To: Members of the Council on Postsecondary Education  
From: Brenda Dann-Messier, Ed.D., Commissioner of Postsecondary Education  
Date: September 20, 2017  
Re: Notification of new program—Data Science minor at Rhode Island College

Background
Rhode Island College (RIC) is proposing the creation of an undergraduate Minor in Data Science through the Department of Accounting and Computer Information Systems, School of Business. This new minor will provide additional technical skills to students and complement the current offerings at RIC. The initiation date for this program would be the fall of 2017.

Rationale
The proposal states that data science is one of the fastest growing subfields of the information technology industry and that this Data Science minor was developed in response to industry need for trained data experts. The proposal cites Governor Raimondo’s CS4RI initiative, which aims to increase the number of RI residents with technical skills and includes establishing new computer science-related minors at colleges and universities. Representatives from Commerce RI met with faculty and administration at RIC to help identify new minors that would promote and support CS4RI. This Data Science minor was identified as one that would provide additional technical skills in the state and complement current offerings at the college.

Virtually all organizations have a need for individuals who understand how to collect, organize and present data. RIC states that most of their undergraduates choose majors in health care, education and social sciences, where data, performance measures and continuing quality improvements have become more focused. In 2016, the School of Business had 1,340 graduates. Six of these graduates received a B.S. degree in computer science and 21 completed a B.A. degree through the School of Business. Had the Data Science option been available, many more students in the School of Business would have had the opportunity to take advantage of training in data science and thereby improve their marketability.
Job opportunities for students who complete this minor would include data scientist, data analyst, logistician/logistics analyst, business intelligence analyst, data mining analyst, information security analyst, financial analyst and database administrator. There are approximately 1,700 unfilled software position openings in Rhode Island, and Burning-Glass.com reports approximately 1,100 job openings for data or analyst specialists in the state, with both areas projected to be among the fastest-growing skills areas needed. The Bureau of Labor Statistics shows median incomes of $90,120 for Information Security Analysts, $80,310 for Financial Analyst, and $81,710 for Database Administrators.

Institutional Role
RIC is a regional comprehensive college with a mission to educate students in a variety of undergraduate and graduate arts and sciences and professional programs. RIC awards B.S. degrees in computer science as part of the Mathematics department, as well as B.A. degrees through the School of Business. This minor will give more RIC students the ability to be more competitive in today’s market.

Interinstitutional Considerations
Brown has a relatively new graduate program in Data Science and Bryant College has a Data Analytics Program that is tailored to business applications with a core of computer programming, databases, data mining and statistics classes. URI just began offering a new undergraduate major and minor in Data Science through the Computer Science & Statistics Department. RIC’s program is offering a minor designed for their existing students, serving a different student demographic than URI and Bryant. Up to 80% of RIC students are Rhode Island natives and they tend to live and work in Rhode Island after graduation. RIC also has a higher percentage of students of color, and their students are more likely to be the first in their families to have sought post-secondary education.

Program
This program will be delivered with both face-to-face and online courses. The minor requires 22 credit hours; 19 for core classes and 3 credits for the pre-requisite.

Required courses:
- CIS 352: Management Information Systems* – 3 credits
- MATH 177: Quantitative Business Analysis* – 4 credits
- MATH 248: Business Statistics* – 4 credits
- CIS 440/570: Introduction to Data Science (New) – 4 credits
- CIS 472/572: Data Visualization (New) – 4 credits
- CIS 251: Computers in Management (prerequisite)* – 3 credits

*These courses are required as part of most School of Business degree programs.

Faculty and Staff
No new faculty or staff is required to offer this undergraduate minor.

Students
The primary source of students will be RIC undergraduates, mainly in the School of Business. RIC estimates 5 - 10 students per semester with 10-20 graduates each year.

**Evaluation**
The performance measures used to evaluate the program include the following competencies:
- Graduates will understand the roles of information systems in organizations and be able to utilize these systems for organizational process improvements.
- Graduates will be able to develop information systems while identifying and evaluating sourcing alternatives.
- Graduates will understand and be able to address the information requirements of organizations, including data security and risk management.
- Graduates will understand the opportunities created by technology innovations and how these impact organizations.
- Graduates will understand the design and management of the enterprise architecture and infrastructure.
- Graduates will have a basic level of competency in programming, logic skills, and computer literacy.

**Financial Viability**
Since the program will utilize existing faculty, staff and technology resources, it will not require additional financial investment on the part of the institution.

**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.

In their response, URI supported the addition of a Data Science minor at RIC in general and offered suggestions regarding the naming of the program and specific courses that could be added to the minor. RIC provided a response to OPC staff addressing URI’s recommendations. OPC staff reviewed all the information on Rhode Island College’s proposed undergraduate minor in Data Science and conducted research on similar programs of study at comparable institutions. RIC intends, as a next step, to work with URI and CCRI faculty on articulation agreements.

The academic changes presented in this new program are within the mission, role and scope of RIC and do not require Council approval.
Proposal for the Creation of an Undergraduate Minor in Data Science at Rhode Island College

Abbreviated Proposal (When Change Is Consistent with Institutional Role, Scope, and Mission)

1. Program information
   a. What is the program name and CIP code? Undergraduate minor in Data Science
      CIP CODE 52.1201 Title: Management Information Systems, General
      Definition: A program that generally prepares individuals to provide and manage data systems and related facilities for processing and retrieving internal business information select systems and train personnel; and respond to external data requests.
   b. In what academic unit(s) will the program be a component?
      Department of Accounting and Computer Information Systems, School of Business
   c. What are delivery modalities for the new program: on campus, distance learning, asynchronous, hybrid, etc.? Face-to-face, hybrid, online

2. Rationale
   a. Why is the new program being developed?
      This new program has been developed in response to significant industry need for trained data experts. Data science is one of the fastest growing sub-fields of the information technology industry, with demand for trained data scientists in the public, private and nonprofit sectors of the local, state and national economy.
   b. What is the economic need and workforce data related to the program? Provide information on jobs available as a result of successfully completing the certificate or degree: job titles, job outlook/growth, salaries.
      Job categories for students who complete this minor include data scientist and data analyst. Data Science affects virtually all organizations that need skilled professionals who understand processes for collecting, organizing and presenting data.

      Currently, there are approximately 1,700 unfilled software position openings in Rhode Island and Burning-Glass.com reports approximately 1,100 job openings for data or analyst specialists in the state. Both of these areas are projected to continue to be among the fast-growing skills areas needed. Nationwide, there are 17,768 entry-level jobs requiring a bachelor’s degree or higher for Logistician/Logistics Analysts, 16,166 for Business Intelligence Analysts, and 7,913 for Data/Data Mining Analyst.

      A sampling of some jobs available in this field on the Bureau of Labor Statistics website shows median incomes of: $90,120 for Information Security Analysts, $80,310 for Financial Analyst, and $81,710 for Database Administrators. Students majoring in any business or liberal arts discipline who
obtain a minor in data science will greatly improve their employability and career prospects.

Even in fields not represented by these databases, there are needs for data analysts and scientists. Most of RIC’s undergraduates choose majors in health care, education, and social sciences, where data, performance measures and continuing quality improvement have most recently focused.

c. **What entities are advocating for this program? Was an advisory board used to develop the curriculum?**

Governor Raimondo’s CS4RI initiative has a goal of increasing the number of RI residents with technical skills; this includes establishing new CS-related minors at colleges and universities throughout the state. Representatives from Commerce RI met with faculty and administration at RIC to help identify new minors that would promote and support CS4RI. This new Data Science Minor was identified as one of these new minors that would provide additional technical skills in the state and complement the current offerings at RIC.

3. **Institutional Role**
   a. **How does the program fit within the role, scope and mission (or not)?**

   The program fits within RIC’s role, scope, and mission. RIC is “a regional comprehensive college with a statewide mission to educate students in a variety of undergraduate and graduate arts and sciences and professional programs and to conduct research in these fields.” It offers “a broad range of baccalaureate and master's-level core arts and sciences programs appropriate to a comprehensive, teaching institution with a predominantly undergraduate student body.”

   In 2015, eight students completed BS degrees in computer science as part of the Mathematics department and 16 completed BA degrees through the School of Business. In 2016, six students completed the BS degree and 21 completed the BA degree. However, there were 1,364 other graduates in 2015 and 1,313 other graduates in 2016 who could have improved their employment prospects in today’s market had they had this minor available to them.

4. **Inter-institutional considerations**
   a. **What are the similar programs in the state and**

   Brown has a graduate program in data science. Bryant has a graduate certificate in business analytics. URI has a new undergraduate major and minor in data science.

   i. **If similar programs exist, how is this program different or why is duplication necessary?**

   URI’s program is based in the computer science department of its College of Arts and Sciences whereas the RIC program is based in the Computer Information Systems discipline of the School of Business. The RIC program is designed to serve existing RIC students (as a minor) and does not compete with URI’s program. RIC’s existing student body differs significantly from students at URI. Most students at RIC stay in Rhode Island when they finish (up to 80% of our graduates are Rhode Island natives and intend to live and work here upon graduation. The demographics of our student population differ from those of the student body at URI. Sixty-nine percent of our most recent graduates are women, 23 percent of these graduates are students of color, and among our most recently matriculated students, up to 45 percent are students of color. Our students also are very likely to be the first in their families to have sought post-secondary education. Last, these students are very likely to gain the most in their economic condition through participating in a
minor in data science and seeking employment with that credential in addition to their diploma.

ii. Have you communicated with other institutions about the development of this program and have any concerns been raised related to R, S, M or duplication?
We notified URI of our plans for a data science minor in response to its application for its own data science programs.

b. How do courses in this program transfer to other schools?  N/A

c. How does this program align to academic programs at other institutions?  N/A

d. Are recipients of this credential accepted into programs at the next degree level without issue?  N/A

e. How does this program of study interface with degree programs at the level below them?  N/A

f. Are cooperative agreements or affiliations established?  If so, what?  N/A

5. Program Content
a. Are there pre-requisite courses?  Yes (CIS 251 Computers in Management)

b. Curriculum  
   i. How many credit hours are required to graduate (include all general education and pre-requisites)
      19 credit hours for the minor with 3 credit hours for the pre-requisite for a total of 22

   ii. What courses are required for the program (including general education requirements)?
      • CIS 352 Management Information Systems - 3 Cr
      • MATH 177 Quantitative Business Analysis - 4 Cr
      • MATH 248 Business Statistics - 4 Cr
      • CIS 470/570 Introduction to Data Science (NEW) - 4 Cr
      • CIS 472/572 Data Visualization (NEW) - 4 Cr
      • CIS 251 Computers in Management – 3 Cr (pre-requisite)

      It should be noted that CIS 251, CIS 352, MATH 177, and MATH 248 are required as part of most School of Business degree programs (save for Economics and Health Care Administration) and that the CIS faculty plan on combining CIS 251 and CIS 352 into a single four-credit courses for Fall 2018.

   iii. What are the new courses and descriptions that will go into the course catalog?
      CIS 470/570 Introduction to Data Science – domain knowledge in mathematics, machine learning, and databases that pertains to specific data and information extraction are introduced. Students use these tools to solve unstructured problems.

      CIS 472/572 Data Visualization – this course introduces algorithms and techniques for effective data visualization based on data science principles, graphic and communication design, visual art,
perceptual and cognitive science. Data visualization tools are introduced.

iv. Are there specializations and options? If so, please describe. No.

v. Is the program content guided by program-specific accreditation standards or other outside guidance? No

6. Faculty and staff
   a. What are the number of each needed? No new faculty or staff is required
   b. Are these new positions of reassignments? N/A
   c. What are the minimal degree level and academic/technical field requirements and certifications required for teaching in this program? An appropriate graduate degree with industry experience will be a minimum requirement to teach in this program but the majority of courses will be taught by full-time doctorally-qualified faculty.

7. Students
   a. How are students selected for the major? Declaration by existing students
   b. Are there admission requirements? Previous admission to Rhode Island College
   c. What is the primary source of students? Existing RIC students
      i. New students or drawn from other programs?
      ii. Industry sponsored students/employees? Describe. N/A
   d. What is the estimated number of students in the major? 5-10 per semester
   e. What is the estimated number of annual graduates? 10-20

8. Evaluation
   a. How will the program be evaluated?
      i. Performance measures to evaluate the program
         Graduates will understand the roles of information systems in organizations and be able to utilize these systems for organizational process improvements.
         Graduates will be able to develop information systems, which achieve the goals of the organization while identifying and evaluating sourcing alternatives.
         Graduates will understand and be able to address the information requirements of organizations, including data security and risk management.
         Graduates will understand the opportunities created by technology innovations and how these impact
organizations.

Graduates will understand the design and management of the enterprise architecture and infrastructure.

Graduates will have a basic level of competency in programming, logic skills, and computer literacy.

ii. Will the program be accredited? If so, when? How?
The minor will be reviewed as part of the School of Business application for IACBE accreditation in AY 2018-2019.

9. What special equipment or resources are needed?
   a. Special instructional resources and services needed? (i.e., clinical space, internships, proctors) N/A

   b. Facilities and capital equipment? N/A

10. Is the program financially viable?
    Two new courses have already been developed and approved. The program will utilize existing faculty and technology/lab resources.