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Utah State University

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8 March 2019

ITEM FOR ACTION

Utah State University's Department of Electrical and Computer Engineering in the College of Engineering proposes offering a minor in Electrical Engineering in the manner described below.

EXECUTIVE SUMMARY

The Department of Electrical and Computer Engineering in the College of Engineering proposes offering a minor in Electrical Engineering.

RECOMMENDATION

The President and Provost recommend that the Board of Trustees approve the proposal to offer a minor in Electrical Engineering in the College of Engineering's Department of Electrical and Computer Engineering.

RESOLUTION
UTAH STATE UNIVERSITY
BOARD OF TRUSTEES

WHEREAS, Utah State University's Department of Electrical and Computer Engineering in the College of Engineering proposes offering a minor in Electrical Engineering, and

WHEREAS, The proposed change will offer the students a cross disciplinary background and will make them highly sought after in the job market, and

WHEREAS, The proposal has been approved by the academic dean, the Educational Policies Committee, and the USU Faculty Senate, and

WHEREAS, The proposal has been approved by the President and Provost of Utah State University;

NOW THEREFORE BE IT RESOLVED, That the Utah State University Board of Trustees hereby approve the proposal to offer a minor in Electrical Engineering in the College of Engineer's Department of Electrical and Computer Engineering and that notification of this proposal be forwarded to the Utah State Board of Regents of the Utah System of Higher Education.

RESOLUTION APPROVED BY THE BOARD OF TRUSTEES

DATE:

**Utah System of Higher Education
New Academic Program Proposal
Cover/Signature Page - Abbreviated Template**

Institution Submitting Request: Utah State University
Proposed or Current Program Title: Electrical Engineering
Sponsoring School, College, or Division: Engineering
Sponsoring Academic Department(s) or Unit(s): Electrical and Computer Engineering
Classification of Instructional Program Code¹ : 14.1001
Min/Max Credit Hours Required of Full Program: 17 / 19
Proposed Beginning Term²: Fall 2019
Institutional Board of Trustees' Approval Date:

<input type="checkbox"/> Certificate of Proficiency	<input type="checkbox"/> Entry-level CTE CP	<input type="checkbox"/> Mid-level CP
<input type="checkbox"/> Certificate of Completion		
<input checked="" type="checkbox"/> Minor		
<input type="checkbox"/> Graduate Certificate		
<input type="checkbox"/> K-12 Endorsement Program		
<input type="checkbox"/> NEW Emphasis for Regent-Approved Program		
<input type="checkbox"/> Out of Service Area Delivery Program		

Chief Academic Officer (or Designee) Signature:

I, the Chief Academic Officer or Designee, certify that all required institutional approvals have been obtained prior to submitting this request to the Office of the Commissioner.

Please type your first and last name _____ Date: _____

I understand that checking this box constitutes my legal signature.

¹ For CIP code classifications, please see <http://nces.ed.gov/ipeds/cipcode/Default.aspx?y=55>.

² "Proposed Beginning Term" refers to first term after Regent approval that students may declare this program.

**Utah System of Higher Education
Program Description - Abbreviated Template**

Section I: The Request

Utah State University requests approval to offer the following Minor: Electrical Engineering effective Fall 2019. This program was approved by the institutional Board of Trustees on .

Section II: Program Proposal/Needs Assessment

Program Description/Rationale

Present a brief program description. Describe the institutional procedures used to arrive at a decision to offer the program. Briefly indicate why such a program should be initiated. State how the institution and the USHE benefit by offering the proposed program. Provide evidence of student interest and demand that supports potential program enrollment.

There is a strong demand from industry for mechanical engineers to have a better background in electrical engineering topics. To address this need, the Electrical and Computer Engineering Department developed the proposed requirements for a Minor in Electrical Engineering. The proposed program utilizes existing classes only (no new classes needed).

This need was first proposed by the department by USU's Mechanical and Aerospace Engineering Department, based on the following article: <https://www.asme.org/engineering-topics/articles/technology-and-society/does-silicon-valley-have-enough-engineers> which outlines the need for cross disciplinary electrical engineers with a better background in mechanical engineering, and similarly mechanical engineers with a better background in electrical engineering. The article states that "someone who has experience with industrial assets and mechanical engineering as well as IT skills will be the most sought after... Those people are not easy to find." Both the Mechanical and Electrical engineering departments at USU are developing minors to their BS degree programs to address this need. The department currently has Mechanical Engineering students taking classes from the Electrical Engineering department and Electrical Engineering students are taking Mechanical Engineering classes to make themselves more attractive to potential employers. What is lacking is formal recognition of these efforts on the students transcripts.

This minor would be appropriate for any students in the engineering or physics programs at USU.

Labor Market Demand

Provide local, state, and/or national labor market data that speak to the need for this program. Occupational demand, wage, and number of annual openings information may be found at sources such as Utah DWS Occupation Information Data Viewer (jobs.utah.gov/jsp/wi/utalmis/gotoOccinfo.do) and the Occupation Outlook Handbook (www.bls.gov/oco).

According to <https://jobs.utah.gov/jsp/utalmis/#/occupation/17-2141.00/report> website, both mechanical and electrical engineers have a 5 star rating for Occupation Outlook. Current graduates of the programs do not have difficulty finding good paying jobs. As mentioned above, students with cross disciplinary backgrounds are highly sought after on both a state and national level. Putting forth this minor is a way for students to get that recognized for their cross disciplinary background.

In addition, one sub-discipline that is very much in demand today is the engineering necessary for driverless automobiles (autonomous vehicles). This hot area requires expertise in control systems and computer controllers, which is an area of electrical engineering that can be studied in the proposed minor.

Consistency with Institutional Mission/Impact on Other USHE Institutions

Explain how the program is consistent with the institution's Regents-approved mission, roles, and goals. Institutional mission and roles may be found at higheredutah.org/policies/policyr312/. Indicate if the program will be delivered outside of designated service area; provide justification. Service areas are defined in higheredutah.org/policies/policyr315/.

This minor would only be available at Utah State University and would be consistent with the institution's mission, roles, and goals. This is the first electrical engineering minor offered by a USHE institution, which will make USU unique in the system.

Finances

What costs or savings are anticipated in implementing the proposed program? If new funds are required, indicate expected sources of funds. Describe any budgetary impact on other programs or units within the institution.

No additional costs are anticipated with this change. The number of students anticipated to participate in the minor will be small enough to fit into the department's current class enrollments.

Section III: Curriculum

Program Curriculum

List all courses, including new courses, to be offered in the proposed program by prefix, number, title, and credit hours (or credit equivalences). Indicate new courses with an X in the appropriate columns. The total number of credit hours should reflect the number of credits required to receive the award. **For NEW Emphases, skip to emphases tables below.**

For variable credits, please enter the minimum value in the table below for credit hours. To explain variable credit in detail as well as any additional information, use the narrative box below.

		Course Number	NEW Course	Course Title	Credit Hours
General Education Courses (list specific courses if recommended for this program on Degree Map)					
General Education Credit Hour Sub-Total					0
Required Courses					
+	-	ECE 1400		Computer Programming for Electrical and Computer Engineers I	4
+	-	ECE 3620		Continuous-Time Systems and Signals	3
+	-	ECE 3710		Microcontroller Hardware and Software	4
Required Course Credit Hour Sub-Total					11
Elective Courses					
+	-	ECE 2290		Electrical Circuits 2	3
+	-	ECE 2700		Digital Circuits	4
+	-	ECE 3700		Digital System Design	3
+	-	ECE 3410		Microelectronics I	4
+	-	ECE 3640		Discrete-Time Signals and Systems	3
+	-	ECE 3870		Electromagnetics I	4
+	-	ECE 5230		Spacecraft Systems Engineering	3
+	-	ECE 5240		Space System Design	3
+	-	MAE 5530		Space System Design	3
+	-	MAE 5310		Dynamic Systems and Controls	3
+	-	ECE 5310		Control Systems	3
+	-	MAE 5320		Mechatronics	3
+	-	ECE 5320		Mechatronics	3
+	-	ECE 5330		Small Unmanned Aircraft Systems	3
+	-	MAE 5330		Small Unmanned Aircraft Systems	3
+	-	ECE 5460		VLSI Design Automation	3
+	-	ECE 5600		Introduction to Computer Networks	3
+	-	ECE 5630		Digital Signal and Image Processing	3
+	-	ECE 5640		Real-Time Processors	4
+	-	ECE 5660		Communication Systems I	3
+	-	ECE 5720		Computer Systems Programming and Architecture	3
Elective Credit Hour Sub-Total					6

	Course Number	NEW Course	Course Title	Credit Hours
Core Curriculum Credit Hour Sub-Total				17

Program Curriculum Narrative

Describe any variable credits. You may also include additional curriculum information, as needed.

Some of the courses allowed as electives for the minor require 4 credit hours of effort instead of the nominal three credit hours. This could cause some students to take a maximum of 19 credit hours to complete the minor.

Two courses from the above elective course list need to be taken. No course may be applied toward a minor in Electrical Engineering with an earned grade of less than C-. No course may be repeated more than one time to improve the grade to a C- or better. Courses for Electrical Engineering Minors may not be taken on a Pass/ Fail Basis.

Degree Map

Degree maps pertain to undergraduate programs ONLY. Provide a degree map for proposed program. Degree Maps were approved by the State Board of Regents on July 17, 2014 as a degree completion measure. Degree maps or graduation plans are a suggested semester-by-semester class schedule that includes prefix, number, title, and semester hours. For more details see <http://higheredutah.org/pdf/agendas/201407/TAB%20A%202014-7-18.pdf> (Item #3).

Please cut-and-paste the degree map or manually enter the degree map in the table below

A typical degree map could be as follows:

Year 1

Fall Semester - ECE 1400 (Computer Programming for Electrical and Computer Engineers I), 4 credits

Year 2

Fall Semester - ECE 3620 (Continuous-Time Systems and Signals), 3 credits

Year 3

Fall Semester - ECE 3710 (Microcontroller Hardware and Software), 4 credits

ECE 5310 (Control Systems), 3 credits

Spring Semester - ECE 5330 (Small Unmanned Aircraft Systems), 3 credits

It is noted that ECE 1400 is currently taught every semester giving flexibility.