THE
UNIVERSITY
OF RHODE ISLAND

MODIFIED FORM
FOR NEW MINORS, AND TRACKS/OPTIONS/SUB-PLANS/CONCENTRATIONS

A Proposal for a Bioinformatics Track Option in the Program of Cell and Molecular Biology

Date: September 01, 2017

A.   **PROGRAM INFORMATION**

A1. Name of institution University of Rhode Island

A2. Name of department, division, school or college
Department: Cell and Molecular Biology
College: College of the Environment and Life Sciences

A3. Title of proposed program and Classification of Instructional Programs (CIP) code
Program title: Bioinformatics Track/Option in the major of Cell and Molecular Biology
Classification code (CIP): 26.1103

A4. Intended initiation date of program change. Include anticipated date for granting first degrees or certificates, if appropriate.
Initiation date: September, 2017
First degree date: June, 2021

A5. Intended location of the program
URI Kingston Campus

A6. Description of institutional review and approval process

	Approval Date
Department	3/30/2016
College	1/4/2017
CAC/Graduate Council	
Faculty Senate	
President of the University	

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

This proposal aims to establish a new Bioinformatics track within the Cell and Molecular Biology Major in the URI Department of Cell and Molecular Biology (CMB). CMB is a teaching and research department representing several broad disciplines in molecular biosciences: biochemistry, microbiology, molecular biology, molecular genetics, and medical laboratory science. The department is based in both Kingston and at the URI Providence Biotechnology Center. On the Kingston campus, we currently offer a Bachelor of Science (BS) degree in Cell and Molecular Biology with four tracks: Microbiology, Biochemistry, Biotechnology, and General. We train graduate students in Cell and Molecular Biology as part of the CMB Specialization in the Biological and Environmental

Sciences (BES) program. The department proposes to add a Bioinformatics track to our undergraduate program.

Although the proposed new track is tethered to a degree program in the Department of Cell and Molecular Biology, this actually represents a multidisciplinary program. The students will take courses in many departments and colleges, including Cell and Molecular Biology, Computer Sciences, Biology, Chemistry, Physics, and Mathematics. These courses together will provide the students a well rounded education in the general sciences and specialty training in Bioinformatics and Computational Biology.

A8. Signature of the President

David M. Dooley

A9. Person to contact during the proposal review
Name: Gongqin Sun
Title: Professor & Chair
Phone: (401) 874-5937
Email: gsun@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.
Not applicable.

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

B1. Why is the new program being developed?

The advent of high-throughput technologies in biological, environmental, and biomedical research has brought a new degree of competitiveness in today's biotechnology job market. With the rapid accumulation of "Big Data" from digitized medical records, genomic sequencing of healthy and diseased individuals, environmental explorations, etc., our society is facing exponentially growing needs for expertise in organizing, analyzing, and making sense of the large volumes of data being produced in the biotechnological industry. Such needs can be met by academic training in bioinformatics, an interdisciplinary field that applies computational techniques into addressing biological, medical, and environmental problems. Hence, we propose to establish a new Bioinformatics track in the undergraduate B.S. major of Cell and Molecular Biology. We envision this new track will bring new training and job opportunities for students at the University of Rhode Island. Furthermore, the Bioinformatics track will facilitate collaborative teaching among faculty from multiple departments and colleges, including new faculty in the BigData Cluster Hire and existing

faculty in Cell and Molecular Biology, Biological Sciences, Pharmacy, Engineering, and Computer Sciences.

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

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

Biomedical, pharmaceutical and biotechnology industries have become major drivers of economic development in New England and across the country. This economic trend demands a workforce well trained in the molecular biosciences. Bioinformatics is becoming an essential component for making major breakthroughs in biomedicine, pharmaceuticals and biotechnology due to the large accumulation of molecular data from a wide range of high-throughput technologies. Graduates with knowledge and training in bioinformatics will feed this economic demand.

The demand for bioinformatics education is clearly demonstrated by the great global need of bioinformatics expertise. It is estimated that the global bioinformatics market will grow at a Compound Annual Growth Rate (CAGR) of around 21.2% during 2014-2020, and the bioinformatics market size is projected to reach $13.3 billion by 2020 (Grand View Research, 2015). Table 1 provides a list of states with the highest employment level of bioinformatics experts in the United States and the mean wages in these positions. Hundreds to thousands of bioinformatics and biotechnology jobs were made available in most states in 2015, and the average annual wages of these positions range from around $60,000 to $106,000. The New England area has also experienced significant increases in vacancies in bioinformatics positions. Three states: Vermont, Connecticut, and New Hampshire, are among the foremost New England states with highest vacancies in bioinformatics jobs (Recruiter.com, 2015). Besides dedicated positions in bioinformatics, graduates from this interdisciplinary training are well prepared to work in a wide variety of biological sciences, informatics, and data sciences job positions.

State	Employment	Employment per thousand jobs	Location quotient	Hourly mean wage	Annual mean wage
California	7,230	0.47	2.01	$39.95	$83,100
Maryland	3,420	1.32	5.67	$47.49	$98,780
Massachusetts	1,820	0.54	2.31	$34.43	$71,610
Texas	1,730	0.15	0.64	$30.76	$63,990
Florida	1,530	0.19	0.83	$36.10	$75,090

Table 1. States with the highest employment level in bioinformatics (Bureau of Labor Statistics).

B3. What entities are advocating for this program? Was an advisory board used to develop the curriculum?

The proposal has been developed in the Department of Cell and Molecular Biology in consultation with the Department of Computer Sciences. Faculty from Computer Sciences, Statistics, and Biological Sciences have indicated their support for this program. New bioinformatics courses, when developed by faculty in the recent BigData Initiative at URI, will be incorporated into the curriculum.

C.   INSTITUTIONAL ROLE: The program should be clearly related to the published role, scope, 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, scope, and mission of the institution and how it is related to the institution's Academic Plan.

This proposal will allow students to select bioinformatics as an undergraduate track within the Cell and Molecular Biology major. With its interdisciplinary nature, bioinformatics integrates educations in Molecular Biology, Genomics, Statistics, Computer Sciences, and Data Sciences. This is a major foundation area for the Life Sciences and Health Sciences, which are two of the focus areas in the Academic Plan for URI in enhancing the STEM disciplines. The Bioinformatics track will collaborate with the campus-wide data sciences initiative and new faculty in the BigData Cluster. It will facilitate collaborative effort among faculty of different disciplines for the education of undergraduate students at URI.

D.   INTER-INSTITUTIONAL CONSIDERATIONS:

D1. What are the similar programs in the state and region?

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

At present, there is no similar established undergraduate bioinformatics program at any of the New England state universities.

b. 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?

Not applicable.

D2. How do courses in this program transfer to other schools?

We do not expect a large number of transfers from the new track to other schools, or vice versa, as there are no comparable programs in other public institutions in Rhode Island. In case some students pursue a transfer to or from other schools, normal transfer procedures will apply.

D3. How does this program align to academic programs at other institutions?

No public higher education institution in Rhode Island offers a bioinformatics program. So adding a Bioinformatics track to CMB at URI will not directly impact other institutions. The only way this proposal will impact other institutions and programs is

that some students may find the bioinformatics program we offer to be better suited for their educational interests. In this case the new track will provide a better educational opportunity for those Rhode Islanders.

D4. Are recipients of this credential accepted into programs at the next degree level without issue?

The program provides an interdisciplinary curriculum that will train students in cell and molecular biology, computer sciences, and an integration of the two broader areas. Graduates from this program can pursue next degree level in a variety of biological, computational, and bioinformatics programs. There are currently over fifty graduate level degree programs and certificate programs in Bioinformatics and Computational Biology. Our students should be competitive applicants for entering many of these programs.

D5. How does this program of study interface with degree programs at the level below them?

Not Applicable.

D6. Are cooperative agreements or affiliations established? If so, what?

Not Applicable.

E.   PROGRAM:

E1. Are there pre-requisite courses? If so, please explain/list?

The proposed Bioinformatics track will not have pre-requisite courses. All courses are built into the program.

E2.   Curriculum

a.   How many credit hours are required to graduate (include all general education and pre-requisites)?

120 credits. This number of credits is consistent with the credit requirements at URI and other institutions.

b.   What courses are required for the program?

Required courses in the area of bioinformatics include the following:

CMB 201 or 211	Introductory Microbiology	4cr
CMB 311	Introductory Biochemistry	3cr
CMB 320	Introduction to Computational Biology	3cr
CMB 352	General Genetics	4cr
CMB 450	Practical Tools for Molecular Sequence Analysis	3cr
CMB 495	Seminar in Cell and Molecular Biology	1cr
CSC 201	Introduction to Computer Programming	4cr
CSC 211	Object-Oriented Programming	4cr
CSC 212	Data Structures and Abstractions	4cr

In addition, the students are required to complete at least 1 credit of a CMB laboratory course above the 300-level and at least 9 credits in specialty concentration courses. More information can be found in the attached curriculum sheet, and a list of preferred and approved elective courses is provided.

c. What are the new courses and descriptions that will go into the course catalog?
This proposal does not involve development of new courses.

d. Are there specializations and options? If so, please describe.
Not applicable.

e. Is the program content guided by program-specific accreditation standards or other outside guidance?
The curriculum was developed following guidelines released by the International Society for Computational Biology (Welch *et al.*, 2014, PLoS Computational Biology). The program aims to provide students with training in core competence areas that are important for working as bioinformatics technicians or pursuing higher degrees as bioinformatics scientists.

f. What are the learning goals (what students are expected to gain, achieve, know, or demonstrate by completion of the program)?
Through training in this program, students will reach the following goals of learning:
1. An ability to apply knowledge of computing, biology, statistics, and mathematics appropriate to the discipline
2. An ability to analyze a problem and identify and define the computing requirements appropriate to its solution
3. An ability to use current techniques, skills, and tools necessary for computational biology practice.
4. An ability to function effectively on teams to accomplish a common goal.
5. An understanding of professional, ethical, legal, security, and social issues and responsibilities.
6. An ability to communicate effectively with a range of audiences.
7. An ability to analyze the local and global impact of bioinformatics and genomics on individuals, organizations, and society.
8. Recognition of the need for and an ability to engage in continuing professional development.
9. Detailed understanding of the scientific discovery process and of the role of bioinformatics in it.
10. An ability to apply statistical research methods in the contexts of molecular biology, genomics, medical, and population genetics research.
11. Knowledge of general biology, in-depth knowledge of at least one area of biology, and understanding of biological data generation technologies.

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. What are the number of each needed?

Currently the department has two faculty members working in the broader area of bioinformatics: Associate Professor Bethany Jenkins and Assistant Professor Ying Zhang. As a group, they have been active in conducting funded research and teaching bioinformatics courses at the graduate and undergraduate levels. Courses listed in the curriculum are already offered at URI. Thus, no new faculty are required to initiate the program. The proposed curriculum includes a number of required CSC courses, and the Department of Computer Sciences indicates that the bioinformatics students can be accommodated in their courses (See attached letter from the Computer Sciences Department Chairperson).

F2. Are these new positions or reassignments?
The initial program will involve existing faculty offering existing courses. Once the program is up and running, if we reach the projected number of enrollment, expansion will require the commitment of additional faculty hours and will be supported either through workload reassignments or through the hiring of new faculty or teaching assistants.

F3. What are the minimal degree level and academic/technical field requirements and certifications required for teaching in this program?
Ph. D. in Bioinformatics, Computational Biology, Cell and Molecular Biology, Biological Sciences, Computer Sciences, or related fields.

G. STUDENTS:

G1. How are students selected for the program?
Students will be selected to the program through the normal annual admission process or through transfer from other programs.

G2. Are there admission requirements?
The Bioinformatics track will follow the standard admission procedure in the CMB department.

G3. What is the primary source of students?

a. New students or drawn from other programs?
We expect most of the students will be recruited through the admission process for the CMB program.

b. Industry sponsored students/ employees? Describe.
Not applicable.

G4. What is the estimated number of students in the program?
At the beginning, we expect to recruit around 10-20 students per year to the Bioinformatics track. The student population is expected to reach 20-50 in the first five years.

G5. What is the estimated number of annual graduates?
The estimated number of graduates is 20-50 per year after the initial ramp-up period.

H. EVALUATION:

H1. How will the program be evaluated?

a. **Performance measures to evaluate the program.**

There are three criteria that will ultimately measure the success of the Bioinformatics track: enrollment, graduation rate, and success of the graduates in the economic market place. 1) Enrollment. It would likely take 2 to 5 years of ramp-up time before we can judge if the program is successful in attracting students. Thus, the fifth anniversary of the program's initiation would be a time to evaluate its enrollment success. 2) Graduation rate. Universities often use four-year and six-year graduate rates to measure the success of a program. The same criterion should apply to the Bioinformatics track. 3) Success of the graduates from this track in the economic market place. This will be the ultimate measure of the program's success. We plan to track the career and employment of our graduates one year and five years after their graduation. Such information would provide a measure for how well we attract and educate students in this track.

b. **Will the program be accredited? If so, when? How?**

Not Applicable.

I. **WHAT SPECIAL EQUIPMENT OR RESOURCES ARE NEEDED?**

I1. Special instructional resources and services needed? (Clinical space, internships, proctors)

The Bioinformatics track will be offered with existing courses, so no new space will be needed.

I2.   Facilities and capital equipment?

Not applicable.

J. **IS THE PROGRAM FINANCIALLY VIABLE?**

J1.   If 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.

If new funding for faculty, staff, equipment or facilities *is* required, complete the budget form (select *Academic Program Change Forms*) (see also *Budget Form Instructions*) and submit the entire proposal with budget form to the URI Budget and Financial Planning Office.

The new Bioinformatics track will be established with existing courses and the projected student enrollment can be accommodated with the current capacity. Therefore, no new funding is required for the initiation of the program. If unexpectedly high enrollment were seen in the new track, resources would be needed for opening new course sessions to fulfill the needs in the growing program track.

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: December 15, 2016

TO: Nancy F. Neff
            Coordinator, Faculty Senate

FROM: Linda Barrett
            Director, Budget and Financial Planning

SUBJECT: Proposal for a Bioinformatics track option in Cell and Molecular Biology

As requested in an email from Dr. Gongqin Sun, Professor and Chairperson in the Department of Cell and Molecular Biology, College of Environmental Life Sciences, dated December 9, 2016, the Budget and Financial Planning Office has reviewed the submitted documents related to the proposal for a new track option in Cell and Molecular Biology .

According to the proposal, the undergraduate major will be offered through the College of the Environment and Life Sciences, and will provide URI students with the knowledge of organizing, analyzing, and utilizing large volumes of data being produced in the biotechnological industry. This information will be important for applying computational techniques into addressing biological, medical, and environmental problems in the field. Dr. Sun indicates in the submission that these concepts will promote intellectual and ethical leadership skills needed today. Also, this program will encourage embracing diversity, promote social justice, and expand areas of scholarships and will be unique to the state and when compared to other New England state universities.

The Budget and Financial Planning Office concurs that the undergraduate major in the Bioinformatics track option in Cell and Molecular Biology 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   Cheryl Hinkson
        Dean Libutti   Colleen Robillard
        Cliff Katz   Kelly Slocum
        John Kirby   Dr. Gongqin Sun
        Laura Beauvais   Joanne Lawrence

Office/BudgetImpactStatements/Cell and Molecular Biology/BudgetImpactStatementLetter.final

B.S. Cell and Molecular Biology - Bioinformatics Option - Effective Fall 2017
College of the Environment & Life Sciences

List of approved electives

Course Name	Course #	Credits	Grade
Introductory Biochemistry Laboratory	CMB 312	2	
Immunology and Serology	CMB 333	3	
Virology	CMB 334	3	
Genetics Laboratory	CMB 353	1	
Advanced Biochemistry Laboratory I	CMB 412	3	
Advanced Microbiology I	CMB 413	3	
Advanced Microbiology II	CMB 414	3	
Advanced Microbiology Lab I	CMB 415	2	
Advanced Microbiology Lab II	CMB 416	2	
Physical Biochemistry	CMB 421	3	
Pathogenic Bacteriology	CMB 432	3	
Genetics of Cancer	CMB 435	3	
Fundamentals of Molecular Biology	CMB 437	3	
Advanced Topics in Genetics	CMB 452	3	
Proteins and Enzymes	CMB 482	3	
Diagnostic Microbiology	CMB 483	3	
Bioinformatics I	CMB 522	3	
Principles of Cell Biology	BIO 341	3	
Endocrinology I	BIO 445	3	
Pharmaceutical Biotechnology	BPS 535	3	
Software Engineering	CSC 305	4	
Intermediate Topics in Computing	CSC 392	1-4	
Operating Systems and Networks	CSC 412	4	
Introduction to Parallel Computing	CSC 415	4	
Database Management Systems	CSC 436	4	
Modern Biological Physics	PHY 430	3	
Independent Research	CMB/CSC 491/492	up to 6 credits	

B.S. Cell and Molecular Biology - Bioinformatics Option - Effective Fall 2017
College of the Environment & Life Sciences

Name: _____   ID #: _____   Date: _____

Intro to URI	(1 credit)
URI 101 _____ (1)	

Basic Sciences	
Biology	**(8 credits)**
*BIO 101 _____ (3) **and** *BIO 103 _____ (1)	
*BIO 102 _____ (3) **and** *BIO 104 _____ (1)	

Chemistry	(16 credits)
*CHM 101 _____ (3) **and** CHM 102 _____ (1)	
CHM 112 _____ (3) **and** CHM 114 _____ (1)	
CHM 226_____ (2)	CHM 227_____ (3)
CHM 228 _____(3)	

Mathematics	(6-8 credits)
*MTH 131_____ (3) **OR** *MTH 141 _____ (4)	
And 1 of the following:	
MTH 132 _____ (3)	*MTH 142 _____ (4)
STA 307/8_____ (4)	STA 409 _____ (4)

Physics	(8 credits)
*PHY 111 _____ (3) **and** *PHY 185 _____ (1)	
*PHY 112 _____ (3) **and** *PHY 186 _____ (1)	

Note: Courses marked with an * can be used to satisfy major and general education requirements.

Free Electives: Consult with your advisor to determine the total needed to meet the **minimum 120 credit** graduation requirement and to make sure you have satisfied all General Education Requirements

_____ ( )	_____ ( )		
_____ ( )	_____ ( )		
_____ ( )	_____ ( )		
_____ ( )	_____ ( )		
_____ ( )	_____ ( )		
_____ ( )	_____ ( )		
_____ ( )	_____ ( )		
_____ ( )	_____ ( )		
_____ ( )	_____ ( )		
_____ ( )	_____ ( )		

BIOINFORMATICS Concentration Courses			(40 credits)
1. Required Courses			
1.a Cell and Molecular Biology			**(19 credits)**
Course Name	**Course #**	**Credits**	**Grade**
Introductory Microbiology	CMB 201 or 211	4	
Introductory Biochemistry	CMB 311	3	
Intro. Computational Biology	CMB 320	3	
General Genetics	CMB 352	4	
Molecular Sequence Analysis	CMB 450	3	
Seminar in Cell and Molecular Biology	CMB 495	1	
Select at least 1 credit of a CMB laboratory course above the 300-level			
Course Name	**Course #**	**Credits**	**Grade**
Genetics Laboratory	CMB 353	1	
Introductory Biochemistry Laboratory	CMB 312	2	
Advanced Biochemistry Laboratory I	CMB 412	3	
Advanced Microbiology Lab I	CMB 415	2	
Advanced Microbiology Lab II	CMB 416	2	
1.b Computer Sciences			**(12 credits)**
Course Name	**Course #**	**Credits**	**Grade**
Intro. Computer Programming	CSC 201	4	
Object-Oriented Programming	CSC 211	4	
Data Structures and Abstractions	CSC 212	4	

2. Electives			
Select from the following and a list of approved electives (9 credits)			
Course Name	**Course #**	**Credits**	**Grade**
Principles of Cell Biology	BIO 341	3	
Immunology and Serology	CMB 333	3	
Virology	CMB 334	3	
Advanced Microbiology I	CMB 413	3	
Advanced Microbiology II	CMB 414	3	
Pathogenic Bacteriology	CMB 432	3	
Fundamentals of Molecular Biology	CMB 437	3	
Proteins and Enzymes	CMB 482	3	
Genetics of Cancer	CMB 435	3	
Bioinformatics I	CMB 522	3	
Software Engineering	CSC 305	4	
Operating Systems and Networks	CSC 412	4	
Database Management Systems	CSC 436	4	
Independent Research	CMB/CSC 491/492	up to 6 credits	

120 credits required. Student Total_____

Subject: Re: Bioinformatics track curriculum
From: Joan Peckham <joan@cs.uri.edu>
Date: 9/19/16, 9:05 PM
To: Ying Zhang <yingzhang@uri.edu>

Dear Ying,

We will do everything we can to support the students in this program. We are devoted to the assertion that CS is by nature interdisciplinary, and we have supported bioinformatics education and research on campus in the past and are willing to do so going forward.

We should be able to support your bioinformatics track in the first few semesters if there are only a few students. CSC 201 should not be a problem, and we could squeeze a few into 211 and 212, and we are happy to do this. If numbers grow beyond a few, we would need to secure additional resources.

It would greatly help us in our planning if you could let us know of the start date of the track and the estimated number of students in years 1, 2 and 3. We know that these things are hard to estimate and that you would need to update each year, and that is of course okay.

This looks like a solid and needed track.

Thank you,
Joan

> On Sep 18, 2016, at 7:24 PM, Ying Zhang <yingzhang@uri.edu> wrote:
>
> Hi Joan,
>
> It was nice seeing you on Friday. Thank you for supporting our application of the Bioinformatics track. Attached please find a curriculum sheet that is approved by the CMB faculty. In the curriculum, we have included a number of CSC courses, and we will ensure that students take appropriate prerequisites for the CSC courses through advising. We would like to ensure that students in this track will not have any trouble enrolling in their courses so that they can have cross disciplinary training in both CS and CMB, and they will be able to complete the major. If this looks agreeable to you, would you please write a letter of support for our application?
>
> Thank you,
>
> Ying
>
>
> --
> Ying Zhang
> Assistant Professor
> Department of Cell and Molecular Biology
> College of the Environment and Life Sciences
> University of Rhode Island

─Attachments:─

Subject: Re: Bioinformatics track support
From: Prabhani Kuruppumullage Don <prabhani@uri.edu>
Date: 10/28/16, 3:38 PM
To: Ying Zhang <yingzhang@uri.edu>

Hi Ying,

I would be more than happy to introduce and incorporate classes that would be useful and appropriate for the students in the proposed Bioinformatics track. Looking at the proposed curriculum, I think the students do need some training in appropriate statistical methods, and believe they would heavily benefit from the new linear models class (will be offered from Spring 2017) and the future (still in sketch-level) statistical learning class. But I am also willing to talk through and design a new track specific statistical methods class if the need arise.

Looking forward to work with you on bringing the new track to live

Prabhani

On Fri, Oct 28, 2016 at 11:07 AM, Ying Zhang <yingzhang@uri.edu> wrote:

Hi Prabhani,

I am writing to see if you could provide a letter to support our application of the CMB Bioinformatics track. Specifically, I was hoping to incorporate your new Informatics/Data science course as electives to our curriculum if you see fit. Would you please provide a letter or simply by replying to this email to state the synergy of your future course with the Bioinformatics track and your support to the track application? Below I am providing a list of core courses we had for the track:

CSC 201	Introduction to Computer Programming	4cr
CSC 211	Object-Oriented Programming	4cr
CSC 212	Data Structures and Abstractions	4cr
CMB 201 or 211	Introductory Microbiology	4cr
CMB 311	Introductory Biochemistry	3cr
CMB 320	Introduction to Computational Biology	3cr
CMB 352	General Genetics	4cr
CMB 450	Practical Tools for Molecular Sequence Analysis	3cr
CMB 495	Seminar in Cell and Molecular Biology	1cr

Thanks,

Ying

--
Ying Zhang
Assistant Professor
Department of Cell and Molecular Biology
College of the Environment and Life Sciences
University of Rhode Island

--
Prabhani Kuruppumullage Don
Assistant Professor of Statistics
University of Rhode Island
Kingston, RI

Subject: Re: Bioinformatics track course support
From: Rachel Schwartz <rsschwartz@uri.edu>
Date: 10/31/16, 8:03 PM
To: Ying Zhang <yingzhang@uri.edu>

Hi Ying,

I think having a Bioinformatics track in CMB is a wonderful idea. I am very supportive and I look forward to the success of students in this program. I will also be happy to continue working with you on ensuring that the course I am developing in BIO is complementary to these courses and provides additional knowledge and skills for the Bioinformatics students. Please feel free to share this email with anyone interested in this program.

-Rachel

Rachel Schwartz, PhD
Assistant Professor
Department of Biological Sciences
College of the Environment and Life Sciences
The University of Rhode Island
Kingston, RI 02881

Office: CBLS 377
Phone: 401-874-5404

On Fri, Oct 28, 2016 at 10:57 AM, Ying Zhang <yingzhang@uri.edu> wrote:

> Hi Rachel,
>
> I am writing to see if you could provide a letter to support our application of the CMB Bioinformatics track. Specifically, I was hoping to incorporate your new Bioinformatics/Data science course to our curriculum when it gets developed. Would you please provide a letter or simply by replying to this email to state the synergy of your future course with the Bioinformatics track and your support to the track application? Below I am listing a list of core courses we had for the track:
>
> | | | |
> |---|---|---|
> | CSC 201 | Introduction to Computer Programming | 4cr |
> | CSC 211 | Object-Oriented Programming | 4cr |
> | CSC 212 | Data Structures and Abstractions | 4cr |
> | CMB 201 or 211 | Introductory Microbiology | 4cr |
> | CMB 311 | Introductory Biochemistry | 3cr |
> | CMB 320 | Introduction to Computational Biology | 3cr |
> | CMB 352 | General Genetics | 4cr |
> | CMB 450 | Practical Tools for Molecular Sequence Analysis | 3cr |
> | CMB 495 | Seminar in Cell and Molecular Biology | 1cr |
>
> Thanks,
>
> Ying

--
Ying Zhang
Assistant Professor
Department of Cell and Molecular Biology
College of the Environment and Life Sciences
University of Rhode Island

Biomedical & Pharmaceutical Sciences Department:

Support letter to the CMB Bioinformatics track
David Rowley <drowley@uri.edu> Wed, Jan 25, 2017 at 6:51 PM
To: Gongqin Sun <gongqinsun@uri.edu>
Cc: Ying Zhang <yingzhang@uri.edu>
Dear Gongqin,
I'm writing to confirm that students in the Bioinformatics Track may enroll in the graduate course BPS 535 Pharmaceutical Biotechnology as a specialty elective. This course is offered in the Spring semester in alternate years. Thus, advanced undergraduate students and graduate students should have the opportunity to participate.
Kind Regards,
David

Physics Department:

Dear Gongqin,
Physics department supports the inclusion of PHY430 Modern Biological Physics as a specialty elective in Bioinformatics curriculum.
Best Regards,
Oleg