

**SOUTH DAKOTA BOARD OF REGENTS
ACADEMIC AFFAIRS FORMS**

New Graduate Degree Program

UNIVERSITY:	SDSU
PROPOSED GRADUATE PROGRAM:	Mechanical Engineering
EXISTING OR NEW MAJOR(S):	Existing
DEGREE:	Doctor of Philosophy (Ph.D.)
EXISTING OR NEW DEGREE(S):	Existing
INTENDED DATE OF IMPLEMENTATION:	2020-2021 Academic Year
PROPOSED CIP CODE:	14.1901
SPECIALIZATIONS:¹	N/A
IS A SPECIALIZATION REQUIRED (Y/N):	No
DATE OF INTENT TO PLAN APPROVAL:	Waived
UNIVERSITY DEPARTMENT:	Mechanical Engineering
UNIVERSITY DIVISION:	Graduate School

University Approval

To the Board of Regents 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.

4. to support the development of new technologies and provide an appropriate vehicle to drive innovation and entrepreneurship through the Research Park at South Dakota State University;
5. to assist South D graduates to work in:
 - < advanced manufacturing, including research and development of innovative techniques for manufacturing processes, automation, and process control
 - < development of biomedical processes, equipment and systems in support of the growing high-impact regional medical industry
 - < engineering of systems used in production agriculture, including technology for precision agriculture
 - < renewable energy and bio-resource conversion technologies.

SDSU currently offers a Ph.D. in Agricultural, Biosystems, and Mechanical Engineering (ABME). This degree configuration has not proven attractive to qualified students with mechanical engineering backgrounds who are interested in research-based careers. This hinders recruiting of mechanical engineering students. The backgrounds of students currently enrolled in the program are a hodge-podge of unrelated disciplines, indicating that it appeals mainly to students with food or agriculture focus, or to those who want to earn a Ph.D. but for various reasons do not have other good options. It is not serving the needs of the mechanical engineering graduate program. Potential students who want to pursue a mechanical engineering graduate degree believe that it will be an unnecessary obstacle to seeking employment after graduation.

Infrastructure and expertise exist

Board Policy 1:10:2 South Dakota State University Mission Statement provides: *The legislature established South Dakota State University as the Comprehensive Land Grant University to meet the needs of the State and region by providing undergraduate and graduate programs of instruction in the liberal arts and sciences and professional education in agriculture, education, engineering, human sciences, nursing, pharmacy, and other courses or programs as the Board of Regents may determine (SDCL 13-58-1).*

The Board implemented SDCL 13-58-1 by authorizing South Dakota State University to serve students and clients through teaching, research, and extension activities. The

through the doctoral levels. The University complements this goal by conducting nationally competitive strategic research and scholarly and creative activities. Furthermore, South Dakota State University facilitates the transference of knowledge through the Cooperative Extension Service with a presence in every county and through other entities, especially to serve the citizens of South Dakota.

South Dakota State University is unique within the South Dakota System of Higher Education because of its comprehensive land grant mission. The mission is implemented through integrated programs of instruction, the Cooperative Extension Service, the Agricultural Experiment Station, and numerous auxiliary and laboratory services.

through the doctoral level in engineering. SDSU offers other Ph.D. programs in science and engineering fields, including Ph.D.s in Civil Engineering, Electrical Engineering, and Computational Science and Statistics. The University has offered the B.S. degree in Mechanical Engineering since 1884 and the M.S. degree for many decades.

The program supports the Board of Regents Strategic Plan 2014-2020 by specifically addressing the following points (Policy 1:21)³:

Vision

-educated.

2.2. South Dakotans will have increased access to continuing education opportunities needed to upgrade their credentials while remaining in the workforce.

2.4. The South Dakota ec

significant jump in the percentage of respondents hiring graduates with doctoral degrees.

B. Are

8. Did the University engage any developmental consultants to assist with the development of the curriculum?¹⁹ Did the University consult any professional or accrediting associations during the development of the curriculum? What were the contributions of the consultants and associations to the development of curriculum?

No developmental consultants were engaged in developing this proposal.

The curriculum was developed with reference to the existing curriculum at SDSM&T as well as those of the University of Minnesota, Iowa State University, and Colorado State University.

9. Are students enrolling in the program expected to be new to the university or redirected from other existing programs at the university? Complete the table below and explain the methodology used in developing the estimates (*appropriate year*)? If question 12 includes a request for authorization for off-campus or distance delivery, add lines to the table for off-campus/distance students, credit hours, and graduates.

Three Ph.D. students who desire to complete a mechanical engineering degree are currently enrolled in the ABME Ph.D. at SDSU. These students will be redirected to the Ph.D. in Mechanical Engineering. Other students will be new to the University or will continue into the Ph.D. program after completing the M.S. in Mechanical Engineering at SDSU.

New student enrollments are initially expected to be two per year, with numbers stabilizing at around three per year by the third year of program existence. To estimate program output, data

University, North Dakota State University, the University of Idaho and the University of Wyoming) were collected. In addition, data for the established SDSU Ph.D. in Electrical Engineering were included.²⁰ The average number of doctoral graduates for mature regional Mechanical Engineering programs is two per year. The Ph.D. program in Electrical Engineering (E.E.) at SDSU has been meeting or exceeding that number. Given these figures and the estimated enrollment in the proposed program, a projected number of doctorates awarded was developed.

Fiscal Years*
1

*Do not include current fiscal year.

** Assumes students are registered for 10 credit hours in the fall and spring terms and 1 credit in summer (21 credits total per year). This is the total number of credit hours generated by students in the program in the required or elective program courses. The same numbers are used in Appendix B Budget.

10. Is program accreditation available? If so, identify the accrediting organization and explain whether accreditation is required or optional, the resources required, and the University's plans concerning the accreditation of this program.

There is no program accreditation available for the proposed program.

11. Does the University request any exceptions to any Board policy for this program? Explain any requests for exceptions to Board Policy. *If not requesting any exceptions, gpvgt 'õPqpgö*

None.

12.

B. Complete the following chart to indicate if the university seeks authorization to deliver more than 50% but less than 100% of the certificate through distance learning (e.g., as an online program)?²³

	Yes/No	<i>If Yes, identify delivery methods</i>	<i>Intended Start Date</i>
Distance Delivery (online/other distance delivery methods)	Yes	D2L, Access Grid and the Dakota Digital Network	2020-2021 Academic Year

13. Cost, Budget, and Resources: Explain the amount and source(s) of any one-time and continuing investments in personnel, professional development, release time, time redirected from other assignments, instructional technology & software, other operations and maintenance, facilities, etc., needed to implement the proposed major. Address off-campus or distance delivery separately. Complete Appendix B ó Budget and briefly summarize to support Board staff analysis.

The program budget is provided in Appendix B.

The needed infrastructure and resources necessary to offer the proposed program are in place at SDSU. The SDSU Jerome J. Lohr College of Engineering will direct \$42,000/yr. in base

YES,
the university is seeking approval of new courses related to the proposed program in conjunction with program approval. All New Course Request forms are included as Appendix C and match those described in section 5D.

NO,
the university is not seeking approval of all new courses related to the proposed program in conjunction with program approval; the institution will submit new course approval requests separately or.G 12f flmaa(e)4(r)13(a)14(t(m)8()10(i)8(nr)13()10)12(c)14((a)4(r)13(u)10(n(s)9(e)10(w)12

Appendix A

Ph.D. in Mechanical Engineering – Student Learning Outcomes

Individual Student Outcome	Program Courses that Address the Outcomes						
	ME 790*	GSR 601*	ME 898D*	ME Electives	Qualifying Exam*	Comprehensive Exam*	Dissertation Defense*
1. Acquire and apply the knowledge and skills to make an original contribution to the mechanical engineering field.			X	X	X	X	X
2. Conduct independent research within a supportive framework.			X			X	X
3. Understand and critically evaluate the relevant engineering literature.	X		X	X		X	X

Appendix B

South Dakota State University, Ph.D. in Mechanical Engineering

1. Assumptions

1st

2nd

3rd

4th

Grants/Donations/Other	\$0	\$0	\$0	\$0
Total Resources	\$80,756	\$96,258	\$96,258	\$104,010
Resources Over (Under) Budget	\$8,652	\$23,154	\$23,154	\$30,906

Provide a summary of the program costs and resources in the new program proposal.

Off-Campus Tuition, HEFF & Net	FY19		Net	
	Rate	HEFF		
Undergraduate	\$340.05	\$39.11	\$300.94	<i>Change cell on page 1</i>
Graduate	\$450.90	\$51.85	\$399.05	<i>to point to your net</i>
Externally Supported	\$40.00			

State-support: Change cell on page 1 to use the UG or GR net amount for your university.

On-Campus Tuition, HEFF & Net	FY19		Net	
	Rate	HEFF		
UG Resident - DSU, NSU	\$243.30	\$27.98	\$215.32	<i>Change cell on page 1</i>
UG Resident - SDSU, USD	\$248.35	\$28.56	\$219.79	
UG Resident - BHSU	\$254.20	\$29.23	\$224.97	<i>to point to your net</i>
UG Resident - SDSMT	\$249.70	\$28.72	\$220.98	
GR Resident - DSU,NSU	\$319.40	\$36.73	\$282.67	<i>Change cell on page 1</i>
GR Resident - SDSU, USD	\$326.05	\$37.50	\$288.55	
GR Resident - BHSU	\$328.20	\$37.74	\$290.46	<i>to point to your net</i>
GR Resident - SDSMT	\$324.85	\$37.36	\$287.49	
UG Nonresident - DSU,NSU	\$342.40	\$39.38	\$303.02	<i>Change cell on page 1</i>
UG Nonresident - BHSU	\$355.70	\$40.91	\$314.79	<i>to point to your net</i>
UG Nonresident - SDSU, USD	\$360.50	\$41.46	\$319.04	
UG Nonresident - SDSMT	\$391.10	\$44.98	\$346.12	
GR Nonresident - DSU,NSU	\$596.30	\$68.57	\$527.73	<i>Change cell on page 1</i>
GR Nonresident - BHSU	\$612.40	\$70.43	\$541.97	<i>to point to your net</i>
GR Nonresident - SDSU, USD	\$626.85	\$72.09	\$554.76	