12-8-2016

Curricular Report No. 2016-17-2A from the Graduate Council to the Faculty Senate: Creation of Graduate Certificate in Embedded Systems.

University of Rhode Island Faculty Senate

THE
UNIVERSITY
OF RHODE ISLAND
FACULTY SENATE OFFICE
Green Hall, 35 Campus Avenue, Kingston, RI 02881 USA p: 401.874.2616

THINK BIG WE DO

Serial Number #16-17—10C

TO: President David Dooley
FROM: W. Michael Sullivan, Chairperson of the Faculty Senate

1. The attached BILL titled, Curricular Report No. 2016-17-2A from the Graduate Council to the Faculty Senate: Creation of Graduate Certificate in Embedded Systems, is forwarded for your consideration.

2. This BILL was adopted by vote of the Faculty Senate on December 8, 2016.

3. After considering this bill, will you please indicate your approval or disapproval. Return the original, completing the appropriate endorsement below.

4. In accordance with Section 10, paragraph 4 of the Senate's By-Laws, this bill will become effective December 29, 2016 three weeks after Senate approval, unless: (1) specific dates for implementation are written into the bill; (2) you return it disapproved; or (3) the University Faculty petitions for a referendum.

W. Michael Sullivan
Chairperson of the Faculty Senate

December 8, 2016

ENDORSEMENT

TO: Chairperson of the Faculty Senate

FROM: President of the University

a. Approved ____.

b. Approved subject to Notice of the Council on Postsecondary Education ✓. 2/1/17

c. Disapproved ____.

Signature of the President

12.21.16
(date)

THE GRADUATE SCHOOL - UNIVERSITY OF RHODE ISLAND
NEW PROGRAM REPORT FROM THE GRADUATE COUNCIL TO THE FACULTY SENATE
CURRICULAR REPORT 2016-2017-2A; 05 December 2016

At Meeting No. 504 held on 5 December 2016, the Graduate Council approved the attached proposal that is now submitted to the Faculty Senate.

SECTION I
ABSTRACT AND BACKGROUND INFORMATION

ABSTRACT (modified from proposal)

The Graduate Council approved a proposal from the College of Engineering to create a ***Graduate Certificate in Embedded Systems.*** The URI Graduate Certificate in Embedded Systems is designed to provide the needs of gaining the knowledge and a solid foundation of the latest developments in embedded systems. The proposed graduate-level certificate program in embedded systems will provide local industry and military/government agencies an opportunity to re-train their engineers. This certificate program will also attract students who have enrolled in the M.S. or Ph.D. programs already, by showing them an identifiable field of interests. The creation of a pool of well-versed engineers in embedded systems means a greater competitive edge for the state of Rhode Island economy.

BACKGROUND

Embedded systems are essentially special purpose computer systems commonly found in consumer electronic smart devices, industrial control systems and robots, and military applications, etc. Embedded systems, based on their particular applications, may also be known as: mobile computing, internet-of-things (IoT), system-on-chip (SoC), and cyber-physical system (CPS), etc. Recent developments also bring embedded systems to the medical devices such as portable MRI, robotic prostheses, and health monitors, etc. Many local technology companies, government agencies and military units are involved in one or more of these areas. A common theme of the myriad of applications is the ever advancing embedded hardware and embedded software of the underlying embedded systems. Hence, many companies seek a program to update their engineers with the latest knowledge and skills in this ever-evolving field.

SECTION II
RECOMMENDATION

The Graduate Council approved the proposal to create a ***Graduate Certificate in Embedded Systems*** at its Meeting No. 504 held on 05 December 2016, and forwards it to the Faculty Senate with a recommendation for approval.

THE
UNIVERSITY
OF RHODE ISLAND

Revised 8/2016

Abbreviated Proposal form
For All Programs including Certificates
No New Funding

A Proposal for: Post-baccalaureate Certificate Program in Embedded Systems

Date: October 1, 2016

A. PROGRAM INFORMATION

A1. Name of institution
University of Rhode Island

A2. Name of department, division, school or college
Department of Electrical, Computer and Biomedical Engineering (ECBE)
College of Engineering

A3. Title of proposed program and Classification of Instructional Programs (CIP) code
Program title: Embedded Systems Certificate
Classification code (CIP): 14.0999

A4. Intended initiation date of program change. Include anticipated date for granting first degrees or certificates, if appropriate.
Initiation date January 2017
First degree date December 2017

A5. Intended location of the program
University of Rhode Island, College of Engineering

A6. Description of institutional review and approval process

	Approval Date
Department	4/11/2016
College	4/14/2016
CAC/Graduate Council	
Faculty Senate	
President of the University	

A7. Summary description of proposed program (not to exceed 2 pages)

The Computer Engineering program of the Department of Electrical, Computer and Biomedical Engineering (ECBE) is solely responsible for this certificate program. Jien-Chung Lo, Professor of Computer Engineering, will serve as the director of this certificate program. The courses included in this program are all existing courses from the ECBE department and have been regularly offered for at least the last three years.

Embedded systems are essentially special purpose computer systems commonly found in consumer electronic smart devices, industrial control systems and robots, and military

applications, etc. Embedded systems, based on their particular applications, may also be known as: mobile computing, internet-of-things (IoT), system-on-chip (SoC), and cyber-physical system (CPS), etc. Recent developments also bring embedded systems to the medical devices such as portable MRI, robotic prostheses, and health monitors, etc. Many local technology companies, government agencies and military units are involved in one or more of these areas. A common theme of the myriad of applications is the ever advancing embedded hardware and embedded software of the underlying embedded systems. Hence, many companies seek a program to update their engineers with the latest knowledge and skills in this ever evolving field.

The field of embedded systems involves the disciplines and knowledge of modern computer architecture, embedded system interface and programming, field programmable gate arrays (FPGAs), and cyber security. This certificate program is thus designed to provide the needs of gaining the knowledge and a solid foundation of the latest developments in embedded systems. The proposed graduate-level certificate program in embedded systems will provide local industry and military/government agencies an opportunity to re-train their engineers. This certificate program will also attract students who have enrolled in the M.S. or Ph.D. programs already, by showing them an identifiable field of interests. The creation of a pool of well-versed engineers in embedded systems means a greater competitive edge for the state of Rhode Island economy.

Admission requirements:

A B.S. degree in computer engineering, electrical engineering, biomedical engineering, computer science, or other related fields is required to earn the certificate. To apply to the certificate program, applicant must contact the URI Graduate School for the application procedure.

Certificate requirements:

A minimum of 12 credits to earn this certificate:

One required course:

ELE547: Embedded Computer Systems and Applications

Two to three from the following elective courses:

ELE438: Information and Network Security

ELE470: Mobile Computing

ELE500/ISE500: Project Planning and Management for Systems Engineering

ELE543: Computer Networks

ELE545: Advanced Digital Circuits and Systems

ELE548: Computer Architecture

Program duration:

The certificate program requires a minimum of three courses. Students can ideally complete the requirement within 9 months (Fall and Spring semesters). See the Graduate School Manual for the maximum allowable program duration.

Earned course credits:

Upon the completion of the program the students will be awarded with the certificate in embedded systems. Students who enroll in the certificate program before receiving

their B.S. degrees will receive the certificate after they earn their B.S. degrees. The earned credits can be applied to the URI M.S. and Ph.D. programs wherever the specific program allows. According to the Graduate School Manual, only two fifths of the M.S. degree course credit requirements can come from before being officially admitted to the M.S. program. For example, the M.S. Electrical Engineering program will allow only 12 credits earned before officially enrolling in the program.

Learning Goals:

1. Building work force for the emerging embedded systems and smart devices economy.
2. Continue professional development for practicing engineers in the field of embedded systems.

A8. Signature of the President

_____

David M. Dooley

A9. Person to contact during the proposal review

Name: Jien-Chung Lo
Title: Professor of Computer Engineering
Phone: 401-874-2996
Email: jclce@uri.edu or jcl@ele.uri.edu

A10. List and attach any signed agreements for any cooperative arrangements made with other institutions/agencies or private companies in support of the program.

None.

B. RATIONALE: There should be a demonstrable need for the program.

B1. Explain and quantify the needs addressed by this program, and present evidence that the program fulfills these needs.

Embedded systems represent the core knowledge and skills required in many different computer related jobs. However, the industry rarely uses the term "embedded systems" in the job titles. Often, the job title may be computer engineers, embedded software engineers, and software engineers. In the classification scheme of the Bureau of Labor Statistics (BLS), there are four occupations related to the embedded systems. According to the Occupational Outlook Handbook from BLS, as of 2014, the nation-wide employment numbers are: 77,700 for computer hardware engineers, 315,900 for electrical and electronics engineers, 22,100 for biomedical engineers and 1,114,000 for software developers, systems software. In the "Occupational Employment and Wages in Providence-Fall River-Warwick – May 2014" the major occupational groups: "Computer

and Mathematical" and "Architecture and Engineering" account for 2.6% and 1.5%, respectively of the total employment in the area. The "STEM Occupational Employment and Wages in New England – May 2014" report stated that there are 1,860 professionals employed as "Software developers, Systems Software" in the Providence-Fall River-Warwick area.

A common theme of the myriad of applications is the ever advancing embedded hardware and embedded software of the underlying embedded systems. Hence, many companies seek a program to update their engineers with the latest knowledge and skills in this ever-evolving field. Specifically, the core knowledge and skills are: modern computer architecture, embedded system interface and programming, field programmable gate arrays (FPGAs), and cyber security. This certificate program is thus designed to provide the needs of gaining the knowledge and a solid foundation of the latest developments in embedded systems. The proposed graduate-level certificate program in embedded systems will provide local industry and military/government agencies an opportunity to re-train their engineers. This certificate program will also attract students who have enrolled in the M.S. or Ph.D. programs already, by showing them an identifiable field of interests. The creation of a pool of well-versed engineers in embedded systems means a greater competitive edge for the state of Rhode Island economy.

B2. What is the economic need and workforce data related to the program?

Besides the data from the BLS mentioned above, a recent study was announced in May 2016 from the Brookings Institute entitled, "Rhode Island Innovates: A Competitive Strategy for the Ocean State". Specifically, seven advanced industry growth areas were identified. Among them, the first three areas are related to this certificate program. They are: (1) Biomedical Innovation, (2) IT-Software, Cyber-Physical Systems, and Data Analysis, and (3) Defense Shipbuilding and Maritime. Area (1) has 31,548 jobs in 2013, has 31% higher industry concentration than nation and with -0.2% job decline from 2009-2013. Area (2) has 12,528 jobs in 2013, has 18% higher industry concentration than nation and with -3.2% job decline from 2009-2013. Area (3) has 19,107 jobs in 2013, has 86% higher industry concentration than nation and with 9.1% job gain from 2009-2013. Areas (1) and (3) are indirectly related to the embedded systems while area (2) is directly related to the embedded systems. These areas required workers with at least college degrees. This certificate program is designed to provide the necessary up-to-date training or re-training to build up the workforce for the future of Rhode Island.

B3. Provide information on jobs available as a result of successfully completing the certificate or degree: job titles, job outlook/growth, and salaries.

Job titles: embedded systems engineer, embedded software engineer, computer hardware engineer, computer application engineer, etc.

Job outlook/growth: about 2.6% (see above)

Salaries: $75,248/year for Embedded systems engineer and $80,195/year for Embedded software engineer; according to payscale.com.

C. INSTITUTIONAL ROLE: The program should be clearly related to the published role and mission of the institution and be compatible with other programs and activities of the institution.

C1. Explain how the program is consistent with the published role and mission of the institution and how it is related to the institution's academic planning.

This program will provide the Rhode Island community, as well as our national and international populations, with an opportunity to develop their technical skills in an advancing industrial environment. This program satisfies strategic themes of the Academic Strategic Plan, 2016-2021, including providing opportunity to engage in creative tasks, expanding research opportunities, and developing a foundation for student success beyond their academic pursuits. With the College of Engineering about to embark on a major transformation to improve and enhance its already strong academic offerings, this program would provide an additional opportunity for URI to establish its niche and be competitive in attracting a robust community of scholars. The program should satisfy perceived student interest, make graduates more marketable to local industry and government agencies, as well as provide an opportunity students may not have considered to expand their knowledge base and expertise.

D. INTER-INSTITUTIONAL CONSIDERATIONS: The program should be consistent with all policies of the Council on Postsecondary Education pertaining to the coordination and collaboration between public institutions of higher education.

D1. Estimate the projected impact of this program on other public higher education institutions in Rhode Island (e.g. loss of students or revenues), provide a rationale for the assumptions made in the projections, and indicate the manner in which the other public institutions were consulted in developing the projections. Have you communicated with other institutions about the development of this program and have any concerns been raised related to role, scope, and mission or duplication.

None. This is a post-baccalaureate level program.

D2. Using the format prescribed by the Council on Postsecondary Education, describe provisions for transfer students (into or out of the program) at other Rhode Island public institutions of higher education. Describe any transfer agreements with independent institutions. The institution must also submit either a Joint Admissions Agreement transition plan or the reason(s) the new program is not transferable (see *Procedure for Strengthening the Articulation/Transfer Component of the Review Process for New Programs*).

None.

D3. Describe any cooperative arrangements or affiliations with other institutions in establishing this program. (Signed copies of any agreements pertaining to use of faculty, library, equipment, and facilities should be attached.)

None.

D4. How does this program align to academic programs at other institutions?

Potential applicants may earn their baccalaureate degree from other institution.

D5. Are recipients of this credential accepted into programs at the next degree level without issue?

Yes. The graduate credits earned under this certificate program can later be applied to other advanced degrees, i.e. M.S. or Ph.D.

D6. How does this program of study interface with degree programs at the level below them?

Students with B.S. degree in Computer Engineering, Electrical Engineering, Computer Science, or related field may be accepted to this certificate program.

D7. If external affiliations are required, identify providing agencies. (Indicate the status of any arrangements made and append letters of agreement, if appropriate.)

None.

D8. Indicate whether the program will be available to students under the New England Board of Higher Education's (NEBHE) Regional Student Program (RSP).

Not available. This is a post-baccalaureate level program.

E. PROGRAM: The program should meet a recognized educational need and be delivered in an appropriate mode.

E1. Prepare a typical curriculum display for one program cycle for each sub-major, specialty or option, including the following information:

a. Name of courses, departments, and catalog numbers and brief descriptions for new courses, preferably as these will appear in the catalog.

There is no new course proposed for this program.

b. Are there specializations and/or tracks/options/sub-plans/concentrations? If so, describe required courses in area of specialization or tracks/options/sub-plans/concentrations.

No.

c. Course distribution requirements, if any, within program.

None.

d. Total number of free electives available after specialization requirements are satisfied.

None.

e. Total number of credits required for completion of program or for graduation. Present evidence that the program is of appropriate length as illustrated by conformity with appropriate accrediting agency standards, applicable industry standards, or other credible measure, and comparability of lengths with similar programs in the state or region.

A minimum of 12 credits. This is the requirement for a graduate certificate at the University of Rhode Island. These earned credits can be applied to advanced degree programs wherever the specific programs allow. According to the Graduate school Manual, only two fifths of the M.S. degree requirements can come from before being admitted to the M.S. program. For example, the M.S. Electrical Engineering program will allow only 12 credits earned before officially enrolled in the program.

Similar post-baccalaureate programs in the related fields all require 12 to 16 credits to complete the certificate.

f. Identify any courses that will be delivered or received by way of distance learning (refer to *Policy on Distance Learning, Council on Postsecondary Education, State of Rhode Island and Providence Plantations*).

None.

g. Is the program content guided by program-specific accreditation standards or other outside guidance?

No.

E2. Describe certification/licensing requirements, if any, for program graduates and the degree to which completion of the required course work meets said requirements. Indicate the agencies and timetables for graduates to meet those requirements.

One required course (four credits):

ELE547: Embedded Computer Systems and Applications (4 crs.)

At least eight credits from the following courses:

ELE438: Information and Network Security (4 crs.)
ELE470: Mobile Computing (3 crs.)
ELE500/ISE500: Project Planning and Management for Systems Engineering (3 crs.)
ELE543: Computer Networks (4 crs.)
ELE545: Advanced Digital Circuit and Systems (4 crs.)

ELE548: Computer Architecture (4 crs.)

All above courses have been regularly offered once a year: during Fall semester: ELE547, ELE470, ELE545, and ELE/ISE500, during Spring semester: ELE438, ELE543 and ELE548. All courses are offered by the Department of Electrical, Computer and Biomedical Engineering except for ELE/ISE500 which is being offered by the Department of Mechanical Engineering, ISE program.

Student can complete all required course work within one academic year.

E3. Include the learning goals (what students are expected to gain, achieve, know, or demonstrate by completion of the program) and requirements for each program.

1. Building work force for the emerging embedded systems and smart devices economy.
2. Continue professional development for practicing engineers in the field of embedded systems.

E4. Demonstrate that student learning is assessed based on clear statements of learning outcomes and expectations.

The outcomes for goal #1:

1. Ability to apply the core knowledge pertinent to the embedded systems applications.
2. Ability to construct embedded systems according to the design specifications.

The outcomes for goal #2:

1. Knowledge of the latest standards and trends for the embedded systems.
2. Demonstrate the knowledge and skills necessary to remain relevant in the emerging fields related to embedded systems (such as smart devices, industrial and medical systems, etc.) in order to design and construct new solutions.

E5. Provide an assessment plan detailing what a student should know and be able to do at the end of the program and how the skills and knowledge will be assessed. Consult with the Office of Student Learning, Outcomes Assessment, and Accreditation (SLOAA) to prepare a Learning Outcomes Assessment Plan for student learning assessment. Following consultation, submit a final draft of the plan to the Chair of the Learning Outcomes Oversight Committee (LOOC) for approval.

See attached "New Program Proposal Student Learning Outcomes Assessment Plan".

F. FACULTY AND STAFF: The faculty and support staff for the program should be sufficient in number and demonstrate the knowledge, skills, and other attributes necessary to the success of the program.

F1. Describe the faculty who will be assigned to the program. Indicate total full-time equivalent (FTE) positions required for the program, the proportion of program faculty who will be in tenure-track positions, and whether faculty positions will be new positions or reassignment of existing positions. What are the minimal

degree level and academic/technical field requirements and certifications required for teaching in this program?

This program will be supported by the existing faculty of the Department of Electrical, Computer and Biomedical Engineering. All the courses included in the proposed certificate program have been regularly offered by the Department in the last three years at least. No additional faculty or staff is required to facilitate the proposed certificate program.

G. STUDENTS: The program should be designed to provide students with a course of study that will contribute to their intellectual, social, and economic well-being. Students selected should have the necessary potential and commitment to complete the program successfully.

G1. Describe the potential students for the program and the primary source of students. Indicate the extent to which the program will attract new students or will draw students from existing programs and provide a specific rationale for these assumptions. For graduate programs, indicate which undergraduate programs would be a potential source of students.

This certificate program is of great interest to the following three groups: (1) computer software or hardware engineers/professionals who may be supported by their employers to earn this certificate as an effort to update their core knowledge and skills, (2) graduate students who already enrolled in an URI M.S. or Ph.D. degree program in a related field, and (3) professionals who cannot enter full-time graduate study right away but would like to get a head start.

The program official website is being prepared for the online presence. During the preparation stage of this proposal, many local industrial leaders and engineers have been contacted. Once the program is approved, they will also help distribute the information. Many of them are in the position to send their engineers to this program.

The information will also be made available to the undergraduate and graduate students in the Department of Electrical, Computer and Biomedical Engineering, as well as other related departments.

H. EVALUATION: Appropriate criteria for evaluating the success of a program should be developed and used.

H1. List the performance measures by which the institution plans to evaluate the program. Indicate the frequency of measurement and the personnel responsible for performance measurements. Describe provisions made for external evaluation, as appropriate.

The performance of this certificate program in embedded systems will be measured by (1) the number of enrolled students and the number of students who successfully complete the program; and (2) an exit interview/survey to evaluate the program from the student's perspective. The program director will keep track of the enrollment and graduating numbers, as well as conducting the exit interview/survey. The data collection

and survey will be conducted every semester, including summer session, and will be evaluated annually.

Based on the surveys and interviews with the local industrial leaders and engineers we have conducted during the preparation of this proposal, we anticipate about 12 students may be enrolled in the certificate program each year. The expected graduation rate may be around 90%.

I. IS THE PROGRAM FINANCIALLY VIABLE?

I1. As no new funding is required and the new program can be administered entirely with existing funds, include a five-year plan demonstrating that existing funds are sufficient for carrying out the program. Proposers shall request a "Statement of No Financial Impact" from the URI Budget and Financial Planning Office.

Graduate Certificate in Embedded Systems Engineering

Budget Justification

Revenue:

"Full-Time Tuition Rate: In-State"

For this program we actually expect to accept about 12 in-state students per year into the program. We assume that these new students are all part-time in-state graduate students. As such, they will be paying the per credit tuition for a total of 12 credits per year. Therefore, B11 = $7860 is calculated by 12 x $655, where $655 is current tuition per credit for in-state graduate student. A 3% increase is assumed for the subsequent years.

Since the program requires only 12 credits, we expect the students to complete all requirements in one year. Therefore, there should not be second, third and fourth years. However, this requires modifying the form, and thus we can't do that. Note that the total tuition and fees are thus over estimated.

Expenditures:

All courses included in this new certificate program are existing course. All these courses have been regularly offered over the years and will continue to be offered regardless of the new program. Therefore, there is no additional resource required for this new program.

STANDARD ACADEMIC PROGRAM CHANGES
BUDGET FORM: Page 1 of 3

Use this form for programs that can be pursued on a full-time basis or through a combination of full-time and part-time attendance

REVENUE ESTIMATES

	Year 1 20__		Year 2 20__		Year 3 20__		Year 4 20__	
Full-Time Tuition Rate: In-State	7860		8096		8339		8589	
Full-Time Tuition Rate: Out-State	0		0		0		0	
Mandatory Fees per Student	500		550		600		650	
FTE # of New Students: In-State	12		12		12		12	
FTE # of New Students: Out-State	0		0		0		0	
# of In-State FTE Students transferring in from the institution's existing programs		0		0		0		0
# of Out-State FTE Students transferring in from the institution's existing programs		0		0		0		0
Tuition and Fees	Newly Generated Revenue	Revenue from existing programs	Newly Generated Revenue	Revenue from existing programs	Newly Generated Revenue	Revenue from existing programs	Newly Generated Revenue	Revenue from existing programs
First Year Students								
Tuition								
In-State	94,320	-	97,152	-	100,068	-	103,068	-
Out-of-State	-	-	-	-	-	-	-	-
Mandatory Fees	6,000	-	6,600	-	7,200	-	7,800	-
Second Year Students								
Tuition								
In-State			97,152	-	100,068	-	103,068	-
Out-of-State			-	-	-	-	-	-
Mandatory Fees			6,600	-	7,200	-	7,800	-
Third Year Students								
Tuition								
In-State					100,068	-	103,068	-
Out-of-State					-	-	-	-
Mandatory Fees					7,200	-	7,800	-
Fourth Year Students								
Tuition								
In-State							103,068	-
Out-of-State							-	-
Mandatory Fees							7,800	-
Total Tuition and Fees	100,320	-	207,504	-	321,804	-	443,472	-
Grants								
Contracts								
Other Revenues (specify)								
Total	100,320	-	207,504	-	321,804	-	443,472	-

Note: All of the above figures are estimates based on projections made by the institution submitting the proposal.

STANDARD ACADEMIC PROGRAM CHANGES
BUDGET FORM: Page 2 of 3

Use this form for programs that can be pursued on a full-time basis or through a combination of full-time and part-time attendance

EXPENDITURE ESTIMATES

	Year 1 20__		Year 2 20__		Year 3 20__		Year 4 20__	
	Additional resources required for progam	Expenditures from current resources	Additional resources required for progam	Expenditures from current resources	Additional resources required for progam	Expenditures from current resources	Additional resources required for progam	Expenditures from current resources
Personnel Services								
Administrators								
Faculty								
Support Staff								
Others								
Fringe Benefits ____%								
Total Personnel	-	-	-	-	-	-	-	-
Operating Expenses								
Instructional Resources								
Other (specify)								
Total Operating Expenses	-	-	-	-	-	-	-	-
Capital								
Facilities								
Equipment								
Other								
Total Capital	-	-	-	-	-	-	-	-
Net Student Assistance								
Assistantships								
Fellowships								
Stipends/Scholarships								
Total Student Assisstance	-	-	-	-	-	-	-	-
Total Expenditures	-	-	-	-	-	-	-	-

Note: All of the above figures are estimates based on projections made by the institution submitting the proposal.

STANDARD ACADEMIC PROGRAM CHANGES
BUDGET FORM: Page 3 of 3

Use this form for programs that can be pursued on a full-time basis or through a combination of full-time and part-time attendance

BUDGET SUMMARY OF COMBINED EXISTING AND NEW PROGRAM

	Year 1 20__	Year 2 20__	Year 3 20__
Total revenue	100,320	207,504	321,804
Total expenses	-	-	-
Excess/Defeciency	100,320	207,504	321,804

BUDGET SUMMARY OF EXISTING PROGRAM ONLY

	Year 1 20__	Year 2 20__	Year 3 20__
Total revenue	-	-	-
Total expenses	-	-	-
Excess/Defeciency	-	-	-

BUDGET SUMMARY OF NEW PROGRAM ONLY

	Year 1 20__	Year 2 20__	Year 3 20__
Total of newly generated revenue	100,320	207,504	321,804
Total of additional resources required for program	-	-	-
Excess/Defeciency	100,320	207,504	321,804

Note: All of the above figures are estimates based on projections made by the institution submitting the proposal.

STANDARD ACADEMIC PROGRAM CHANGES
BUDGET FORM: Page 3 of 3

[redacted]

Year 4 20__
443,472
-
443,472

[redacted]

Year 4 20__
-
-
-

[redacted]

Year 4 20__
443,472
-
443,472

THE
UNIVERSITY
OF RHODE ISLAND

THINK BIG WE DO℠

BUDGET AND FINANCIAL PLANNING
Adams House, 85 Upper College Road, Kingston, RI 02881 USA p: 401.874.2509 f: 401.874.5824 uri.edu/budget

DATE: November 1, 2016

TO: Dr. Nasser H. Zawia
Dean, Graduate School

Andrea Rusnock
Associate Dean, Graduate School

FROM: Linda Barrett
Director, Budget and Financial Planning

SUBJECT: Proposal for Graduate Certificate in Embedded Systems Engineering

As requested in an email from Jien-Chung Lo, Professor of Computer Engineering, dated October 5, 2016, the Budget and Financial Planning Office has reviewed the budget related to the proposal for a Graduate Certificate in Embedded Systems Engineering.

According to the proposal, the Graduate Certificate in Embedded Systems Engineering will provide URI students with the skills and knowledge of modern computer architecture, embedded system interface and programming, field programmable gate arrays (FPGAs), and cyber security. This certificate will be offered through the Computer Engineering program of the Department of Electrical Computer and Biomedical Engineering (ECBE). This program will allow students to provide local industry and military/government agencies an opportunity to retrain their engineers and provide a pool of well-versed engineers in this field for a greater competitive edge for the Rhode Island economy.

The Budget and Financial Planning Office concurs that the Graduate Certificate in Embedded Systems Engineering will have no impact on the Fund 100 unrestricted budget as it has been presented.

Please let us know if you require any further information.

cc: Donald DeHayes
Dean Libutti
Cliff Katz
Ray Wright
Cheryl Hinkson
Colleen Robillard
Jien-Chung Lo

Office/BudgetImpactStatements/GradCertinEmbeddedSystemsEngineering/BudgetImpactStatementLetter.draft

THE
UNIVERSITY
OF RHODE ISLAND

NEW PROGRAM ASSESSMENT PLAN REVIEW

DATE of SLOAA Review: _____**10/28/16**_____

DATE of LOOC Review: **10/31/2016**

Academic Program/Degree: Certificate: **Embedded Systems**
College: Engineering

Date New Program Assessment Plan Submitted: October 21, 2016 (original submission 10/14; resubmitted 10/21)
Faculty Member(s) Submitting Plan Proposal: Jien-Chung Lo

FEEDBACK

Strengths:

SLOAA: The Assessment Plan within the proposal details the specific skills and knowledge students will acquire as they earn the certificate. The curriculum map presents one core course requirement which provides all students with the essential introduction to the 2 major goal areas, and 4 student learning outcomes. The lack of additionally required coursework should be off-set by the credit requirement for electives which, as it is now, will ensure students have repeated opportunity for building on their introductory course-work to achieve higher levels of learning in the outcome areas, while allowing students to select electives appropriate to their interests and field of work.

LOOC: (Comments, if any) Agree with SLOAA.

Suggestions for improvement:

SLOAA: Suggestions for change were responded to by the program during preliminary planning.

LOOC: (Comments, if any**):** N/A

Issue(s) of note:

SLOAA: The program was flexible and responsive to suggestions for outcome clarity within the proposed certificate. Note that at this time, certificates are not included in the biennial campus-wide reporting framework for the assessment of student learning outcomes, and therefore, no assessment timeline is required.

LOOC: (Comments, if any**):** Agree with SLOAA

Assessment Plan Designation:

1 X	2	3
The Assessment Plan is ready for implementation	The Assessment Plan can be implemented after minor revisions, as indicated, and does not require further review	The Assessment Plan requires revisions, and should be submitted for further review after revisions, by date: _____

Program Information		Reviewer Ratings & Comments				
Information box complete		☒ Yes ☐ Incomplete		***Suggestions**:*		
Criteria		***Efficacy of Plan Description & Content***				***Suggestions for improvement***
		Less Developed	**Developing**	**Well Developed**	**Not addressed**	
PART I	**1. Program goals**					
	a. Broad statements of program learning goals	☐	☐	☒	☐	
	b. Limited in number (ideally 2-5)	☐	☐	☒	☐	(Appropriate for a certificate program)
PART II	**2. Learning outcomes/competencies**					
	a. Linked to goals (numbered 1.1 etc.)	☐	☐	☒	☐	
	b. Each goal is represented by at least one outcome	☐	☐	☒	☐	
	c. Statements are observable/measurable	☐	☐	☒	☐	Revisited and revised some language
	d. Directed at what students will know or be able to do	☐	☐	☒	☐	Revisited and revised some language
	e. Reasonable number (ideally 1-3 per goal)	☐	☐	☒	☐	
	3. Curriculum Map					
	a. Program requirements are listed, developmentally when possible	☐	☐	☒	☐	
	b. Outcomes are linked to appropriate requirements	☐	☐	☒	☐	

	Criteria	Reviewer Ratings & Comments				
		Efficacy of Plan Description & Content				*Suggestions for improvement*
		Less Developed	**Developing**	**Well Developed**	**Not addressed**	**NOT APPLICABLE AT THIS TIME**
PART III	**4. Assessment Timeline (3-year plan)**					
	a. Assessment Reporting Period 1 is thoroughly presented	☐	☐	☐	☐	
	b. Assessment Reporting Periods 2 and 3 are presented	☐	☐	☐	☐	
	c. All goals are represented by at least one outcome somewhere in the 3 reporting periods	☐	☐	☐	☐	
	d. Requirements are clearly stated and connected to outcomes (from Curriculum Map)	☐	☐	☐	☐	
	e. Evidence is stated for each designated outcome	☐	☐	☐	☐	
	f. Selection of evidence takes advantage of existing indicators	☐	☐	☐	☐	
	g. Evidence is stated in enough detail to guide assessment activities	☐	☐	☐	☐	
	h. Evidence is feasible for collection within the timeline	☐	☐	☐	☐	
	i. Methods for quantifying evidence are stated for each designated outcome	☐	☐	☐	☐	
	j. Methods are appropriate for evidence	☐	☐	☐	☐	