State of Rhode Island and Providence Plantations
Council on Postsecondary Education
OFFICE OF THE POSTSECONDARY COMMISSIONER
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Enclosure 5b3
June 22, 2016

TO: Members of the Council on Postsecondary Education

FROM: Jim Purcell, Ed.D, Commissioner for Postsecondary Education

DATE: June 21, 2016

RE: **Proposal from the University of Rhode Island to Offer a Minor in Robotics Engineering**

Background

The University of Rhode Island is announcing its intent to offer a Minor in Robotics Engineering in the College of Engineering starting in September 2016. The proposed Robotics Engineering Minor is designed to provide an attractive option for highly motivated high school students who are interested in engineering and seeking hands-on, project based learning in robotics, as well as attracting more women and minorities into the field of engineering.

Rationale

URI states that there is a large regional and national demand for robotics engineering at the undergraduate level, much of which has come from the increasing number of students in K-12 who are exposed to robotics through various extra-curricular competitions. Funding and support for these programs stems from a recognition that robotics at the K-12 level is an important gateway for matriculation in STEM fields and entry into STEM-related careers. The FIRST Robotics Competition pairs teams of high school students with working engineers. These teams participate in local, regional and national competitions by designing and building mobile robots. There are currently 44 FIRST robotics teams in Connecticut, 37 teams registered for the Rhode Island District Competition and more than 180 teams combined in New England. This translates into approximately 2000 high school students regionally with a strong interest in robotics.

The proposal states that an evaluation of the FIRST Robotics Program, led by Brandeis University, indicates that: 89% of FIRST alumni report attending college; 77% of female participants, 68% of African-American participants and 78% of Hispanic participants were in college. Nearly 60% of FIRST alumni had at least one science or technology-related work experience, 13% received grants or scholarships related to science or engineering, and 66% reported receiving any kind of grant or scholarship. Women and minority FIRST alumni also majored in Engineering at comparatively high rates (33% female, 27% African-American, and 47% Hispanic).

Institutional Role
The Minor in Robotics is being created following the College of Engineering's (COE) Strategic Plan which seeks to recruit a larger number of high quality undergraduates into the college by developing minors in strategically important disciplines. COE is currently in the process of hiring three tenure-track faculty with robotics specializations and is working closely with the Graduate School of Oceanography (GSO) to develop robotics offerings. GSO is currently in the process of hiring for a tenure-track faculty position in marine robotics with a commitment to teach courses within the Ocean Engineering Department.

Interinstitutional Considerations
URI asserts that no significant impact is expected on other public higher education institutions as the proposed program does not add any course that overlaps with offerings through CCRI or RIC.

Program
Any engineering major may declare a minor in Robotics Engineering. The minor is composed of courses which are currently listed in the URI course catalog and no new courses are proposed. Students declaring this minor are required to complete 18 credit hours from the following options, as well as an additional three courses (9 credits) from the list of supporting courses:

Option 1 – Ocean Engineering Focus (9 Credits)
- OCE360: Ocean Engineering - Robotic Ocean Instrumentation Design
- OCE467: Ocean Engineering - Design of Remotely Operated Vehicles
- MTH215: Math - Linear Algebra

Option 2 – Mechanical Engineering Focus (9 credits)
- MCE431: Mechanical Engineering - Computer Control of Mechanical Systems
- MCE433: Mechanical Engineering - Mechatronics
- MTH215: Math - Linear Algebra

Option 3 – Electrical Engineering Focus (9 credits)
- ELE458/459: Electrical Engineering – Digital control Systems & lab
- ELE470: Electrical Engineering – Mobile Computing
- MTH215: Math – Linear Algebra

Supporting Courses (Choose 3 other courses – 9 credits total)
- ELE470: Electrical Engineering – Mobile Computing
- MCE433: Mechanical Engineering – Mechatronics
- OCE360: Ocean Engineering – Robotic Ocean Instrumentation Design
- EGR515: Ocean Engineering – Hydrodynamics
- ELE205/206: Electrical Engineering – Microprocessors
- ELE458/459: Electrical Engineering – Digital Control Systems & Lab
- ELE583: Electrical Engineering – System Dynamics
- MCE366: Mechanical Engineering – Computer Vision
- MCE431: Mechanical Engineering – Computer Control of Mechanical Systems
- MCE530: Real-Time Monitoring and Control
- MCE566: Mechanical Engineering – The Mechanics of Robot Manipulators
- OCE467: Ocean Engineering – Design of Remotely Operated Vehicles
- OCE516: Ocean Engineering – Biomimetics in Ocean Engineering
- OCE562: Ocean Engineering – Modeling, Simulation, and Control of Marine Vehicles
- OCG555: Oceanography – Modern Oceanographic Imaging and Mapping Techniques

Faculty
All courses within the program are offered by current faculty. No new faculty lines, adjunct faculty, or instructors will be required.

Staff and Administration
No additional staff, advisors, or program director will be required.

Students
The primary source of students will be the undergraduate population of the College of Engineering, with most students beginning to take courses that can be counted towards the minor in the fall of their third year. URI expects that the minor will draw additional students to the College of Engineering, given the growing regional and national demand for robotics programs.

Evaluation
The program will initially be evaluated on a yearly basis by the faculty coordinators of the disciplines corresponding to the three options: Electrical Engineering, Mechanical Engineering or Ocean Engineering. The faculty coordinators will compile a report for the COE Dean which will include the number of students who have completed the minor, number of current students who have declared the minor, and the breakdown of those numbers by department. Exit interviews will be solicited from students graduating with the minor by the faculty coordinators to assess the level of their satisfaction with the program and to assemble a database of students' expected employment status at time of graduation. The report to the COE Dean will recommend changes to the program on a yearly basis, as needed, to maximize student interest and optimize student outcomes.

Financial Viability
The courses in the minor are existing courses that are already offered. Since no additional faculty or learning resources are required for this minor, there should be no additional resources needed.

RIOPC Review
The *Regulations Governing Academic Changes in Rhode Island Public Institutions of Higher Education* require that proposals be circulated among the other public institutions of higher education and comments invited. Rhode Island College has reviewed URI's proposal for the creation of a Robotics Engineering Minor at the University of Rhode Island and has no objections or concerns.

RIOPC staff reviewed the proposal and has determined that the academic changes presented are within the mission, role and scope of the University of Rhode Island and do not require Council approval.