SOUTH DAKOTA BOARD OF REGENTS

Academic and Student Affairs

AGENDA ITEM: 4 – J (1)

DATE: March 30 – April 1, 2016

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SUBJECT: New Program: SDSU Minor in Electronics

South Dakota State University (SDSU) requests authorization to offer a baccalaureate minor in Electronics. SDSU currently has a related major in Electronics Engineering Technology. The minor will benefit students interested in applied technology and science fields by expanding their understanding of the theory and use of electronic devices and electronic systems. The minor is intended to meet the growing number of students interested in precision agriculture, manufacturing, and entrepreneurship. SDSU expects to graduate 18 students per year with this minor after full implementation.

The proposed curriculum does not require the addition of any new courses and consists of 18 credit hours. SDSU is not requesting new resources.

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RECOMMENDED ACTION OF THE EXECUTIVE DIRECTOR

I move to approve SDSU's proposal for a Minor in Electronics as described in Attachment I.

South Dakota Board of Regents
New Baccalaureate Degree Minor

University:	South Dakota State University
Title of Proposed Minor:	Electronics
Degree(s) in which minor may be earned:	Any
Existing related majors or minors:	Electronics Engineering Technology (B.S.)
Proposed Implementation (term):	Fall 2016
Proposed CIP Code:	15.0303

University Approval
To the Board and the Executive Director: I certify that I have read this proposal, that I believe it to be accurate, and that it has been evaluated and approved as provided by university policy.

David L. Chicoine

President of the University

February 10, 2016
Date

After approval by the President, a signed copy of the proposal should be transmitted to the Executive Director. Only after Executive Director review should the proposal be posted on the university web site and the Board staff and the other universities notified of the URL.

1. Do you have a major in this area? X Yes _____ No

South Dakota State University (SDSU) is authorized to deliver the Electronics Engineering Technology major.

2. If you do not have a major in this area, explain how the proposed minor relates to your mission.

Not applicable.

3. How will the proposed minor benefit students?

The minor in Electronics will provide students in applied technology and science fields such as engineering, architecture, agricultural systems technology, and computer science the opportunity to learn more about the underlying theory and use of electronic devices and the configuration of electronic systems. The minor will provide technical knowledge for the growing number of students interested in precision agriculture as devices, sensors, and electronic systems underlie this technology making them more competitive in the workplace. The minor will also meet the needs of Maker Movement technology enthusiasts and entrepreneurs who develop sophisticated devices and gadgets for sale or open-source distribution. The Maker Movement could be described as a combination of DIY, manufacturing, entrepreneurship, and tinkering where people start businesses that offer products that are trending, saleable, and often use open source technology.

South Dakota State University
New Minor: Electronics

4. Provide estimated enrollments and completions in the table below and explain how the estimates were developed.

These estimates were based on 5 percent of enrollments in Agricultural Systems Technology, Computer Science, Mechanical Engineering, and Entrepreneurial Studies programs as it is anticipated these programs will be the primary source of students for the minor.

	Fiscal Years*			
	1st	2nd	3rd	4th
Estimates	FY17	FY18	FY19	FY20
Students in the minor (fall)	5	12	18	24
Completions by graduates	0	5	12	18

* Do not include current year.

5. What is the rationale for the curriculum?

The curriculum establishes fundamental competency in basic electronics via the first three courses: Introduction to Electronic Systems, Analog Electronics, and Digital Electronics and Microprocessors. The next two, Microcontrollers and Circuit Boards & Design, add necessary skills to develop software and build hardware systems.

6. Complete the tables below. Explain any exceptions to BOR policy being requested.

A. Distribution of Credit Hours

Electronics	Credit Hours	Percent
Requirements in Minor	14	78
Electives in the Minor	4	22
Total	18	100%

B. Required Courses in the Minor

Prefix	Number	Course Title	New*	Hours
ET	210-210L	Introduction to Electronic Systems & Lab	N	4
ET	220-220L	Analog Electronics & Lab	N	4
ET	232-232L	Digital Electronics & Microprocessors & Lab	N	3
ET 330-330L Microcontrollers & Lab OR ET 451-451L Industrial Controls & Lab			N	3
		Subtotal, required		14

* New: Y= yes, N = no.

C. Elective Courses in the Minor: **List courses that may be taken as electives in the minor. Indicate any new courses to be added specifically for the minor.**

Prefix	Number	Course Title	New*	Hours
Technical Electives**(Selected with Department Approval)*			N	4

Subtotal, required		4

*Students should be able to complete this minor with 18 credits. There are a number of 2 and 4 credit courses available: ABE 314/L, ARCH 411 (2) + ARCH 472 (2), CHEM 112/L, EE 320L, EE 385, EE 430/L, ET 230/L, ET 370/L, ET 472/L, PHYS 113/L, PHYS 213/L. Also, all programs have a senior design sequence of 2+2 or 2+1 which provide additional options.

7. What outcomes will be expected for all students who complete the minor? How will these outcomes be achieved?

Upon completion of the minor in Electronics, students will be able to:

a. Understand theory and apply the concepts of voltage, current, resistance, power, and energy in circuits in lab assignments;
b. Demonstrate the proper use of electronic test instruments and troubleshoot devices and circuits using root cause analysis;
c. Demonstrate the ability to use software commands in the control of hardware/software used in electronic systems;
d. Apply knowledge of software and hardware systems used in industrial and electronics environments; and,
e. Collect data and information from experiments and other sources, critically analyze the information, and propose solutions suitable for the situation.

These selected course outcomes are currently implemented within the Electronics Engineering Technology program as part of accreditation requirements. These outcomes are specific to the required courses in the minor.

8. What instructional technologies will be used to teach courses in the minor? *This refers to the instructional technologies used to teach the <u>new</u> courses in the minor and NOT the technology applications students are expected to learn.*

There are no new courses that will be taught in the minor. Current instructional technologies will be used. All courses are offered in traditional face-to-face classroom and lab environments on the SDSU campus.

9. Is the University is requesting authorization to provide the minor to students at an off-campus location or by distance delivery? If yes, explain. *If off-campus or distance delivery authorization is not requested, enter "None."*

None.

10. Costs, Budget & Resources: Explain the amount and source(s) of any one-time and continuing investments in personnel, professional development, release time, instructional technology and software, other O&M, facilities, etc needed to implement the minor.

All courses are currently being taught. No additional resources are needed. The minor in Electronics will leverage available section capacity in the Electronics Engineering Technology program.

South Dakota State University
New Minor: Electronics

Appendix A
Electronics Minor – Student Learning Outcomes

	Required Coursework				
Individual Student Outcomes	ET 210-210L	ET 220-220L	ET 232-232L	ET 330-330L	ET-451-451L
Students will understand theory and apply the concepts of voltage, current, resistance, power, and energy in circuits in lab assignments.	X	X			
Students will demonstrate the proper use of electronic test instruments and troubleshoot devices and circuits using root cause analysis.		X	X		
Students will demonstrate the ability to use software commands in the control of hardware/software used in electronic systems.				X	X
Students will apply knowledge of software and hardware systems used in industrial and electronics environments.			X		X
Students will collect data and information from experiments and other sources, critically analyze the information, and propose solutions suitable for the situation.					X