a student must satisfy the following requirements:

1. Satisfy the general admission requirements of the Graduate College.

2. Possess a Bachelor of Science in electrical or computer engineering, with a minimum 3.2 grade point average, or a Master of Science in electrical or computer engineering, with a minimum 3.0 grade point average. Exceptional applicants with a master’s degree in other closely related quantitative fields such as engineering, mathematics, physics, or computer science will be considered on a case by case basis, after completing a prescribed set of prerequisite courses.

3. Submit results of the GRE General Test.

4. Three (3) recommendation letters from faculty familiar with the student’s work.

5. A personal statement of intended research goals, intended academic fields(s) of interests, and any previous research experiences written by the applicant.

All requirements for the Ph.D. must be completed within seven (7) years preceding the date on which the degree is conferred.

Program Requirements
The credit hour, course work, and general program requirements include:

1. Minimum of 50 credit hours beyond the master's degree to include:
   a. 15 hours of:
      ECE 7300 - Doctoral Dissertation Credits: 15 hours
   b. A maximum of 12 hours of:
      ECE 6970 - Problems in Electrical and Computer Engineering Credits: 1-6 hours or
      ECE 7100 - Independent Research Credits: 2-6 hours
   c. A minimum of 2 hours of:
      ECE 7250 - Doctoral Research Seminar Credits: 2-6 hours
   d. A minimum of 21 hours of graduate course work approved by the doctoral dissertation committee at least 12 hours of which should be ECE courses.

2. Minimum of 80 credit hours beyond the bachelor's degree to include:
   a. 15 hours of:
      ECE 7300 - Doctoral Dissertation Credits: 15 hours
   b. A maximum of 18 hours of:
      ECE 6970 - Problems in Electrical and Computer Engineering Credits: 1-12 hours or
      ECE 7000 – Master's Thesis Credits: 1-6 hours or
      ECE 7100 - Independent Research Credits: 2-6 hours
   c. A minimum of 2 hours of:
      ECE 7250 - Doctoral Research Seminar Credits: 2-6 hours
   d. A minimum of 45 hours of graduate course work approved by the doctoral dissertation committee at least 39 hours of which should be ECE courses.
   e. Students may acquire a Master's Degree en route to the doctoral degree based on the procedure outlined by the graduate college.
   f. Students who choose to discontinue their doctoral studies after completing a minimum of 30 to 33 graduate credits and meet the master's degree requirements in electrical or computer engineering, may be awarded a master's degree.

3. Ph.D. Qualifying Examination:
a. For those entering with an M.S., the QE is to be taken within the first year after admission.

b. For those entering with a B.S., the QE is to be taken within the first three years after admission.

4. Comprehensive Examination administered by the doctoral dissertation committee to be taken before a student becomes a doctoral candidate.

5. The general graduation requirements of the Graduate College.

6. At least one-half of the credits earned for the doctoral degree must be in courses numbered 6000 or above.

7. Presentation/publication requirements as specified by the doctoral dissertation committee.

8. Research Tools:

Completion (with a "B" or better grade) of at least six hours in engineering, science, or mathematics at the graduate level designated as research tools by the doctoral dissertation committee.

9. A one-year residency during which the student will conduct research.

10. Final dissertation defense and approval by committee.
Current/Existing Catalog Description

Doctor of Philosophy in Electrical and Computer Engineering

Advising: Department Chair or a Faculty Member/Advisor listed on Admission Letter B-236 Floyd Hall (Parkview Campus)

The Doctor of Philosophy in Electrical and Computer Engineering is designed to provide students advanced electrical/computer engineering education and research opportunities. The program will engage doctoral students in independent research in the field of electrical/computer engineering which will prepare them for research and development positions in the rapidly growing information and electronics sectors.

Current research areas in the department include real-time embedded systems, biomedical engineering, signal processing, image processing, sensors and nanotechnology, biological neural networks, fuzzy logic, energy conversion, power electronics systems, communications and networking, semiconductor materials and devices, and control systems. The department has seven instructional laboratories in electric circuits, digital logic, energy conversion systems, microcomputer systems, programmable digital systems, and digital/analog electronics. In addition, there are seven labs for student and faculty research. These labs include radio frequency shield rooms, a digital signal-processing lab, an image processing lab, a RF communications and RFID lab, an intelligent fuzzy controllers lab, and a smart sensors and structures lab.

Admission Requirements

To be admitted to the Ph.D. program, a student must satisfy the following requirements:

1. Satisfy the general admission requirements of the Graduate College.

2. Possess an M.S. in electrical or computer engineering, with a minimum 3.0 grade point average. Exceptional applicants with a master’s degree in other closely related quantitative fields such as engineering, mathematics, physics, or computer science will be considered on a case by case basis, after completing a prescribed set of prerequisite courses.

3. Submit results of the GRE General Test.

4. Three (3) recommendation letters from faculty familiar with the student’s work.

5. A personal statement of intended research goals, intended academic fields(s) of interests, and any previous research experiences written by the applicant.

All requirements for the Ph.D. must be completed within seven (7) years preceding the date on which the degree is conferred.

Program Requirements

The credit hour, course work, and general program requirements include:
1. Minimum of 50 credit hours beyond the master's degree to include:

   a. 15 hours of:

   ECE 7300 - Doctoral Dissertation Credits: 15 hours

   b. A maximum of 12 hours of:

   ECE 6970 - Problems in Electrical and Computer Engineering Credits: 1-6 hours or

   ECE 7100 - Independent Research Credits: 2-6 hours

   c. A minimum of 2 hours of:

   ECE 7250 - Doctoral Research Seminar Credits: 2-6 hours

   d. A minimum of 21 hours of graduate course work approved by the doctoral dissertation committee at least 12 hours of which should be ECE courses.

2. Ph.D. Qualifying Examination, to be taken within the first year after admission.

3. Comprehensive Examination administered by the doctoral dissertation committee to be taken before a student becomes a doctoral candidate.

4. The general graduation requirements of the Graduate College.

5. Presentation/publication requirements as specified by the doctoral dissertation committee.

6. Research Tools:

   Completion (with a "B" or better grade) of at least six hours in engineering, science, or mathematics at the graduate level designated as research tools by the doctoral dissertation committee.

7. A one-year residency during which the student will conduct research.

8. Final dissertation defense and approval by committee.
----- Forwarded Message -----

Subject: Fw: Recruitment & Admission of Iraqi Graduate Students  
Date: Sun, 9 Dec 2018 22:09:23 -0500  
From: Susan R Stapleton <susan.stapleton@wmich.edu>  
   To: Bradley J Bazuin <brad.bazuin@wmich.edu>  
   CC: Susan R Stapleton <susan.stapleton@wmich.edu>

Brad,  
Is there any chance to get this done before break? See note from Dave Reinhold.

Sue

From: David S Reinhold  
Sent: Friday, December 7, 2018 12:15 PM  
To: Susan R Stapleton; Jody A Brylinsky  
Subject: Re: Recruitment & Admission of Iraqi Graduate Students

Sue;  
I just had a discussion with Jody about this and I think we have a fairly clean solution.

I have talked with Kelley Oliver and the Registrar's Office is willing to get this change into  
the fall 2019 catalog if the department can get the change to us ASAP (before break).  
This is a unique enough situation for me to be comfortable forgoing the October 31  
deadline. When you inform the department, please make it clear that this is being done  
due to this unique opportunity. We do not make these kinds of exceptions as a general  
rule of thumb.

Dave

From: Susan R Stapleton  
Sent: Thursday, December 6, 2018 11:32 PM  
To: Jody A Brylinsky  
CC: David S Reinhold; Susan R Stapleton  
Subject: Re: Recruitment & Admission of Iraqi Graduate Students

So we do have both provisional and conditional admission and it is defined in the  
ggraduate catalog. These students would be admitted to the PhD with the  
provision/condition that they complete the masters along the way.
graduate have conditional admission to the PhD program. It also meets the time frame of the Iraqi scholarship opportunity.

We intend to work on a PhD program curriculum change to allow direct BS admission, following the example of the admission requirements for the PhD in Mechanical Engineering, in the spring semester but would not expect it to be approved and available until fall 2020 catalog.

Until this can be accomplished and to meet the time frame of this unique opportunity, we would like to request an exception to the current ECE graduate PhD program admissions policies for Iraqi applicants and allow Iraqi BS students to directly apply and, if qualified and approved, be conditionally admitted to the PhD program.

If appropriate, and for your information and review, the Example Five Year Plan drafted in October is attached as well as a draft set of admission conditions that require the plan to be followed.

Best Regards,

Dr. Bradley Bazuin
Chair & Associate Professor
Electrical and Computer Engineering

<ECE_MSPhDFiveYearPlan.docx>
<ECE_MSPhDPlanConditions.docx>