ASU ARIZONA STATE UNIVERSITY

PROPOSAL TO ESTABLISH A NEW UNDERGRADUATE CERTIFICATE

The completed and signed proposal should be submitted by the Dean's Office to: curriculumplanning@asu.edu.

Before academic units can advertise undergraduate certificates or include them in their offerings as described in the university catalogs, they must be recommended for approval by the Senate Curriculum and Academic Programs Committee and the University Senate, and be approved by the Office of the University Provost.

Definition and minimum requirements:

These are the minimum requirements for approval. Individual undergraduate certificates may have additional requirements.

An undergraduate certificate is a programmatic or linked series of courses from a single field or one that crosses disciplinary boundaries and may be freestanding or affiliated with a degree program. The certificate provides a structured and focused set of courses that can be used to enhance a student's baccalaureate experience or professional development.

An undergraduate certificate program:
- Requires a minimum of 15 credit hours of which at least 12 credit hours must be upper division
- Requires a minimum grade of "C" or better for all upper-division courses
- Consists of courses that must directly relate in whole or large part to the purpose of the certificate. Example: Geographic area certificates must include only courses specific to the title of the certificate, other than a non-English language
- Is cross disciplinary; or,
    - Certified by a professional or accredited organization/governmental agency; or,
    - Clearly leads to advanced specialization in a field; or,
    - Is granted to a program that does not currently have a major

College/School/Institute:	College of Liberal Arts and Sciences
Department/Division/School:	School of Life Sciences
Proposed certificate name:	Certificate in Computational Life Sciences
Requested effective date:	2019-20

Delivery method and campus or location options: select all locations that apply

☐ Downtown Phoenix   ☐ Polytechnic   ☒ Tempe   ☐ Thunderbird   ☐ West   ☐ Other: _____

☐ **Both** on-campus and ☐ ASU Online* - (check applicable campus(es) from options listed above)

☐ ASU Online only (all courses online and managed by ASU Online)

Note: Once students elect a campus or online option, students will not be able to move between the on-campus and the ASU Online options. Approval from the Office of the University Provost and Philip Regier (Executive Vice Provost and Dean) is required to offer programs through ASU Online. Please contact Ed Plus then complete the ASU Online Offering form in Curriculum ChangeMaker to begin this request.

Proposal Contact

Name:	Melissa A. Wilson Sayres Kenneth H. Buetow	**Title:**	Assistant Professor Professor
Phone number:	480-727-6366 480-727-9413	**Email:**	melissa.wilsonsayres@asu.edu kenneth.buetow@asu.edu

DEAN APPROVAL(S)

This proposal has been approved by all necessary unit and College/School levels of review. I recommend implementation of the proposed organizational change.

College/School/Division Dean name: Paul LePore

Signature _____   **Date:** 10/ 31 /2018

College/School/Division Dean name:
(if more than one college involved)

Signature _____   **Date:** __ / __ /20

1. **Overview**

   Provide a brief description of the new certificate.

   Big data is a challenge for life sciences undergraduate majors. The School of Life Sciences has faculty that spans a diverse background of scientific disciplines in computational life sciences and ethics who can provide expert training to students who will benefit from increased computational understanding as applied uniquely to life sciences data. New and diverse data types are emerging in the life sciences including biomarker data, longterm monitoring data, longitudinal samples, genomic, transcriptomic, proteomic, and metabolomics data for human and non-human samples (including viruses, plants, animals, bacteria, the environment, and ecosystems). Further, each of these types of life sciences data is only growing in size as technology increases. By completing the undergraduate Certificate in Computational Life Sciences, our undergraduate students will be able to understand these life sciences data formats, understand how to combine and analyze life sciences data types, and discuss the ethical implications of biological data.

   A. This proposed certificate (check one):

   ☒ is cross disciplinary; or

   ☐ is certified by a professional or accredited organization/governmental agency; or,

   ☐ clearly leads to advanced specialization in a field; or,

   ☐ is granted to a program that does not currently have a major

   B. Why should this be a certificate rather than a concentration or a minor?

   This certificate draws on courses across highly divergent fields in the life sciences, spanning functional and molecular genetics, to ecology and biostatistics, to give our students expertise in Computational Life Sciences, and thus spans across these disparate life sciences fields.

   C. Affiliation

   If the certificate program is affiliated with a degree program, include a brief statement of how it will complement the program. If it is not affiliated with a degree program, incorporate a statement as to how it will provide an opportunity for a student to gain knowledge or skills not already available at ASU.

   The Certificate in Computational Life Sciences is not affiliated with a specific degree program, but will be affiliated with the all of the undergraduate degrees in the School of Life Sciences.

   D. Demand

   Explain the need for the new certificate (e.g., market demand, interdisciplinary considerations).

   Glassdoor.com ranks data scientist at the top of its 50 Best Jobs in America. It reports that the average annual salary for computational biologists in the Phoenix area is $82,112, and that the national average is $104,313. The McKinsey Global Institute projects that the demand for deep analytical talent in the United States could be 50 to 60 percent greater than its projected supply by 2018, and a large portion of this is going to be in computational biology, requiring trainees with expertise in both fundamental life sciences and in computation. Job prospects for people with training in computational life sciences span academic institutions, and notably include growing life sciences industries like 23andMe, Monsanto, GlaxoSmithKline (Respective medians $105,048, $105,113, and $101,452 per year). Our trainees need computational life sciences training.

   E. Projected enrollment

   What are enrollment projections for the first three years?

	1st Year	2nd Year (Yr. 1 continuing + new entering)	3rd Year (Yr. 1 & 2 continuing + new entering)
Number of Students (Headcount)	15	40	100

2. **Support and Impact**

   A. Faculty governance
   Attach a supporting letter from the chair of the academic unit verifying that the proposed certificate has received faculty approval through appropriate governance procedures in the unit and that the unit has the resources to support the certificate as presented in the proposal, without impacting core program resources.

   B. Other related programs
   Identify other <u>related</u> ASU programs and outline how the new certificate will complement these existing ASU programs. (If applicable, statements of support from potentially affected academic unit administrators need to be included with this proposal submission.)

   While there are programs around ASU focused exclusively on life sciences, or exclusively on computation, and programs with a very specialized focus on biomedical informatics, there are no programs that give students training in computation as applied to the broad fields spanning life sciences.

   C. Letter(s) of support
   Provide a supporting letter from each college/school dean from which individual courses are taken.

3. **Academic Curriculum and Requirements**

   A. Knowledge, competencies, and skills
   List the knowledge, competencies, and skills (learning outcomes) students should have when they complete this proposed certificate. Examples of program learning outcomes can be found at (https://uoeee.asu.edu/assessment).

   Outcome 1.

   Students will be able to identify, describe, and summarize key computational concepts, such as algorithms and relational databases, and their applications in the life sciences.

   Measure 1.1

   Homework assignments will assess student capacity to identify computational methods for analyzing life sciences data in either BIO 439 Computing for Research and BIO 440 Functional Genomics, using a rubric that measures how many methods they can identify and in what detail they can describe the functionality.

   Performance Criterion 1.1

   80% of students will score 3.8 or above on a faculty-developed rubric of a 1-5 scale of this measure.

   Measure 1.2

   Student capacity to describe the application of computational tools to life sciences data will be assessed using homework assignments using a rubric that measures the detail in which students can describe the way in which the computational tool is applied and on what kind of data, such as are offered in the foundational courses, as well as in BIO 355 Computational Molecular Biology.

   Performance Criterion 1.2

   80% of students will score 3.8 or above on a faculty-developed rubric for this metric.

   Outcome 2.

   Students will be able to describe biological data types, structure, and reproducibility, and interpret the ethical, legal, and social implications of large biological data.

   Measure 2.1

   Homework assignments will be used to assess student ability using a rubric that measures the degree to which students can describe different types and structures of biological data, which are assessed in the core courses, as well as in BIO 414 Biometry

Performance Criterion 2.1

80% of students will score a 3.8 or above on a faculty-developed rubric of this metric.

Measure 2.2

Students capacity will be assessed using in-class discussion and homework assignments (from BIO 316: History of Biology; BIO 331 History of Medicine; or BIO 323: History of Science), with a rubric that assesses student ability to fully describe the ethical issues associated with the use of life sciences data.

Performance Criterion 2.2

80% of students will score a 3.8 or above on a faculty-developed rubric of this metric.

B. Enrollment criteria
Describe the procedures and any qualifications for enrollment in the proposed certificate. If they are identical to the admission criteria for the existing major and degree program under which this certificate will be established, please note that.

Enrollment is the same to current ASU programs. Enrollment is open to all current ASU students.

C. Program Map
Attach a copy of the "proposed" map for this certificate program. Instructions on how to create a "proposed certificate map" in BAMM can be found in the Build a Major Map Training Guide.

D. Curricular structure
Provide the curricular structure for this certificate. Be specific in listing required courses and specify the total minimum number of hours required for the certificate.

Required certificate courses				
Prefix	**Number**	**Title**	**Is this a new Course?**	**Credit Hours**
BIO	316	History of Biology: Conflicts and Controversies, OR BIO 317 History of Science, OR BIO 318 History of Medicine,	No	3
BIO	439	Computing for Research, OR	Yes	3
BIO	440	Functional Genomics	No	3
			(Select one)	
			Section sub-total:	6
Elective certificate courses				
Prefix	**Number**	**Title**	**Is this a new Course?**	**Credit Hours**
BIO	355	Introduction to Computational Molecular Biology	No	3
BIO	411	Quantitative Methods in Conservation and Ecology	No	4
BIO	415	Biometry	No	4

BIO	439	Computing for Research	Yes	3
BIO	440	Functional Genomics	No	3
BIO	494	Topic: Data Analysis in Neuroscience	No	3
BIO	494	Topic: Genomic Analysis	No	3
BMI	311	Modeling Biomedical Knowledge	No	3
BMI	312	Modeling Biomedical Data	No	3
BMI	330	Topics in Translational Bioinformatics	No	3
			Section sub-total:	9

Other certificate requirements **E.g. –** Capstone experience, internship, clinical requirements, field studies, foreign language skills as applicable	Credit Hours
Section sub-total:	
Total minimum credit hours required for certificate	**15**

E. Minimum residency requirement
How many hours of the certificate must be ASU credit?

15 credits

F. New courses
Provide a brief course description for each new course.

BIO 439 Computing for Research (3)

The course will work mainly with command-line programs for data analysis, with a major focus on sequence-based analysis. This will be an interactive flipped course, with required hands-on aspects both in class trouble-shooting and for out-of-class assignments where students will work on problem-solving and implementation.

Note: All new required courses should be submitted in Curriculum Changemaker and ready for Provost's Office approval before this certificate is put on Curriculum and Academic Programs Committee (CAPC) agenda.

4. Administration and Resources

A. Administration
How will the proposed certificate be administered (including admissions, student advisement, retention, etc.)?

The certificate will be administered via the undergraduate office in the School of Life Sciences.

B. Resources
What are the resource implications for the proposed certificate, including any projected budget needs? Will new books, library holdings, equipment, laboratory space and/or personnel be required now or in the future? If multiple units/programs will collaborate in offering this certificate please discuss the resource contribution of each participating program. Letters of support must be included from all academic units that will commit resources to this certificate.

The certificate does not have additional projected budget needs beyond what is provided by administration in the School of Life Sciences.

C. Primary faculty
List the primary faculty participants regarding this proposed certificate. For interdisciplinary certificates, please include the relevant names of faculty members from across the University.

Name	Title	Area(s) of Specialization as they relate to proposed certificate
Melissa A. Wilson Sayres	Assistant Professor	co-director, Evolution, Genomics
Kenneth H. Buetow	Professor	co-director, Complex Adaptive Systems, Network Analysis
Stephen Pratt	Associate Professor	Biostatistics
John Szabo	Professor	Ecology, Ecosystems
Emilia Martins	Professor	Statistics, Phylogenetics
Jeff Jensen	Professor	Population genetics
Susanne Pfeifer	Assistant Professor	Conservation genetics
Kenro Kusumi	Professor	Regeneration, Genomics
Reed Cartwright	Assistant Professor	Computational and statistical methods
Michael Lynch	Professor	Evolution, single-cell genomics
Nico Franz	Professor	Systematics and taxonomy
Sharon Crook	Professor	Mathematical modeling, neuroscience
Beckett Sterner	Assistant Professor	Philosophy, Data integration, Ethics
Karin Elison	Administrative Professor	Ethics in big data
Benjamin Blonder	Assistant Professor	Ecology
Carlo Maley	Associate Professor	Modeling, Cancer, Genomics
Manfred Laubichler	Professor	Evolution, Complexity

5. Additional Materials

A. Complete and attach the Appendix document.

B. Provide one or more model programs of study (if appropriate).

C. Attach other information that will be useful to the review committees and the Office of the Provost.

PROVOST OFFICE APPROVAL(S)
This proposal has been approved by all necessary Provost office levels of review. I recommend implementation of the proposed organizational change. **Office of the University Provost**   **Signature**   **Date:**   / /20 *Note: An electronic signature, email, or a PDF of the signed signature page is acceptable.*
CIP Code:

APPENDIX

OPERATIONAL INFORMATION FOR UNDERGRADUATE CERTIFICATES

(This information is used to populate the Degree Search/catalog website.

Please consider the student audience in creating your text.)

1. **Proposed Certificate Name: Computational Life Sciences**

2. **Marketing Description**
   Optional. 50 words maximum. The marketing description should not repeat content found in the program description.

   The research landscape is changing thanks to advances in technology. To become a successful scientist it is critical to use the power of the computer to analyze data. Learn about tools that can analyze different types of life science datasets and investigate how computational approaches in research help solve scientific problems.

3. **Program Description (150 words maximum)**

   In the life sciences, employers need graduates who are skilled in understanding and interpreting data. In particular, students who have experience using new, computational approaches and computer programs to process data are in demand. By completing this certificate in computational life sciences, students will learn how to identify and interpret data that is generated from a wide range of fields in the life sciences. These fields include, but are not limited to: ecology, botany, evolutionary biology, neuroscience, molecular and cellular biology, and animal behavior. Students learn about many types of data generated from sources such as DNA, RNA, protein, imaging, conservation and even from long-term ecological research sites.

   Students are introduced to a suite of computational approaches that are used to analyze, visualize and interpret this data. Finally, students will delve into the ethical implications of collecting, analyzing and sharing the results of computational life sciences data.

4. **Contact and Support Information**
   Building code and room number: *(Search ASU map)*   LSC 426
   Program office telephone number: (*i.e. 480/965-2100*)   480/727-2039
   Program Email Address: SOLS.advising@asu.edu
   Program Website Address: https://sols.asu.edu

5. **Program Requirements**
   Remember to attach a copy of the "proposed" map for this certificate program. Instructions on how to create a "proposed certificate map" in BAMM can be found in the Build a Major Map Training Guide.

6. **Enrollment Requirements**
   If applicable, list any special enrollment requirements applicable to this certificate in addition to the standard text. Enrollment requirements for all undergraduate certificates include the following text:

   A student pursuing an undergraduate certificate must be enrolled as a degree-seeking student at ASU. Undergraduate certificates are not awarded prior to the award of an undergraduate degree. A student already holding an undergraduate degree may pursue an undergraduate certificate as a nondegree-seeking graduate student.

7. **Delivery/Campus Information Options:**   On-campus only (ground courses and/or iCourses)

   Note: Once students elect a campus or online option, students will not be able to move between the on-campus and the ASU Online options. Approval from the Office of the Provost and Philip Regier (Executive Vice Provost and Dean) is required to offer programs through ASU Online.

8. **Campus/Locations:** indicate **all** locations where this program will be offered.

☐ Downtown Phoenix   ☐ Polytechnic   ☒ Tempe   ☐ Thunderbird   ☐ West   ☐ Other: _____

9. **Keywords**
   List all keywords used to search for this program (limit 7). Keywords should be specific to the proposed program.
   data science
   genomics
   systems biology
   interdisciplinary
   computational biology
   bioinformatics technologies
   big data
   mathematical modeling

2019 - 2020 CERTIFICATE Map
Computational Life Sciences (Proposed)

Program Requirements

The certificate in computational life sciences requires a minimum of 15 credit hours, of which at least 12 credit hours must be upper-division. The core consists of one computing course and one ethics course. A minimum of nine credit hours in elective courses complete the certificate. The computing course not used toward the core requirements may be used toward the elective credit hours. A grade of C (2.00 on a 4.00 scale) or higher is required for all courses used toward the certificate.

Required Courses -- 6 credit hours

BIO 316: History of Biology: Conflicts and Controversies (H) or BIO 317: History of Science (HU & H) or BIO 318: History of Medicine (HU & H) (3)
BIO 439: Computing for Research or BIO 440: Functional Genomics (3)

Electives -- 9 credit hours

BIO 355: Introduction to Computational Molecular Biology (CS) (3)
BIO 411: Quantitative Methods in Conservation and Ecology (4)
BIO 415: Biometry (CS) (4)
BIO 439: Computing for Research (3)
BIO 440: Functional Genomics (3)
BIO 494: Data Analysis in Neuroscience (3)
BIO 494: Genomic Analysis (3)
BMI 311: Modeling Biomedical Knowledge (3)
BMI 312: Modeling Biomedical Data (3)
BMI 330: Topics in Translational Bioinformatics (3)

If not used as the required computing course, students may include BIO 439 or BIO 440 as a certificate elective.

Depending on a student's undergraduate program of study, prerequisite courses may be needed in order to complete the requirements of this certificate.

July 26, 2018

Dear Colleagues,

I enthusiastically support the proposed undergraduate certificate in Computational Life Sciences. As you are aware, datasets of ever-increasing size and new computational approaches are becoming the norm in Life Sciences. Experimental and observational data types include biomarker data, long term monitoring data, longitudinal samples, genomic, transcriptomic, proteomic, and metabolomics data for human and non-human samples (including viruses, plants, animals, bacteria, the environment, and ecosystems); each with multiple associated computational approaches. The School of Life Sciences programs span ecology, evolution, molecular and cellular biology, neuroscience, immunology, genetics, and philosophy. To be successful, our students need training to be able to understand life sciences data formats and computational tools, understand how to combine and analyze life sciences data types, and be able to discuss the ethical implications of computational life sciences research. By completing the proposed certificate in Computational Life Sciences our undergraduate students will have domain specific knowledge in these areas.

As chair of the School of Life Sciences, I verify that the proposed certificate in undergraduate Computational Life Sciences has received faculty approval through appropriate governance procedures in the unit and that the unit has the resources to support the certificate as presented in the proposal, without impacting core program resources.

This certificate will provide training and recognition of skills in Computational Life Sciences that are critical for the future success of our students. We anticipate that this certificate will not only train life sciences in computational skills, but it will allow students with quantitative and computational skills across ASU to complement their foundational training and apply them in the life sciences.

Sincerely,

Bert Jacobs
Professor and Director, School of Life Sciences

Dr. Anne Katherine Jones
Associate Director of Academic Affairs
 and Associate Professor
School of Molecular Sciences
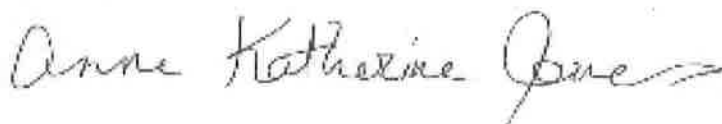   (formerly Department of Chemistry and Biochemistry)

<div align="right">
T: 480/965 - 0356
F: 480/965 – 2747
jonesak@asu.edu
</div>

20 September 2018

Dear Melissa,

This letter is to support the SOLS proposal for a new undergraduate Certificate in Computational Life Sciences. We have no doubt that this certificate will prove interesting to a broad range of students including those in biochemistry and do not see any negative impact on the academic programs in the School of Molecular Sciences. Please do not hesitate to contact me if you have questions regarding this letter.

Sincerely,

Anne Katherine Jones, D. Phil.

From:	Melissa A. Wilson Sayres <melissa.wilsonsayres@asu.edu>
Sent:	Monday, September 17, 2018 3:06 PM
To:	Jenny Smith
Cc:	Kenneth Buetow
Subject:	Fwd: Response requested: Impact of Graduate Certificate in Computational Life Sciences

No conflict with SHESC!

---------- Forwarded message ---------
From: **Kaye Reed** <kaye.reed@asu.edu>
Date: Mon, Sep 17, 2018 at 10:05 PM
Subject: Re: Response requested: Impact of Graduate Certificate in Computational Life Sciences
To: Melissa A. Wilson Sayres <melissa.wilsonsayres@asu.edu>

Dear Melissa,

I think that this is wonderful. I can imagine that some of our students will be interested in this certificate. SHESC sees no conflict with your certificate.

Best,

Kaye

--

Kaye E. Reed, President's Professor

Director, School of Human Evolution and Social Change

Research Associate, Institute of Human Origins

Arizona State University

PO Box 872402

Tempe, AZ 85287

(480) 965-9813

1

From:	Melissa A. Wilson Sayres <melissa.wilsonsayres@asu.edu>
Sent:	Wednesday, September 19, 2018 2:33 AM
To:	Jenny Smith; Kenneth Buetow
Subject:	Fwd: Response requested: Impact of Graduate Certificate in Computational Life Sciences

Approval from physics.

---------- Forwarded message ---------
From: **Michael Treacy** <treacy@asu.edu>
Date: Wed, Sep 19, 2018 at 3:33 AM
Subject: Re: Response requested: Impact of Graduate Certificate in Computational Life Sciences
To: Melissa A. Wilson Sayres <melissa.wilsonsayres@asu.edu>
Cc: Kenneth Buetow <Kenneth.Buetow@asu.edu>, Ashley Meyers <Ashley.N.Meyers@asu.edu>

Dear Melissa, Ken:

I have looked over the two proposals for: (a) "Graduate Certificate in Computational Life Sciences" and; (b) the "Undergraduate Certificate in Computational Life Sciences"

(a) "Graduate Certificate in Computational Life Sciences"

> (i) I support this certificate. As computers and their software and algorithms become more powerful, they offer us unprecedented tools for gaining deeper mechanistic insights into many fields of science. Life Sciences is an extraordinarily complex field, with important contributions to medicine – a topic of great public interest. Computational Life Sciences could offer us a tool for bringing to light some of the deeper mechanisms from cell biology, and medicine, all the way to the social complexities of society.

> (ii) I can see no conflicts within the Department of Physics. If students were to take elective courses in physics, this would require some mathematical competency on the part of the student. We do offer 300- and 400-level biophysics courses, but it I hard to avoid the math.

(b) "Undergraduate Certificate in Computational Life Sciences"

> (i) I support this certificate for the same reasons as in (a)(i) above

(ii)   I can see no conflicts within the Department of Physics. If students were to do elective courses in physics I would recommend the PHY 121/131/252 sequence if there is reasonable math comptency. If the math is too intense, then the PHY 111/112 sequence would be a good option for beginner-level physics, with less math (no calculus).

I hope that this helps?

Best Regards

Mike Treacy
Professor of Physics, Honors Faculty,
Associate Chair (Academic Affairs), Department of Physics, Bateman Building, PSB-147
Arizona State University | P.O. Box 871504 | Tempe, Arizona 85287-1504
Phone: 480.965.5359| Fax: 480.965.7565| e-mail: treacy@asu.edu

From: "Melissa A. Wilson Sayres" <melissa.wilsonsayres@asu.edu>
Date: Tuesday, September 18, 2018 at 3:34 PM
To: Michael Treacy <treacy@asu.edu>
Cc: Kenneth Buetow <Kenneth.Buetow@asu.edu>
Subject: Re: Response requested: Impact of Graduate Certificate in Computational Life Sciences

No worries at all, Mike, please take your time. :)

Best,

Melissa

On Tue, Sep 18, 2018 at 11:32 PM Michael Treacy <treacy@asu.edu> wrote:

Hi Melissa:

Oh! I feel a bit guilty here as my earlier response was sent to the wrong person.

2

I will look it over tonight and respond to you.

Regards

Mike

From: "Melissa A. Wilson Sayres" <melissa.wilsonsayres@asu.edu>
Date: Tuesday, September 18, 2018 at 2:46 PM
To: Michael Treacy <treacy@asu.edu>
Cc: Kenneth Buetow <Kenneth.Buetow@asu.edu>
Subject: Re: Response requested: Impact of Graduate Certificate in Computational Life Sciences

Dear Mike,

Ken and I just heard back from the graduate college that they'd like something a little more definitive. Would you say that Physics is supportive of us moving forward with the graduate certificate in Computational Life Sciences? (and a similar definitive response later about the undergraduate certificate.)

Best,

Melissa

On Tue, Sep 18, 2018 at 9:12 PM Michael Treacy <treacy@asu.edu> wrote:

Dear Melissa:

Prof Bennett forwarded your message of 8/30/18 to me. I thought that I had sent you the message and query below, but it appears that I "replied" to Peter Bennett instead.

I have seen your recent message about the undergraduate program too. I will look at that very soon.

Mike

Dear Melissa:

This proposal sounds very reasonable. Which of our electives did you have in mind? We do not have too many at the undergraduate level. I could imagine some of our biophysics core courses (PHY 312, 370, 371, 472) also being of interest.

How many students are you anticipating enrolling in Computational Life Sciences?

Regards

Mike Treacy
Professor of Physics, Honors Faculty,
Associate Chair (Academic Affairs), Department of Physics, Bateman Building, PSB-147
Arizona State University | P.O. Box 871504 | Tempe, Arizona 85287-1504
Phone: 480.965.5359| Fax: 480.965.7565| e-mail: treacy@asu.edu

Dear Prof Bennett,

Ken Buetow and I are in the School of Life Sciences (SOLS), and have developed a graduate certificate in Computational Life Sciences (attached is the description for your reference).

We have been directed to contact you to request a very brief statement from you about the potential impact of our proposed graduate certificate in Computational Life Sciences (this can be a response to this email) on your Unit.

Our aim with the Computational Life Sciences Certificate is to provide knowledge of a core set of computational analyses, management of life sciences data (e.g., biomarker data, longterm monitoring data, longitudinal samples, genomic, transcriptomic, proteomic, and metabolomics from a variety of sources including viruses, plants, animals, bacteria, the environment, and ecosystems), and ethical concerns when dealing with life sciences data.

We anticipate that this Certificate would complement your Unit and would like for the Computational Life Sciences certificate to include electives taught in the Department of Physics, as appropriate.

Elective courses offered in your department would not be core courses, so would not be required for your department to teach. The approval of this Certificate means that you may experience additional enrollment in any courses offered as electives for Computational Life Sciences certificate.

We are writing to ask you to respond to this email with either:

1. **Your support for us moving forward with this certificate, or;**

2. **Your perceived conflicts within your unit with this certificate.**

Thank you in advance for your time and support as we work to provide the best possible training for all of our students.

Sincerely,

Melissa and Ken

--

Melissa A. Wilson Sayres, PhD

Assistant Professor

Genomics, Evolution, and Bioinformatics, School of Life Sciences

Evolutionary Biology Graduate Program, Co-chair

Center for Evolution and Medicine

The Biodesign Institute

Arizona State University

www.sexchrlab.org

DATE: September 28, 2018
TO: Melissa Wilson Sayres, School of Life Sciences
RE: Undergraduate certificate in computational life sciences

The proposed undergraduate certificate in computational life sciences overlaps with the BMI undergraduate program with respect to the proposed outcome 1, which emphasizes key algorithms and relational databases. Given that the proposed certificate program does not offer courses to cover these topics, we suggest inclusion of the following BMI courses in the proposed program (either required or electives):

- BMI-311: Modeling Biomedical Knowledge
- BMI-312: Modeling Biomedical Data
- BMI-330: Translational Bioinformatics

Kate Lehman
Senior Director Academic Affairs and Innovation
Academic Integrity Officer
Arizona State University | College of Health Solutions
550 N. 3rd Street, Phoenix, AZ 85004 | Health North Room 508D
602-496-0241 | kate.lehman@asu.edu | chs.asu.edu

From:	Melissa A. Wilson Sayres <melissa.wilsonsayres@asu.edu>
Sent:	Wednesday, September 26, 2018 3:09 PM
To:	Jenny Smith
Cc:	Kenneth Buetow
Subject:	Fwd: Impact statement from New College

No conflict with New College.

---------- Forwarded message ---------
From: **Patricia Friedrich** <Patricia.Friedrich@asu.edu>
Date: Tue, Sep 25, 2018 at 12:49 PM
Subject: Re: Impact statement from New College
To: Melissa A. Wilson Sayres <melissa.wilsonsayres@asu.edu>
Cc: Kenneth Buetow <Kenneth.Buetow@asu.edu>

Hi Melissa,

I apologize. The School had actually responded to me and in the grouping of emails that Outlook does, I did not notice the answer until I went searching for it.

The comments by the School indicate that, regarding the undergrad certificate, we don't have any such courses - thus, there will be no conflict and we support this development. We would like, however, to discuss whether there would be a way to direct, where appropriate, such undergrad certificate students to our soon-to-be MS in Biological Data Science (we are at the last stages of approval), perhaps even discuss a 4+1 once students have done the certificate or a SoLS degree.

Should you be interested in talking more about this, Stephen Wirkus would be the best person to chat with.

Thank you!

Patty

Patricia Friedrich, PhD

Associate Dean of Academic Programs and Faculty Affairs,

New College of Interdisciplinary Arts and Sciences

Professor of Linguistics/Rhetoric and Composition,

School of Humanities, Arts, and Cultural Studies

Arizona State University P. O. Box 37100

4701 W. Thunderbird Rd. Mail Code 3051

Phoenix, AZ, USA 85069-7100

voice 602 543-6046

From: "Melissa A. Wilson Sayres" <melissa.wilsonsayres@asu.edu>
Date: Tuesday, September 25, 2018 at 9:54 AM
To: Patricia Friedrich <Patricia.Friedrich@asu.edu>
Cc: Kenneth Buetow <Kenneth.Buetow@asu.edu>
Subject: Re: Impact statement from New College

Dear Patricia,

Do you mind responding about the undergraduate certificate?

Best,

Melissa

On Mon, Sep 17, 2018 at 2:35 PM Melissa A. Wilson Sayres <melissa.wilsonsayres@asu.edu> wrote:

Dear Patricia,

From:	Melissa A. Wilson Sayres <melissa.wilsonsayres@asu.edu>
Sent:	Wednesday, September 26, 2018 2:48 PM
To:	Jenny Smith
Cc:	Kenneth Buetow
Subject:	Fwd: Response requested: Impact of Graduate Certificate in Computational Life Sciences

School of Sustainability!

Best,
Melissa

---------- Forwarded message ---------
From: **Caroline Harrison** <Caroline.Harrison@asu.edu>
Date: Tue, Sep 25, 2018 at 4:54 PM
Subject: RE: Response requested: Impact of Graduate Certificate in Computational Life Sciences
To: Melissa A. Wilson Sayres <melissa.wilsonsayres@asu.edu>
Cc: Kenneth Buetow <Kenneth.Buetow@asu.edu>, Nicole Darnall <ndarnall@asu.edu>, Christopher Boone <Christopher.G.Boone@asu.edu>

We fully support moving forward on implementing this undergraduate certificate. We don't see any conflicts with any of our current offerings.

Thanks.

Caroline J. Harrison, PhD

Curricular and Academic Programs

Senior Sustainability Scholar

ASU **School of Sustainability**
Arizona State University
P.O. Box 875502 | Tempe, Arizona | 85287-5502
PH: 480-965-8645 | Main: 480-965-2975

SchoolOfSustainability.asu.edu

From: Melissa A. Wilson Sayres <melissa.wilsonsayres@asu.edu>
Sent: Monday, September 17, 2018 2:46 PM

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From:	Melissa A. Wilson Sayres <melissa.wilsonsayres@asu.edu>
Sent:	Tuesday, September 25, 2018 10:50 AM
To:	Jenny Smith
Subject:	Fwd: FW: Response requested: Impact of Graduate Certificate in Computational Life Sciences
Attachments:	CompLifeSciCert proposal_to_establish_an_undergrad_certificate.v3.doc

---------- Forwarded message ---------
From: **Katherine Kenny** <Katherine.Kenny@asu.edu>
Date: Tue, Sep 25, 2018 at 10:49 AM
Subject: FW: Response requested: Impact of Graduate Certificate in Computational Life Sciences
To: melissa.wilsonsayres@asu.edu <melissa.wilsonsayres@asu.edu>
Cc: Kenneth Buetow <Kenneth.Buetow@asu.edu>

Dear Melissa – thank you for asking me to review your proposal for the Undergraduate Certificate in Computational Life Sciences. This undergraduate certificate does not compete or conflict with any of the current certificate or degree programs that we offer in CONHI. On behalf of the College of Nursing and Health Innovation, I support your moving this proposal forward. Good luck as you complete the process.

Best,

Kathy

Katherine (Kathy) Kenny, DNP, RN, ANP-BC, FAANP, FAAN

Associate Dean of Academic Affairs

College of Nursing and Health Innovation

Arizona State University

(P) 602-496-1719

(F) 602-496-0545

Katherine.kenny@asu.edu

From: Melissa A. Wilson Sayres <melissa.wilsonsayres@asu.edu>
Sent: Monday, September 17, 2018 2:51 PM

From:	Melissa A. Wilson Sayres <melissa.wilsonsayres@asu.edu>
Sent:	Monday, September 24, 2018 10:25 PM
To:	Jenny Smith
Cc:	Kenneth Buetow
Subject:	Fwd: Response requested: Impact of Graduate Certificate in Computational Life Sciences

Excellent news!

---------- Forwarded message ---------
From: **Duane Roen** <Duane.Roen@asu.edu>
Date: Sun, Sep 23, 2018 at 3:45 PM
Subject: RE: Response requested: Impact of Graduate Certificate in Computational Life Sciences
To: Melissa A. Wilson Sayres <melissa.wilsonsayres@asu.edu>
Cc: Kenneth Buetow <Kenneth.Buetow@asu.edu>, Myrna Hanaoka <Myrna.Hanaoka@asu.edu>, Nancy Gonzales <nancy.gonzales@asu.edu>

Melissa,

A few minutes ago, I heard back from Kelly Steele. CISA is delighted to support your proposal for an undergraduate certificate in computational life sciences. As with the graduate certificate, we would be delighted if students were to take some of CISA's life sciences courses as electives.

Best,

Duane

Duane Roen

Vice Provost, Polytechnic campus

Dean, College of Integrative Sciences and Arts

Dean, University College

Arizona State University

Mail Code: 2780

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