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 CAPC, University Senate (two readings), and be approved by the Office of the University Provost.

Definition and minimum 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.

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

- 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:	The College of Liberal Arts and Sciences
Department/Division/School:	School of Life Sciences
Proposed certificate name:	Evolutionary Medicine
Requested effective date:	Fall 2020
Initial delivery method:	Campus immersion only (ground and iCourses)

Once students elect a campus or digital option, they will not be able to move between the modalities. Approval from the Office of the University Provost and Philip Regier (Executive Vice Provost and Dean) is required to offer programs through ASU Online. Approval begins by submitting the *Request for Digital Immersion Consideration* form in Curriculum ChangeMaker. An EdPlus letter of support must be included with this proposal to demonstrate preliminary approval for digital immersion. Contact EdPlus at edplusprogrammanagement@asu.edu for additional information.

Campus/Locations: Indicate all locations where this program will be offered.

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

PROPOSAL CONTACT

Name:	Kenneth Buetow	**Title:**	Professor
Phone number:	480-727-9413	**Email:**	kenneth.buetow@asu.edu

DEAN APPROVAL(S)

This proposal has been approved by all necessary unit and college/school levels of review and the college/school(s) has the resources to support the requested changes. I recommend implementation of the proposed organizational change.

An electronic signature, an email from the dean or dean's designee or a PDF of the signed signature page is acceptable. The second signature is only required if multiple colleges are involved.

College/School/Division Dean name: Paul LePore

Signature: **Date:** / /20

College/School/Division Dean name:

Signature: **Date:** / /20

SECTION A - Overview

1. **Provide a brief description of the new certificate.**

Evolutionary Medicine is the application of the principles of evolution to the fields of medicine, public health, and other health professions. Inherently interdisciplinary in nature, Evolutionary Medicine integrates basic science – and provides a firm understanding of the core concepts of evolutionary thinking and analysis, and places disease in the context of changing environments, exposures, and the encompassing ecology of life in which an individual is embedded. While evolution is already a foundational basic science of the life sciences, evolutionary medicine is a new way of thinking that integrates perspectives across traditionally siloed disciplines of public health and medicine.

The certificate will give students foundational training in evolutionary medicine and how it is applied to the health of human populations, and then will allow students to specialize further through their electives in the direction of their primary academic interests. These interests could include, but are not limited to: populational genomics, maternal and child health, mental health, cancer, microbiome, aging, anthropology, biology, public health, global health, and medicine.

ASU, as the New American University, is dedicated to the "fusion of intellectual disciplines", transforming society by "being connected to social needs", and committed to the "success of each unique student". These ideas among other key tenets serve to fulfill ASU's mission "to achieve excellence, access, and impact", which will define a new era in higher education.

The Certificate in Evolutionary Medicine achieves the aims of the New American University:
• This program bridges traditionally siloed disciplines within the School of Life Sciences and the School for Human Evolution & Social Change as an interdisciplinary endeavor between the two.
• The educational mission of evolutionary medicine to improve human health creates meaningful impact within the fields of biology, medicine, public health, and global health.
• The program guides learners through progressive coursework that leads from competence to proficiency, and then to mastery of the educational objectives within evolutionary medicine. It culminates in an experience that allows learners to explore the unique questions relevant to their lives and interests.

2. **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

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

Rather than stand on its own, students will be able to use evolutionary medicine as a foundation for approaching problems within fields like public health, medicine, anthropology, and evolutionary biology and will be better prepared as compared to analogous peers when it comes to addressing today's and future health challenges. They will understand how evolution can provide insight across basic, medical, and public health. Students will set themselves apart by asking better and different questions. They will be capable of addressing emerging, anticipated public need such as reemerging infectious diseases, challenges with vaccines, the expansion of chronic disease, and other growing public health crises.

As opposed to a concentration, a certificate allows us to reach students across disciplines, and apply interdisciplinary curricula from the degrees in which they are already embedded. By offering a certificate rather than a minor, we will be able to educate students that are considering programs for a gap year between their undergraduate curriculum and graduate or professional schools. As students who declare a minor must actively be pursuing an undergraduate degree, those who enroll in a certificate may either do so concurrently with their program or after the conclusion of their program. This extends our audience to alumni of undergraduate programs, as well as currently enrolled students.

Public health and medicine are currently taught as separate disciplines and through separate degree programs at the academic level. Evolutionary medicine focuses on health and disease, and social and biological evolution. Medicine focuses on treating individuals with disease, while Public Health operates at a population level. The evolutionary medicine certificate will serve

to provide an integrated conceptual framework that can be applied to the problems of public health and medicine in order to produce more holistic outcomes for the improvement of human health.

4. 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.

Although not attached to a degree, students with a certificate in evolutionary medicine will be able to set themselves apart from their peers with skills in problem solving that address the integration of basic, medical, and public health science and practice. For those who plan on moving into careers involving medicine or public policy they will gain an understanding of how evolutionary thinking influences medical and public health intervention which is not currently outlined in biological, anthropological, or public health related curriculum within the university.

5. Demand

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

According to the Bureau of Labor Statistics, demand for health science-related careers is expected to grow 18 percent from 2016 to 2022. With an aging population in the United States, there will be an increase in demand for health care services. Health care professional programs have competitive admissions processes and students with a certificate in evolutionary medicine will be able to set themselves apart from their peers with:

- skills in problem-solving that address the integration of basic, medical, and public health science and practice.
- working knowledge of how evolutionary thinking influences medical and public health intervention which is not currently outlined in biological, anthropological, or public health-related curriculum within the university.
- an integrated conceptual framework that can be applied to the problems of public health and medicine in order to produce more holistic outcomes for the improvement of human health.

The median annual wage across the U.S. for health care practitioners and technical occupations (such as registered nurses, physicians and surgeons, and dental hygienists) was $64,770 in May 2017, which was higher than the median annual wage for all occupations in the economy of $37,690. According to an analysis by Martinaian et al. on the Labor Statistic Projections, more than 400,000 physicians, nurse practitioners, nurses and others will be needed to fill positions between 2014 and 2024. This number does not include careers within the public health arena such as social work, epidemiology, and public policy which also continue to grow at a national average of 16 percent with a median salary near $47,000. Training well-rounded health professionals with integrative perspectives is essential to the success of improving human health.

6. Projected enrollment

What are enrollment projections for the first three years?

3-YEAR PROJECTED ANNUAL ENROLLMENT			
	1st YEAR	**2nd YEAR** *Yr 1 continuing + new entering*	**3rd YEAR** *Yr 1 & 2 continuing + new entering*
Number of Students (Headcount)	120	200	250

SECTION B - Support and Impact

7. 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.

8. Related programs

Identify related ASU programs and outline how the new certificate will complement these existing ASU programs. Statements of support from potentially affected academic unit administrators must be included with this proposal.

Department of English:

No conflict with the Interdisciplinary Health Humanities programs within this department. A letter of support is attached.

School of Life Sciences:

- Biological Sciences BS (Including concentrations in Biomedical Sciences; Genetic, Cell and Developmental biology; Biology and Society; Conservation Biology and Ecology; Neurobiology, Physiology, and Behavior)
- Microbiology BS (including the concentration in Medical Microbiology)
- Molecular Biosciences and Biotechnology BS
- Neuroscience BS

As one of the supporting two schools for this interdisciplinary effort, there is no conflict between the certificate and current programs. It is expected that the certificate will add value to existing degrees. A letter of support is attached.

School of Human Evolution and Social Change:

- Anthropology BS/BA
- Global Health BA
- Applied Mathematic for the Life and Social Sciences BS

As one of the supporting two schools for this interdisciplinary effort, there is no conflict between the certificate and current programs. It is expected that the certificate will add value to existing degrees. A letter of support is attached.

College of Nursing and Health Innovation:

- Applied Sciences (Health Entrepreneurship and Innovation) BAS
- Community Health BS
- Health Care Compliance and Regulations BS
- Health Care Coordination BS
- Health Entrepreneurship and Innovation BS
- Integrative Health BS
- Nursing BSN

No perceived conflict with the programs listed above nor others within the college. The certificate will amplify the skills of students, especially those within majors having to do with the life, health, and social sciences. A letter of support is attached.

College of Health Solutions

- Applied Science (Food Service Management) BAS
- Applied Science (Health Sciences) BAS
- Applied Science (Medical Laboratory Science) BAS
- Biomedical Informatics BS
- Exercise and Wellness BS
- Health Education and Health Promotion BS
- Health Sciences BS (Including concentration in Health Lifestyles coaching)
- International Public Health BIPH
- Kinesiology BS

- Medical Studies BS
- Medical Studies minor
- Nutrition BS (including concentrations in Dietetics, Human Nutrition)
- Public Health BS
- Science of health Care Delivery BS
- Speech and Hearing Science BS
- Sport Science and Performance Programming BS

No perceived conflict with the programs listed above nor others within the college. The certificate will amplify the skills of students, especially those within majors having to do with the life, health, and social sciences. A letter of support is attached.

College of Integrative Sciences and Arts:

- Applied Biological Sciences BS (Including concentrations in Natural Resource Ecology, Preveterinary Medicine, Secondary Education in Biology, and Sustainable Horticulture)
- Applied Mathematics BS
- Applied Physics BS
- Applied Quantitative Science BS
- General Studies BA
- History of Science, Ideas and Innovation BA
- Interdisciplinary Studies BA
- Psychology BS BA

No perceived conflict with the programs listed above nor others within the college. The certificate will amplify the skills of students, especially those within majors having to do with the life and social sciences. A letter of support is attached.

New College of Interdisciplinary Arts and Sciences:

- Applied Science BAS
- Biology BS/BA (Including concentrations in Forensics and Pharmacology/Toxicology)
- Biotechnology and Bioenterprise BS
- Disability Studies BA
- History BA
- Pharmacology and Toxicology BS
- Psychology BA/BS (Including concentrations in Forensic Psychology)
- Social and Behavioral Sciences BS/BA
- Sociology BS/BA

No perceived conflict with the programs listed above nor others within the college. The certificate will amplify the skills of students, especially those within majors having to do with the life and social sciences. A letter of support is attached.

Fulton Schools of Engineering:

- Biomedical Engineering BSE

No perceived conflict with the programs listed above nor others within the school. The certificate will amplify the skills of students, especially those within majors having to do with medical sciences. A letter of support is attached.

School of Sustainability:

- Sustainability BA/BS
- Sustainable Food Systems BS

No perceived conflict with the programs listed above nor others within the school. The certificate will amplify the skills of students, especially those within majors having to do with life and social sciences. A letter of support is attached.

Sandra Day O'Connor College of Law:

No perceived conflict with the programs within this school. The certificate may be useful for those wishing to go into law fields surrounding medical science. A letter of support is attached.

W.P. Carey School of Business:

No perceived conflict with the programs within this school. The certificate may be useful for those wishing to go into business fields surrounding medical science. A letter of support is attached.

School of Molecular Sciences:

- Chemistry BS
- Biochemistry BS/BA (Including concentration in Medicinal Chemistry BS)

No perceived conflict with the programs listed above nor others within the school. The certificate will amplify the skills of students, especially those within majors having to do with medical sciences. A letter of support is attached.

Department of Physics:

No perceived conflict with the programs within this department. A letter of support is attached.

Department of English:

Interdisciplinary Health Humanities certificate

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

SECTION C - Academic Curriculum and Requirements

10. **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. While learning outcomes are needed, the measures and performance criteria and are not needed for certificates.

Outcome 1:
Students will be able to identify, describe, and summarize key evolutionary concepts related to human health and disease.

Measure 1.1 Homework assignments will assess student capacity to identify evolutionary principles applied to human health and disease, using a rubric that measures how many concepts they can identify and in what detail they can describe their relationship to human health.
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 life-history theory, environmental mismatch, and biological and cultural variation to human health and disease will be assessed via homework assignments using a rubric that measures the detail in which students can describe the way in which these factors are applied and how they are viewed in population data, as offered in the foundational courses.
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 appropriately analyze, interpret, and present data relevant to evolutionary medicine.

Measure 2.1 Homework assignments will be used to assess the degree to which students can analyze and interpret public data sets through the application of evolutionary theory. This shall be addressed in the core courses with a rubric that assesses student ability to fully describe the ethical issues associated with the use of population health data.
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 Student capacity for the presentation of data will be assessed through group projects and individualized projects that allow students to explore concepts of evolutionary medicine in conjunction with public data sets and compose written works including white papers, research papers, and policy statements.
Performance Criterion 2.2 80% of students will score a 3.8 or above on a faculty-developed rubric of this metric.

11. Enrollment criteria

Describe the procedures and any qualifications for enrollment in the proposed certificate. Please note if they are identical to the admission criteria for the existing major and degree program under which this certificate will be established.

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

12. Program Map

Attach a copy of the "proposed" map for this certificate program.
See the Build a Major Map Training Guide for instructions on how to create a "proposed certificate map" in BAMM.

13. Minimum residency requirement

How many hours of the certificate must be ASU credit?

15

14. New courses

List new courses in alphanumeric order and provide a brief course description for each one.
Prior to submitting this proposal, all new courses must be at the *University Review* level in Curriculum ChangeMaker.

ASB 250 Introduction to Evolution and Medicine (3)

This course is designed to introduce applications of evolutionary biology to medicine. Topics ranging from the evolution of antibiotic resistance, to aging, obesity, Alzheimer's Disease and cancer will be discussed using an evolutionary framework to better understand how these diseases/issues came to be, and what can be done to prevent/treat/mitigate these conditions

ASM 403 Evolutionary Medicine and Global Health (3)

Fundamentally, the practice of medicine is applied biology to improve human health and well-being and is embedded within population and global scales. Here we integrate the life and social sciences to tackle the current and emerging global health challenges of the 21st Century. This course integrates an evolutionary biology lens with current medical knowledge enhancing our understanding of health. This class uses topics such as human-pathogen coevolution, development and aging, human migration, diseases (infectious, metabolic, and autoimmune), and physiological and behavioral mechanisms of immunity to explore the broad arena of human health within a deep time and global context.

BIO 408 Advanced Evolutionary Medicine (3)

Evolutionary medicine explores the application of the principles of evolution to the fields of medicine and public health and places disease in the context of changing environments, both exposures and the encompassing ecology of life in which an individual is imbedded. Advanced evolutionary medicine, focuses on the biological aspects of evolutionary theory through the use of molecular genetics, population genetics, and the use of evolutionary thinking and analysis with translational, clinical, and public health intersections. A foundation in evolutionary medicine is useful for students with interests including but not limited to: premed, population genomics, maternal and child health, mental health, cancer, microbiome, aging, anthropology, biology, public health, global health, and medicine.

SECTION D - Administration and Resources

15. Administration

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

The certificate will be coordinated academically by a committee of 2 faculty and the staff program administrator involved in the program in the Center for Evolution and Medicine, with rotating three-year terms. Faculty will be divided between the social sciences and biological sciences specializations. Duties will include recommendations for admissions, approval of projects and coursework. Academic advising for coursework within the program to meet student needs and interests can be recommended by members of the committee but will be executed and added within the student's graduate school. Programs of Study will be approved by the committee and then placed into the system by the Director of the Center for Evolution and Medicine or by the Center's Instructional Designer at the Director's discretion.

The certificate functions as a collaborative effort between the School of Life Sciences (SoLS) and the School for Human Evolution and Social Change (SHESC), but will be awarded and maintained through SoLS.

16. 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, The School of Human Evolution and Social Change, and The Center for Evolution & Medicine.

17. 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. The areas of specialization should refer to

FACULTY NAME	TITLE	AREA(S) OF SPECIALIZATION
Kenneth Buetow	Professor	Bioinformatics, Cancer, Genetics, Complex Systems, Molecular Biology
C Athena Aktipis	Assistant Professor	Cancer, Social Psychology
Katherine Hinde	Associate Professor	Ecological Behavior, Mammalogy, Physiology, Biomedicine, Women's Health, Evolutionary Anthropology, Global Health, and Medical Anthropology
Silvie Huijben	Assistant Professor	Public Health, Evolution, Molecular Biology, Biomedicine, Ecology, HIV, STI and Infectious, Diseases, Health Policy, Disease Modeling
Jeffrey Jensen	Professor	Genetics, Populations, Evolution
Manfred Laubichler	Professor	History of Science, Philosophy of Science, Complex systems, Development Biology, Theoretical biology
Randolph Nesse	Professor	Diseases, Emotion, Evolution, Stress, Biomedicine, Psychology
Krijn Paaijmans	Assistant Professor	Climate Change, Microclimate, Public Health, Insects, Evolution, Bioengineering, Ecology, HIV, STI and Infectious Diseases, Surveillance
Anne Stone	Professor	Genetics, Evolutionary Anthropology, Evolution and Development Biology
Jesse Taylor	Associate Professor	Epidemiology, Ornithology, Invertebrates, Mathematical Biology, Evolutionary and, Population Genetics
Benjamin Trumble	Assistant Professor	Evolutionary Anthropology, Global Health
Melissa Wilson	Assistant Professor	Population Biology, Bioinformatics, Cancer, Genetics, Evolution, Genomics, Reproduction, Theoretical

		Biology, Evolutionary and Population Genetics, Computational Biology

SECTION E - Additional Materials

18. Complete and attach the Appendix document.

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

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

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. **Certificate Name:** Evolutionary Medicine

2. **Marketing Text** *Optional*, 50 words maximum
The marketing text should make an emotional connection with prospective students to draw them in so they continue reading. Do not repeat content found in the program description.

Transforming our understanding of disease to improve human health requires framing questions about health and illness in new and innovative ways. Through the connection of evolutionary biology, medicine, global health, and public health learn how to holistically approach ideas about evolution, human vulnerability, and the future of medicine.

3. **Program Description** 150 words maximum
Present factual basic and specialized information about the program to help students decide if the program is the right fit. This section is not the place for hyperbole, information about enrollment or admission, campus, course requirements, or potential careers.

With rising need for health science-related skills and an aging population in the United States, innovations in health and medicine are in demand. Evolutionary medicine is a new and burgeoning field situated between the life and social sciences that seeks to integrate the fields of evolutionary biology, genetics, medicine, global health and public health to transform our understanding of disease and improve human health. Students who complete this certificate program learn how to integrate perspectives from across fields to answer questions about health and disease in the context of human life history.

Students are introduced to integrated approaches within the biological and social sciences that are capable of address an emerging, anticipated public need such as reemerging infectious disease, challenges with vaccines, the expansion of chronic disease and other growing public health crises.

4. **Contact and Support Information**

Building code and room number: *(Search ASU map)*	LSC 210
Program office telephone number: (*i.e. 480/965-2100*)	480/965-9944
Program Email Address:	evmed@asu.edu
Program Website Address:	https://evmed.asu.edu

5. **Program Requirements**
These requirements will be drawn from the "proposed certificate map" that must be submitted with this proposal. Instructions 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. **Keywords**
List all keywords used to search for this program (limit 7). Keywords should be specific to the proposed program.
All parts of the certificate name are automatically included as keywords.

genetics, genomics, Darwinian medicine, biology, public health, global health, evolutionary biology

8. **Delivery/Campus Information Options:** Campus immersion (ground and/or iCourses)

9. **Campus/Locations:** Indicate all campus immersion locations where this program will be offered

☐ Downtown Phoenix ☐ Polytechnic ☒ Tempe ☐ West ☐ Other: online

2020 - 2021 CERTIFICATE Map
Evolutionary Medicine (Proposed)

Program Requirements

The certificate in evolutionary medicine consists of 15 credit hours, at least 12 of which must be upper-division. All 15 credit hours must be completed at ASU.

Required Courses -- 6 credit hours

ASM 403 / BIO 403: Evolutionary Medicine and Global Health (3)
BIO 408 / ASB 408: Advanced Evolutionary Medicine (3)

Electives -- 9 credit hours

Minimum of 6 credits hours of electives must be upper division
ASB 250 / BIO 250: Introduction to Evolution and Medicine (3)
ASB 494 / BIO 494: Maternal and Child Health (3)
ASM 246: Human Origins (SB) (3)
ASM 342 / BIO 327: Evolution of Human Behavior (3)
ASM 345: Disease and Human Evolution (3)
ASM 394 / BIO 394: Ecology and Evolution of Infectious Diseases (3)
ASM 401: Health and Human Biology (3)
ASM 446 / BIO 446: Principles of Human Genetics (L) (3)
ASM 456: Infectious Disease and Human Evolution (3)
ASM 494 / BIO 494: Evolution and Mental Disorders (3)
BIO 302: Cancer--Mother of All Diseases (L) (3)
BIO 318 / HPS 331: History of Medicine (HU & H) (3)
BIO 345: Evolution (3)
BIO 394 / PSY 394: Introduction to Evolutionary Psychology (3)
BIO 440 / MBB 440: Functional Genomics (3)
BIO 462: Endocrine Physiology (3)
MBB 445 / MIC 445: Techniques in Molecular Biology/Genetics (3)
MIC 205: Microbiology (SG) (3)
MIC 314: HIV/AIDS: Science, Behavior, and Society (3)
MIC 425: Advanced Immunology (3)

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

ASU School of Life Sciences
Arizona State University

March 25, 2019

Office of the Executive Vice President
and Provost of the University
Arizona State University
P.O. Box 877805
Tempe, AZ 85287-7805

To Whom it May Concern,

As Interim Director of the School of Life Sciences, I am writing in support of the proposals to establish undergraduate and graduate certificates in Evolutionary Medicine.

The field of Evolutionary Medicine applies the principles of evolution to medicine and public health, placing disease in the context of changing environments. Evolutionary medicine is inherently interdisciplinary and integrates basic and applied science, providing a foundation for core concepts of evolutionary thinking and analysis in translational, clinical, and public health training. The proposed certificates will give students foundational training in evolutionary medicine and how it is applied to the health of human populations. The certificates permit students to specialize further through their electives including: population genomics, maternal and child health, mental health, cancer, microbiomics, aging, anthropology, biology, public health, global health, and medicine.

The undergraduate and graduate programs offices of the School of Life Sciences have obtained the necessary faculty approvals through governance procedures in the unit. In addition, the School has the resources to support the certificates as presented in the proposal, without impacting core program resources. The courses in the attached list are approved for use within the two programs.

This certificate will provide training and recognition of skills in Evolutionary Medicine that will enhance the future success of our students.

Sincerely,

Kenro Kusumi

Kenro Kusumi
Interim Director and Professor,
School of Life Sciences

The College of Liberal Arts and Sciences
PO Box 874501 | Tempe, AZ 85287-4501
P: 480-965-0803 | f: 480-965-1093 | sols.asu.edu

Undergraduate courses with support from SoLS

BIO 498 Evolution and Mental Disorders (Pending Permanent Number)

BIO 498 Maternal and Child Health (Omnibus)

BIO 395 Introduction to Evolutionary Psychology (Omnibus)

BIO/ASB 250 Introduction to Evolutionary Medicine

BIO 446 Principles of Human Genetics

BIO 301 Cancer: Mother of All Diseases

BIO 318 History of Medicine

BIO 327 Evolution and Human Behavior

BIO 345 Evolution

BIO 425 Advanced Immunology

BIO 440 Functional Genomics

BIO 462 Endocrine Physiology

HPS 331 History of Medicine

MBB 445 Molecular Biology/ Genetics

MIC 205 Microbiology

MIC 314 HIV/AIDS: Sci/Behavior/Society

ASM/BIO 394 Ecology and Evolution of Infectious Diseases (Omnibus)

Graduate courses with support from SoLS

BIO 598 Evolution and mental Disorders (pending permanent number)

BIO 545 Populations Evolution Genetics

BIO 546 Principles of Human Genetics

EVO 601 Principles of Evolution

BIO 522 Populations: Evolutionary Ecology

BIO 598 Maternal and Child Health (omnibus)

BIO 425 Advanced Immunology

BIO 540 Functional Genomics

BIO 462 Endocrine Physiology

MBB 445 Molecular Biology/ Genetics

School of Human Evolution and Social Change
Arizona State University

Dear Colleagues,

I enthusiastically support the proposed undergraduate and graduate certificates in Evolutionary Medicine.

As you are aware, Evolutionary Medicine is the application of the principles of evolution to the fields of medicine and public health and places disease in the context of changing environments, both exposures and the encompassing ecology of life in which an individual is imbedded. It is also inherently interdisciplinary in nature, as Evolutionary Medicine integrates basic and applied science – providing a firm understanding of the core concepts of evolutionary thinking and analysis, with translational, clinical, and public health training. The certificate will give students foundational training in evolutionary medicine and how it is applied to the health of human populations, and then will allow students to specialize further through their electives in the direction of their academic interests including, but not limited to: population genomics, maternal and child health, mental health, cancer, microbiome, aging, anthropology, biology, public health, global health, and medicine.

As there are faculty from SHESC that are involved with the certificates, I see no conflict of interest with our school and there will be no impact on our current degree programs except to enhance them with the certificate. The courses in the attached list are approved for use within the two programs.

This certificate will provide training and recognition of skills in Evolutionary Medicine that are critical for the future success of a variety of students.

Sincerely,

Kaye E. Reed

Kaye E. Reed, President's Professor
Director, School of Human Evolution and Social Change
Research Associate, Institute of Human Origins
Arizona State University
Tempe, AZ 85287
(480) 965-9813

School of Human Evolution and Social Change
Arizona State University

Undergraduate courses with support from SHESC

ASM 345 Disease and Human Evolution

ASM 246 Human Origins

ASM 401 Health and Human Biology

BIO/ASB 250 Introduction to Evolutionary Medicine (Pending Permanent Number)

ASM 456 Infectious Disease and Human Evolution

BIO/ASM 498 Evolution and Mental Disorders (Pending Permanent Number)

BIO/ASB 498 Maternal and Child Health (Omnibus)

ASM/BIO 394 Ecology and Evolution of Infectious Diseases (Omnibus)

BIO/ASM 446 Principles of Human Genetics

Graduate courses with support from SHESC

ASM 560 Human growth and development: an evolutionary perspective

BIO/ASM 598 Evolution and mental Disorders (pending permanent number)

ASB 510 Health: Social and Biocultural Theories

ASB 503 Medical Anthropology

BIO/ASM 546 Principles of Human Genetics

ASM 456 Infectious Disease and Human Evolution

ASM 401 Health and Human Biology

From: Duane Roen
To: Kenneth Buetow
Subject: RE: Center for Evolution and Medicine - Proposed Undergraduate Certificate
Date: Thursday, March 28, 2019 8:29:30 PM

Ken,

CISA is delighted to support your proposal for a certificate in Evolutionary Medicine.

Best,
Duane

Duane Roen
Vice Provost, Polytechnic campus
Dean, College of Integrative Sciences and Arts
Dean, University College
Arizona State University
Mail Code: 2780
7271 E Sonoran Arroyo Mall
Mesa, AZ 85212-6415
P: 480-727-6513

From: Kenneth Buetow <KennethBuetow@exchange.asu.edu>
Sent: Thursday, March 28, 2019 11:49 AM
To: Duane Roen <Duane.Roen@asu.edu>
Subject: Center for Evolution and Medicine - Proposed Undergraduate Certificate

Dear Dean Roen,

On behalf of the faculty of the Center for Evolution and Medicine, I am writing to request a very brief statement from you about the potential impact of our proposed **undergraduate certificate** in Evolutionary Medicine (attached).

Our aim with the certificate is to give students foundational training in evolutionary medicine and how it is applied to the health of human populations. Students will specialize their training through their selection of electives in fields of their academic interest including, but not limited to: populational genomics, maternal and child health, mental health, cancer, microbiome, aging, anthropology, biology, public health, global health, and medicine.

Our decision to pursue a certificate is to complement domain-specific degree training within fields like public health, medicine, anthropology, and evolutionary biology with the addition of evolutionary medicine approaches to problems. It is our hope that the addition of the Certificate to established programs of study will offer novel insights and a competitive advantage when our ASU students are compared to analogous peers. A certificate allows us to reach students across disciplines, and apply transdisciplinary curricula from the degrees in which they are already embedded.

The Evolutionary Medicine Certificate is structured to provide a core set of courses in evolutionary biology, genetics, global health and public health (see attached) and to include elective courses, as appropriate, from other units. It will be administered by the School of Life Sciences and the School of Human Evolution and Social Change. If you would like a course offered in your department to be included as an elective in the certificate, we welcome your suggestions.

I am writing to ask you to respond to this email with:

1. Your support for us moving forward with this certificate;
2. Any perceived conflicts within your unit with this certificate.

Unfortunately, to fit within the recently revised ASU timelines for certificate applications, we will need to submit our application by April 1st. Your support letter is a necessary part of our application package that will need to follow shortly thereafter. We would ideally have your letter for forwarding by **April 5th**.

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

Sincerely,

Ken Buetow
Associate Director,
Center for Evolution & Medicine
Arizona State University
Mail Code: 1701
Tempe, AZ 85287-1701
p: 480-727-9413 f: 480-727-4457

From: Julie Liss
To: Kenneth Buetow
Cc: Kate Lehman; Deborah Helitzer
Subject: Undergraduate certificate in Evolutionary Medicine
Date: Friday, April 5, 2019 4:14:30 PM

(forgive me if you already received this)

Ken:

The College of Health Solutions is pleased to support your undergraduate certificate in Evolutionary Medicine. It may be of interest to some of our students.

Sincerely,

Julie Liss,
Associate Dean, Academic Success

Julie Liss, Ph.D.
Associate Dean of Academic Success, College of Health Solutions
Professor, Speech and Hearing Science
Faculty, Barrett, The Honors College
Outgoing Editor-in-Chief, Journal of Speech, Language and Hearing Research (Speech)
Fellow, American Speech Language Hearing Association
Arizona State University
julie.liss@asu.edu

From: Kenneth Buetow
To: Kenneth Buetow
Subject: FW: Center for Evolution and Medicine - Proposed Undergraduate Certificate
Date: Thursday, April 11, 2019 7:53:14 AM
Attachments: Undergrad Certificate 1 Page.pdf
image001.png

From: Katherine Kenny <Katherine.Kenny@asu.edu>
Sent: Wednesday, April 10, 2019 6:34 PM
To: Kenneth Buetow <Kenneth.Buetow@asu.edu>
Subject: Center for Evolution and Medicine - Proposed Undergraduate Certificate

Dear Kenneth – thank you for asking the Edson College of Nursing and Health Innovation to review the attached proposal for an Evolutionary Medicine Undergraduate Certificate Program. We have reviewed and see no conflict with current courses or degree programs that Edson CONHI currently offers. On behalf of the Edson College of Nursing and Health Innovation we support this undergraduate certificate and wish you the best as you move through the University approval processes. Thank you.

Best,
Kathy

Katherine (Kathy) Kenny, DNP, RN, ANP-BC, FAANP, FAAN
Associate Dean of Academic Affairs
Clinical Professor

ASU Edson College of Nursing and Health Innovation
Arizona State University

550 N. 3rd Street | Phoenix, AZ 85004
(P) 602-496-1719
(F) 602-496-0545
Katherine.kenny@asu.edu
https://nursingandhealth.asu.edu/

From: Kenneth Buetow
Sent: Thursday, March 28, 2019 11:52
To: Katherine Kenny <Katherine.Kenny@asu.edu>
Subject: Center for Evolution and Medicine - Proposed Undergraduate Certificate

Dear Dean Kenny,

On behalf of the faculty of the Center for Evolution and Medicine, I am writing to request a very brief statement from you about the potential impact of our proposed **undergraduate certificate** in Evolutionary Medicine (attached).

Our aim with the certificate is to give students foundational training in evolutionary medicine and how it is

applied to the health of human populations. Students will specialize their training through their selection of electives in fields of their academic interest including, but not limited to: populational genomics, maternal and child health, mental health, cancer, microbiome, aging, anthropology, biology, public health, global health, and medicine.

Our decision to pursue a certificate is to complement domain-specific degree training within fields like public health, medicine, anthropology, and evolutionary biology with the addition of evolutionary medicine approaches to problems. It is our hope that the addition of the Certificate to established programs of study will offer novel insights and a competitive advantage when our ASU students are compared to analogous peers. A certificate allows us to reach students across disciplines, and apply transdisciplinary curricula from the degrees in which they are already embedded.

The Evolutionary Medicine Certificate is structured to provide a core set of courses in evolutionary biology, genetics, global health and public health (see attached) and to include elective courses, as appropriate, from other units. It will be administered by the School of Life Sciences and the School of Human Evolution and Social Change. If you would like a course offered in your department to be included as an elective in the certificate, we welcome your suggestions.

I am writing to ask you to respond to this email with:

1. Your support for us moving forward with this certificate;
2. Any perceived conflicts within your unit with this certificate.

Unfortunately, to fit within the recently revised ASU timelines for certificate applications, we will need to submit our application by April 1st. Your support letter is a necessary part of our application package that will need to follow shortly thereafter. We would ideally have your letter for forwarding by **April 5th**.

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

Sincerely,

Ken Buetow
Associate Director,
Center for Evolution & Medicine
Arizona State University
Mail Code: 1701
Tempe, AZ 85287-1701
p: 480-727-9413 f: 480-727-4457

From: Marco Santello
To: Ann McKenna
Cc: Sergio Quiros; Kenneth Buetow; Cindy Boglin; Jessica Meeker; Jeremy Helm
Subject: Re: Center for Evolution and Medicine - Proposed Undergraduate Certificate
Date: Monday, April 1, 2019 5:30:25 PM

Hi Ken,

The school of biological and health systems engineering also supports your undergraduate certificate, there are no conflicts with our program.

Best,
Marco

On Apr 1, 2019, at 2:37 PM, Ann McKenna <Ann.McKenna@asu.edu> wrote:

> Hi Ken,
> The Polytechnic School supports your proposal for an undergraduate certificate in evolutionary medicine, and we do not see any conflicts.
> Best,
> Ann
>
> ---
>
> **From:** Sergio Quiros <Sergio.Quiros@asu.edu>
> **Date:** Monday, April 1, 2019 at 1:16 PM
> **To:** Kenneth Buetow <KennethBuetow@exchange.asu.edu>, Ann McKenna <Ann.McKenna@asu.edu>, Marco Santello <Marco.Santello@asu.edu>
> **Cc:** Cindy Boglin <Cindy.Boglin@asu.edu>, Jessica Meeker <Jessica.Meeker@asu.edu>, Jeremy Helm <JEREMY.HELM@asu.edu>
> **Subject:** FW: Center for Evolution and Medicine - Proposed Undergraduate Certificate
>
> Hello Ken,
>
> I am copying Dr. Ann McKenna in this Dr. Marco Santello in this email for their input.
>
> Please note the highlighted university deadline.
>
> Thank you,
>
> *Sergio L. Quiros*
> Specialist Senior, Academic and Student Affairs
> Ira A. Fulton Schools of Engineering
> Arizona State University
> Tempe, AZ 85287-8109
> Phone: 480/727-5770
> Email: Sergio.Quiros@asu.edu
>
> ---

From:	Ann McKenna
To:	Sergio Quiros; Kenneth Buetow; Marco Santello
Cc:	Cindy Boglin; Jessica Meeker; Jeremy Helm
Subject:	Re: Center for Evolution and Medicine - Proposed Undergraduate Certificate
Date:	Monday, April 1, 2019 2:37:34 PM

Hi Ken,
The Polytechnic School supports your proposal for an undergraduate certificate in evolutionary medicine, and we do not see any conflicts.
Best,
Ann

From: Sergio Quiros <Sergio.Quiros@asu.edu>
Date: Monday, April 1, 2019 at 1:16 PM
To: Kenneth Buetow <KennethBuetow@exchange.asu.edu>, Ann McKenna <Ann.McKenna@asu.edu>, Marco Santello <Marco.Santello@asu.edu>
Cc: Cindy Boglin <Cindy.Boglin@asu.edu>, Jessica Meeker <Jessica.Meeker@asu.edu>, Jeremy Helm <JEREMY.HELM@asu.edu>
Subject: FW: Center for Evolution and Medicine - Proposed Undergraduate Certificate

Hello Ken,

I am copying Dr. Ann McKenna in this Dr. Marco Santello in this email for their input.

Please note the highlighted university deadline.

Thank you,

Sergio Z. Quiros
Specialist Senior, Academic and Student Affairs
Ira A. Fulton Schools of Engineering
Arizona State University
Tempe, AZ 85287-8109
Phone: 480/727-5770
Email: Sergio.Quiros@asu.edu

From: Kenneth Buetow <KennethBuetow@exchange.asu.edu>
Sent: Thursday, March 28, 2019 11:49 AM
To: Sergio Quiros <Sergio.Quiros@asu.edu>
Subject: Center for Evolution and Medicine - Proposed Undergraduate Certificate

Dear Mr. Quiros,

On behalf of the faculty of the Center for Evolution and Medicine, I am writing to request a very brief statement from you about the potential impact of our proposed **undergraduate certificate** in Evolutionary Medicine (attached).

Our aim with the certificate is to give students foundational training in evolutionary medicine and how it is

From:	Adam Chodorow
To:	Kenneth Buetow
Subject:	RE: Center for Evolution and Medicine - Proposed Undergraduate Certificate
Date:	Wednesday, April 10, 2019 3:42:59 PM

If by grant approval you mean support, the answer is yes. They are not crazy enough around here to give me any approval powers.

From: Kenneth Buetow <KennethBuetow@exchange.asu.edu>
Sent: Wednesday, April 10, 2019 3:40 PM
To: Adam Chodorow <Adam.Chodorow@asu.edu>
Subject: RE: Center for Evolution and Medicine - Proposed Undergraduate Certificate

Dean Chodorow –

Do you also grant approval for the **undergraduate** certificate in Evolutionary Medicine? We are required to document the approvals separately.

Best,
Ken

From: Kenneth Buetow
Sent: Thursday, March 28, 2019 11:50 AM
To: Adam Chodorow <Adam.Chodorow@asu.edu>
Subject: Center for Evolution and Medicine - Proposed Undergraduate Certificate

Dear Dean Chodorow,

On behalf of the faculty of the Center for Evolution and Medicine, I am writing to request a very brief statement from you about the potential impact of our proposed **undergraduate certificate** in Evolutionary Medicine (attached).

Our aim with the certificate is to give students foundational training in evolutionary medicine and how it is applied to the health of human populations. Students will specialize their training through their selection of electives in fields of their academic interest including, but not limited to: populational genomics, maternal and child health, mental health, cancer, microbiome, aging, anthropology, biology, public health, global health, and medicine.

Our decision to pursue a certificate is to complement domain-specific degree training within fields like public health, medicine, anthropology, and evolutionary biology with the addition of evolutionary medicine approaches to problems. It is our hope that the addition of the Certificate to established programs of study will offer novel insights and a competitive advantage when our ASU students are compared to analogous peers. A certificate allows us to reach students across disciplines, and apply transdisciplinary curricula from the degrees in which they are already embedded.

The Evolutionary Medicine Certificate is structured to provide a core set of courses in evolutionary biology, genetics, global health and public health (see attached) and to include elective courses, as appropriate, from other units. It will be administered by the School of Life Sciences and the School of Human Evolution and Social Change. If you would like a course offered in your department to be included as an elective in the certificate, we welcome your suggestions.

From: Kenneth Buetow
To: Kenneth Buetow
Subject: FW: Center for Evolution and Medicine - Proposed Graduate Certificate
Date: Thursday, April 4, 2019 8:24:41 AM

From: Neal Woodbury <NWoodbury@asu.edu>
Sent: Thursday, April 4, 2019 7:19 AM
To: Kenneth Buetow <Kenneth.Buetow@asu.edu>
Cc: Anne Jones <Anne.Katherine.Jones@asu.edu>; Barbara Munk <bmunk@asu.edu>
Subject: Re: Center for Evolution and Medicine - Proposed Graduate Certificate

Hi Ken,
It does not look like any SMS classes are involved so we do not see a conflict.
Good luck,
Neal

From: Kenneth Buetow <KennethBuetow@exchange.asu.edu>
Sent: Thursday, March 28, 2019 1:16 PM
To: Neal Woodbury <NWoodbury@asu.edu>
Subject: Center for Evolution and Medicine - Proposed Graduate Certificate

Dear Dr. Woodbury,

The Center for Evolution and Medicine is developing a transdisciplinary **graduate certificate** in Evolutionary Medicine. The certificate program will be administered through the School of Life Sciences and the School of Human Evolution and Social Change. On behalf of the faculty of the Center, I am writing to request a very brief statement from you about the potential impact of our proposed certificate on your program.

Evolutionary Medicine is the application of the principles of evolution to the fields of medicine and public health. While, evolution is the foundational basic science of the life sciences, evolutionary medicine is a new way of thinking that integrates perspectives across the traditionally siloed disciplines of public health and medicine. Inherently interdisciplinary in nature, Evolutionary Medicine provides foundational basic science – providing a firm understanding of the core concepts of evolutionary thinking and analysis, with translational, clinical, and public health training.

The certificate will give students core training in evolutionary medicine and how it is applied to the health of human populations. Through selection of electives students will have the opportunity to further specialize training pursuant to academic degree programs including, but not limited to: populational genomics, maternal and child health, mental health, cancer, microbiome, aging, anthropology, biology, public health, global health, and medicine.

From: Patricia Friedrich
To: Kenneth Buetow
Subject: Re: Center for Evolution and Medicine - Proposed Undergraduate Certificate
Date: Wednesday, April 17, 2019 1:37:42 PM

Dear Ken:

I am so sorry that this went unanswered. New College is in support for the proposed certificate and wishes you good luck. My best,

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: Kenneth Buetow <KennethBuetow@exchange.asu.edu>
Date: Wednesday, April 10, 2019 at 3:32 PM
To: Patricia Friedrich <Patricia.Friedrich@asu.edu>
Cc: Tosha Ruggles <tosha.ruggles@asu.edu>
Subject: RE: Center for Evolution and Medicine - Proposed Undergraduate Certificate

Dr. Friedrich –

I am following up on this request to the New College of Interdisciplinary Arts and Science and if you had any questions or concerns regarding the **undergraduate** certificate in Evolutionary Medicine.

I am writing to ask you to respond to this email with:

1. Your support for us moving forward with this certificate;
2. Any perceived conflicts within your unit with this certificate.

Thank you,
Ken

From: Tosha Ruggles
Sent: Friday, March 29, 2019 8:22 AM
To: Kenneth Buetow <KennethBuetow@exchange.asu.edu>
Cc: Patricia Friedrich <Patricia.Friedrich@asu.edu>

From: Peter Bennett
To: Kenneth Buetow
Subject: RE: Center for Evolution and Medicine - Proposed Undergraduate Certificate
Date: Wednesday, April 10, 2019 4:40:16 PM

Yes, we approve both.

From: Kenneth Buetow <KennethBuetow@exchange.asu.edu>
Sent: Wednesday, April 10, 2019 3:42 PM
To: Peter Bennett <peter.bennett@asu.edu>
Cc: Michael Treacy <treacy@asu.edu>; Peter Rez <PETER.REZ@asu.edu>
Subject: RE: Center for Evolution and Medicine - Proposed Undergraduate Certificate

Peter –

Do you also grant approval for the undergraduate certificate in Evolutionary Medicine? We are required to document the approvals separately.

Best,
Ken

From: Kenneth Buetow
Sent: Thursday, March 28, 2019 11:53 AM
To: Peter Bennett <peter.bennett@asu.edu>
Subject: Center for Evolution and Medicine - Proposed Undergraduate Certificate

Dear Dr. Bennett,

On behalf of the faculty of the Center for Evolution and Medicine, I am writing to request a very brief statement from you about the potential impact of our proposed **undergraduate certificate** in Evolutionary Medicine (attached).

Our aim with the certificate is to give students foundational training in evolutionary medicine and how it is applied to the health of human populations. Students will specialize their training through their selection of electives in fields of their academic interest including, but not limited to: populational genomics, maternal and child health, mental health, cancer, microbiome, aging, anthropology, biology, public health, global health, and medicine.

Our decision to pursue a certificate is to complement domain-specific degree training within fields like public health, medicine, anthropology, and evolutionary biology with the addition of evolutionary medicine approaches to problems. It is our hope that the addition of the Certificate to established programs of study will offer novel insights and a competitive advantage when our ASU students are compared to analogous peers. A certificate allows us to reach students across disciplines, and apply transdisciplinary curricula from the degrees in which they are already embedded.

The Evolutionary Medicine Certificate is structured to provide a core set of courses in evolutionary biology, genetics, global health and public health (see attached) and to include elective courses, as appropriate, from other units. It will be administered by the School of Life Sciences and the School of Human Evolution and Social Change. If you would like a course offered in your department to be included as an elective in the certificate, we welcome your suggestions.

From:	Caroline Harrison
To:	Kenneth Buetow
Cc:	Beth Volker
Subject:	RE: Center for Evolution and Medicine - Proposed Undergraduate Certificate
Date:	Wednesday, April 10, 2019 4:01:16 PM

My apologies for not getting back to you on this program as well.

The School of Sustainability fully supports this program and sees no conflicts within our unit.

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: Kenneth Buetow <KennethBuetow@exchange.asu.edu>
Sent: Wednesday, April 10, 2019 3:38 PM
To: Caroline Harrison <Caroline.Harrison@asu.edu>
Cc: Beth Volker <Beth.Volker@asu.edu>
Subject: RE: Center for Evolution and Medicine - Proposed Undergraduate Certificate

Dr. Harrison –

I am following up on this request to the School of Sustainability and if you had any questions or concerns regarding the **undergraduate** certificate in Evolutionary Medicine.

I am writing to ask you to respond to this email with:

1. Your support for us moving forward with this certificate;
2. Any perceived conflicts within your unit with this certificate.

Thank you,
Ken

From: Kenneth Buetow
Sent: Thursday, March 28, 2019 11:50 AM
To: Caroline Harrison <Caroline.Harrison@asu.edu>
Subject: Center for Evolution and Medicine - Proposed Undergraduate Certificate

Dear Dr. Harrison,

On behalf of the faculty of the Center for Evolution and Medicine, I am writing to request a very brief

From: Kay Faris
To: Kenneth Buetow
Cc: Kay Faris
Subject: RE: Center for Evolution and Medicine - Proposed Undergraduate Certificate
Date: Monday, April 1, 2019 7:27:34 PM

Hi Ken,

We have reviewed the documents and information you sent. The W. P. Carey School is happy to support this program and we see no negative conflicts with this proposal.

Thank you for soliciting our opinion.

Best wishes on the program.

Kay

From: Kenneth Buetow <KennethBuetow@exchange.asu.edu>
Sent: Thursday, March 28, 2019 11:51 AM
To: Kay Faris <KAY.FARIS@asu.edu>
Subject: Center for Evolution and Medicine - Proposed Undergraduate Certificate

Dear Dean Farris,

On behalf of the faculty of the Center for Evolution and Medicine, I am writing to request a very brief statement from you about the potential impact of our proposed **undergraduate certificate** in Evolutionary Medicine (attached).

Our aim with the certificate is to give students foundational training in evolutionary medicine and how it is applied to the health of human populations. Students will specialize their training through their selection of electives in fields of their academic interest including, but not limited to: populational genomics, maternal and child health, mental health, cancer, microbiome, aging, anthropology, biology, public health, global health, and medicine.

Our decision to pursue a certificate is to complement domain-specific degree training within fields like public health, medicine, anthropology, and evolutionary biology with the addition of evolutionary medicine approaches to problems. It is our hope that the addition of the Certificate to established programs of study will offer novel insights and a competitive advantage when our ASU students are compared to analogous peers. A certificate allows us to reach students across disciplines, and apply transdisciplinary curricula from the degrees in which they are already embedded.

The Evolutionary Medicine Certificate is structured to provide a core set of courses in evolutionary biology, genetics, global health and public health (see attached) and to include elective courses, as appropriate, from other units. It will be administered by the School of Life Sciences and the School of Human Evolution and Social Change. If you would like a course offered in your department to be included as an elective in the certificate, we welcome your suggestions.

I am writing to ask you to respond to this email with:

1. Your support for us moving forward with this certificate;
2. Any perceived conflicts within your unit with this certificate.

From: Bradley Ryner
To: Kenneth Buetow
Cc: Krista Ratcliffe; Jennifer Vazquez; Lenora Ott
Subject: Re: Center for Evolution and Medicine - Proposed Undergraduate Certificate
Date: Tuesday, October 15, 2019 2:23:12 PM

Dear Kenneth,

Please accept this email as an impact statement. I have consulted with faculty responsible for the Health Humanities certificate housed in the Department of English. We have determined that, because the proposed certificate in Evolutionary Medicine integrates evolutionary based sciences with the health professions and some related social sciences, it should have minimal impact on the Health Humanities certificate, which is humanities-centered. The two certificates might complement each other.

It was suggested that the Evolutionary Medicine certificate might benefit from more robust attention to questions of ethics and history of medicine. If you would like to coordinate a subset of courses that the two certificates might share, you could reach out to Cora Fox, who heads the Health Humanities certificate.

Sincerely,

Bradley D. Ryner

Associate Professor and
Associate Chair for Curriculum
Department of English
Arizona State University

https://edinburghuniversitypress.com/book-performing-economic-thought.html

http://www2.lib.udel.edu/udpress/earlymoderndrama.htm

From: Kenneth Buetow
Sent: Monday, October 14, 2019 12:35 PM
To: Krista Ratcliffe <Krista.Ratcliffe@asu.edu>; Linda Sullivan <linda.sullivan@asu.edu>
Cc: Jennifer Vazquez <Jennifer.Vazquez@asu.edu>; Lenora Ott <Lenora.Ott@asu.edu>
Subject: Center for Evolution and Medicine - Proposed Undergraduate Certificate

Dear Colleagues,

On behalf of the faculty of the Center for Evolution and Medicine, I am writing to request a very brief statement from you about the potential impact of our proposed **undergraduate certificate** in Evolutionary Medicine (attached).

Our aim with the certificate is to give students foundational training in evolutionary medicine

and how it is applied to the health of human populations. Students will specialize their training through their selection of electives in fields of their academic interest including, but not limited to: populational genomics, maternal and child health, mental health, cancer, microbiome, aging, anthropology, biology, public health, global health, and medicine.

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I am writing to ask you to respond to this email with:

1. Your support for us moving forward with this certificate;
2. Any perceived conflicts within your unit with this certificate.

Our certificate is currently under review. If we could have your response not later than October 16th, that would help greatly.

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

Sincerely,

Kenneth Buetow
Associate Director, Center for Evolution and Medicine

From:	Dawn Phelps
To:	Lenora Ott
Cc:	Jennifer Vazquez
Subject:	RE: Course approval for Evolutionary Medicine Certificate
Date:	Thursday, October 17, 2019 1:03:43 PM
Attachments:	image001.png image002.png

Lenora:

I checked with our Director of Undergraduate Studies, Dr. Clark Presson, and we have no objection to you using the course in the Evolutionary Medicine certificate program.

Have a great week/weekend!

Dawn S. Phelps, M.A.
Assistant Director Academic Services
Department of Psychology
Arizona State University
PO Box 871104
480-965-7258
dphelps@asu.edu

From: Lenora Ott <Lenora.Ott@asu.edu>
Sent: Monday, October 14, 2019 12:35 PM
To: Dawn Phelps <DAWN.PHELPS@asu.edu>
Cc: Jennifer Vazquez <Jennifer.Vazquez@asu.edu>
Subject: Course approval for Evolutionary Medicine Certificate

Hello Dawn,

I am reaching out to get approval from Psychology to offer PSY 394: Introduction to Evolutionary Psychology, as part of the elective offerings for the undergraduate certificate in Evolutionary Medicine. Athena Aktipis, who teaches the course, is a member of our Center, and we believe it aligns with the learning outcomes for the certificate program.

I've attached the description of the evolutionary medicine certificate and our proposed BAMM map for coursework for your review.

Do we have your approval to list it as an elective course within the program?

Best,

Lenora

Lenora L. Ott, MS
Instructional Designer

Center for Evolution and Medicine | Arizona State University
427 E. Tyler Mall, Tempe, AZ 85287 | Life Sciences C-Wing, Room 210A
480.965.9945 | lenora.ott@asu.edu

Like us on Facebook Follow us on Twitter @evmedasu #EvMed

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 CAPC, University Senate (two readings), and be approved by the Office of the University Provost.

Definition and minimum 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.

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

- 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:	The College of Liberal Arts and Sciences
Department/Division/School:	School of Life Sciences
Proposed certificate name:	Evolutionary Medicine
Requested effective date:	Fall 2020
Initial delivery method:	Campus immersion only (ground and iCourses)

Once students elect a campus or digital option, they will not be able to move between the modalities. Approval from the Office of the University Provost and Philip Regier (Executive Vice Provost and Dean) is required to offer programs through ASU Online. Approval begins by submitting the *Request for Digital Immersion Consideration* form in Curriculum ChangeMaker. An EdPlus letter of support must be included with this proposal to demonstrate preliminary approval for digital immersion. Contact EdPlus at edplusprogrammanagement@asu.edu for additional information.

Campus/Locations: Indicate all locations where this program will be offered.

☐ Downtown Phoenix ☐ Polytechnic ☒ Tempe ☐ West ☐ Other: online

PROPOSAL CONTACT

Name:	Kenneth Buetow	**Title:**	Professor
Phone number:	480-727-9413	**Email:**	kenneth.buetow@asu.edu

DEAN APPROVAL(S)

This proposal has been approved by all necessary unit and college/school levels of review and the college/school(s) has the resources to support the requested changes. I recommend implementation of the proposed organizational change.

An electronic signature, an email from the dean or dean's designee or a PDF of the signed signature page is acceptable. The second signature is only required if multiple colleges are involved.

College/School/Division Dean name: Paul LePore

Signature: Paul C LP **Date:** SEPT 19, 2019 / /20

College/School/Division Dean name:

Signature: **Date:** / /20

SECTION A - Overview

1. **Provide a brief description of the new certificate.**

Evolutionary Medicine is the application of the principles of evolution to the fields of medicine, public health, and other health professions. Inherently interdisciplinary in nature, Evolutionary Medicine integrates basic science – and provides a firm understanding of the core concepts of evolutionary thinking and analysis, and places disease in the context of changing environments, exposures, and the encompassing ecology of life in which an individual is embedded. While evolution is already a foundational basic science of the life sciences, evolutionary medicine is a new way of thinking that integrates perspectives across traditionally siloed disciplines of public health and medicine.

The certificate will give students foundational training in evolutionary medicine and how it is applied to the health of human populations, and then will allow students to specialize further through their electives in the direction of their primary academic interests. These interests could include, but are not limited to: populational genomics, maternal and child health, mental health, cancer, microbiome, aging, anthropology, biology, public health, global health, and medicine.

ASU, as the New American University, is dedicated to the "fusion of intellectual disciplines", transforming society by "being connected to social needs", and committed to the "success of each unique student". These ideas among other key tenets serve to fulfill ASU's mission "to achieve excellence, access, and impact", which will define a new era in higher education.

The Certificate in Evolutionary Medicine achieves the aims of the New American University:
• This program bridges traditionally siloed disciplines within the School of Life Sciences and the School for Human Evolution & Social Change as an interdisciplinary endeavor between the two.
• The educational mission of evolutionary medicine to improve human health creates meaningful impact within the fields of biology, medicine, public health, and global health.
• The program guides learners through progressive coursework that leads from competence to proficiency, and then to mastery of the educational objectives within evolutionary medicine. It culminates in an experience that allows learners to explore the unique questions relevant to their lives and interests.

2. **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

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

Rather than stand on its own, students will be able to use evolutionary medicine as a foundation for approaching problems within fields like public health, medicine, anthropology, and evolutionary biology and will be better prepared as compared to analogous peers when it comes to addressing today's and future health challenges. They will understand how evolution can provide insight across basic, medical, and public health. Students will set themselves apart by asking better and different questions. They will be capable of addressing emerging, anticipated public need such as reemerging infectious diseases, challenges with vaccines, the expansion of chronic disease, and other growing public health crises.

As opposed to a concentration, a certificate allows us to reach students across disciplines, and apply interdisciplinary curricula from the degrees in which they are already embedded. By offering a certificate rather than a minor, we will be able to educate students that are considering programs for a gap year between their undergraduate curriculum and graduate or professional schools. As students who declare a minor must actively be pursuing an undergraduate degree, those who enroll in a certificate may either do so concurrently with their program or after the conclusion of their program. This extends our audience to alumni of undergraduate programs, as well as currently enrolled students.

Public health and medicine are currently taught as separate disciplines and through separate degree programs at the academic level. Evolutionary medicine focuses on health and disease, and social and biological evolution. Medicine focuses on treating individuals with disease, while Public Health operates at a population level. The evolutionary medicine certificate will serve

to provide an integrated conceptual framework that can be applied to the problems of public health and medicine in order to produce more holistic outcomes for the improvement of human health.

4. 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.

Although not attached to a degree, students with a certificate in evolutionary medicine will be able to set themselves apart from their peers with skills in problem solving that address the integration of basic, medical, and public health science and practice. For those who plan on moving into careers involving medicine or public policy they will gain an understanding of how evolutionary thinking influences medical and public health intervention which is not currently outlined in biological, anthropological, or public health related curriculum within the university.

5. Demand

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

According to the Bureau of Labor Statistics, demand for health science-related careers is expected to grow 18 percent from 2016 to 2022. With an aging population in the United States, there will be an increase in demand for healthcare services. Healthcare professional programs have competitive admissions processes and students with a certificate in evolutionary medicine will be able to set themselves apart from their peers with:

- skills in problem-solving that address the integration of basic, medical, and public health science and practice.
- working knowledge of how evolutionary thinking influences medical and public health intervention which is not currently outlined in biological, anthropological, or public health-related curriculum within the university.
- an integrated conceptual framework that can be applied to the problems of public health and medicine in order to produce more holistic outcomes for the improvement of human health.

The median annual wage across the U.S. for healthcare practitioners and technical occupations (such as registered nurses, physicians and surgeons, and dental hygienists) was $64,770 in May 2017, which was higher than the median annual wage for all occupations in the economy of $37,690. According to an analysis by Martinaian et al. on the Labor Statistic Projections, more than 400,000 physicians, nurse practitioners, nurses and others will be needed to fill positions between 2014 and 2024. This number does not include careers within the public health arena such as social work, epidemiology, and public policy which also continue to grow at a national average of 16 percent with a median salary near $47,000. Training well-rounded health professionals with integrative perspectives is essential to the success of improving human health.

6. Projected enrollment

What are enrollment projections for the first three years?

3-YEAR PROJECTED ANNUAL ENROLLMENT			
	1st YEAR	**2nd YEAR** *Yr 1 continuing + new entering*	**3rd YEAR** *Yr 1 & 2 continuing + new entering*
Number of Students (Headcount)	120	200	250

SECTION B - Support and Impact

7. **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.

8. **Related programs**
Identify related ASU programs and outline how the new certificate will complement these existing ASU programs. Statements of support from potentially affected academic unit administrators must be included with this proposal.

School of Life Sciences:

- Biological Sciences BS (Including concentrations in Biomedical Sciences; Genetic, Cell and Developmental biology; Biology and Society; Conservation Biology and Ecology; Neurobiology, Physiology, and Behavior)
- Microbiology BS (including the concentration in Medical Microbiology)
- Molecular Biosciences and Biotechnology BS
- Neuroscience BS

As one of the supporting two schools for this interdisciplinary effort, there is no conflict between the certificate and current programs. It is expected that the certificate will add value to existing degrees. A letter of support is attached.

School of Human Evolution and Social Change:

- Anthropology BS/BA
- Global Health BA
- Applied Mathematic for the Life and Social Sciences BS

As one of the supporting two schools for this interdisciplinary effort, there is no conflict between the certificate and current programs. It is expected that the certificate will add value to existing degrees. A letter of support is attached.

College of Nursing and Health Innovation:

- Applied Sciences (Health Entrepreneurship and Innovation) BAS
- Community Health BS
- Health Care Compliance and Regulations BS
- Health Care Coordination BS
- Health Entrepreneurship and Innovation BS
- Integrative Health BS
- Nursing BSN

No perceived conflict with the programs listed above nor others within the college. The certificate will amplify the skills of students, especially those within majors having to do with the life, health, and social sciences. A letter of support is attached.

College of Health Solutions

- Applied Science (Good Service Management) BAS
- Applied Science (Health Sciences) BAS
- Applied Science (Medical Laboratory Science) BAS
- Biomedical Informatics BS
- Exercise and Wellness BS
- Health Education and Health Promotion BS
- Health Sciences BS (Including concentration in Health Lifestyles coaching)
- International Public Health BIPH
- Kinesiology BS
- Medical Studies BS
- Nutrition BS (including concentrations in Dietetics, Human Nutrition)
- Public Health BS
- Science of health Care Delivery BS
- Speech and Hearing Science

- Sport Science and Performance Programming

No perceived conflict with the programs listed above nor others within the college. The certificate will amplify the skills of students, especially those within majors having to do with the life, health, and social sciences. A letter of support is attached.

College of Integrative Sciences and Arts:

- Applied Biological Sciences BS (Including concentrations in Natural Resource Ecology, Preveterinary Medicine, Secondary Education in Biology, and Sustainable Horticulture)
- Applied Mathematics BS
- Applied Physics BS
- Applied Quantitative Science BS
- General Studies BA
- History of Science, Ideas and Innovation BA
- Interdisciplinary Studies BA
- Psychology BS BA

No perceived conflict with the programs listed above nor others within the college. The certificate will amplify the skills of students, especially those within majors having to do with the life and social sciences. A letter of support is attached.

New College of Interdisciplinary Arts and Sciences:

- Applied Science BAS
- Biology BS BA (Including concentrations in Forensics and Pharmacology/Toxicology)
- Biotechnology and Bioenterprise
- Disability Studies BA
- History BA
- Pharmacology and Toxicology BS
- Psychology BA BS (Including concentrations in Forensic Psychology)
- Social and Behavioral Sciences BS BA
- Sociology BS BA

No perceived conflict with the programs listed above nor others within the college. The certificate will amplify the skills of students, especially those within majors having to do with the life and social sciences. A letter of support is attached.

Fulton Schools of Engineering:

- Biomedical Engineering BSE

No perceived conflict with the programs listed above nor others within the school. The certificate will amplify the skills of students, especially those within majors having to do with medical sciences. A letter of support is attached.

School of Sustainability:

- Sustainability BA BS
- Sustainable Food Systems BS

No perceived conflict with the programs listed above nor others within the school. The certificate will amplify the skills of students, especially those within majors having to do with life and social sciences. A letter of support is attached.

Sandra Day O'Connor College of Law:

No perceived conflict with the programs within this school. The certificate may be useful for those wishing to go into law fields surrounding medical science. A letter of support is attached.

W.P. Carey School of Business:

No perceived conflict with the programs within this school. The certificate may be useful for those wishing to go into business fields surrounding medical science. A letter of support is attached.

School of Mathematical and Statistical Sciences:

No perceived conflict with the programs within this school. The certificate may be useful for those wishing to go into mathematical fields surrounding medical science and populational genomics. A letter of support is attached.

School of Molecular Sciences:

- Chemistry BS
- Biochemistry BS BA (Including concentration in Medicinal Chemistry BS)

No perceived conflict with the programs listed above nor others within the school. The certificate will amplify the skills of students, especially those within majors having to do with medical sciences. A letter of support is attached.

Department of Physics:

No perceived conflict with the programs within this school. A letter of support is attached.

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

SECTION C - Academic Curriculum and Requirements

10. **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. While learning outcomes are needed, the measures and performance criteria and are not needed for certificates.

Outcome 1:

Students will be able to identify, describe, and summarize key evolutionary concepts related to human health and disease.

Measure 1.1 Homework assignments will assess student capacity to identify evolutionary principles applied to human health and disease, using a rubric that measures how many concepts they can identify and in what detail they can describe their relationship to human health.

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 life-history theory, environmental mismatch, and biological and cultural variation to human health and disease will be assessed via homework assignments using a rubric that measures the detail in which students can describe the way in which these factors are applied and how they are viewed in population data, as offered in the foundational courses.

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 appropriately analyze, interpret, and present data relevant to evolutionary medicine.

Measure 2.1 Homework assignments will be used to assess the degree to which students can analyze and interpret public data sets through the application of evolutionary theory. This shall be addressed in the core courses with a rubric that assesses student ability to fully describe the ethical issues associated with the use of population health data.

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 Student capacity for the presentation of data will be assessed through group projects and individualized projects that allow students to explore concepts of evolutionary medicine in conjunction with public data sets and compose written works including white papers, research papers, and policy statements.

Performance Criterion 2.2 80% of students will score a 3.8 or above on a faculty-developed rubric of this metric.

11. Enrollment criteria

Describe the procedures and any qualifications for enrollment in the proposed certificate. Please note if they are identical to the admission criteria for the existing major and degree program under which this certificate will be established.

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

12. Program Map

Attach a copy of the "proposed" map for this certificate program.
See the Build a Major Map Training Guide for instructions on how to create a "proposed certificate map" in BAMM.

13. Curricular structure

Provide the curricular structure for this certificate by listing the required courses in alphanumeric order.

REQUIRED COURSES				
Prefix	**Number**	**Title**	**New Course?**	**Credit Hours**
ASM/BIO	403	Evolutionary Medicine and Global Health	Yes	3
BIO/ASB	408	Advanced Evolutionary Medicine	Yes	3
			(Select one)	
			(Select one)	
			Section sub-total:	6
ELECTIVE COURSES				
Prefix	**Number**	**Title**	**New Course?**	**Credit Hours**
ASB/BIO	494	Topic: Maternal and Child Health	N	3
ASM	246	Human Origins	N	3
ASB/BIO	250	Introduction to Evolution and Medicine	Y	3
ASM/BIO	342/327	Evolution of Human Behavior	N	3
ASM	345	Disease and Human Evolution	N	3
ASM/BIO	394	Topic: Ecology and Evolution of Infectious Diseases	N	3
ASM	401	Health and Human Biology	N	3
ASM/BIO	446	Principles of Human Genetics	N	3
ASM	456	Infectious Disease and Human Evolution	N	3

ASM/BIO	494	Topic: Evolution and Mental Disorders	N	3
BIO	302	Cancer- Mother of all Diseases	N	3
BIO/HPS 331	318	History of Medicine	N	3
BIO	345	Evolution	N	3
BIO/PSY	394	Topic: Introduction to Evolutionary Psychology	N	3
BIO/MBB 440	440	Functional Genomics	N	3
BIO	462	Endocrine Physiology	N	3
MBB/MIC	445	Techniques in Molecular Biology/Genetics	N	3
MIC	205	Microbiology	N	3
MIC	314	HIV/AIDS: Science, Behavior, and Society	N	3
MIC	425	Advanced Immunology	N	3
			Section sub-total:	9

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

14. Minimum residency requirement

How many hours of the certificate must be ASU credit?

15

15. New courses

List new courses in alphanumeric order and provide a brief course description for each one.
Prior to submitting this proposal, all new courses must be at the *University Review* level in Curriculum ChangeMaker.

ASM 250 Introduction to Evolution and Medicine (3)

This course is designed to introduce applications of evolutionary biology to medicine. Topics ranging from the evolution of antibiotic resistance, to aging, obesity, Alzheimer's Disease and cancer will be discussed using an evolutionary framework to better understand how these diseases/issues came to be, and what can be done to prevent/treat/mitigate these conditions

ASM 403 Evolutionary Medicine and Global Health (3)

Fundamentally, the practice of medicine is applied biology to improve human health and well-being and is embedded within population and global scales. Here we integrate the life and social sciences to tackle the current and emerging

global health challenges of the 21st Century. This course integrates an evolutionary biology lens with current medical knowledge enhancing our understanding of health. This class uses topics such as human-pathogen coevolution, development and aging, human migration, diseases (infectious, metabolic, and autoimmune), and physiological and behavioral mechanisms of immunity to explore the broad arena of human health within a deep time and global context.

BIO 408 Advanced Evolutionary Medicine (3)

Evolutionary medicine explores the application of the principles of evolution to the fields of medicine and public health and places disease in the context of changing environments, both exposures and the encompassing ecology of life in which an individual is imbedded. Advanced evolutionary medicine, focuses on the biological aspects of evolutionary theory through the use of molecular genetics, population genetics, and the use of evolutionary thinking and analysis with translational, clinical, and public health intersections. A foundation in evolutionary medicine is useful for students with interests including but not limited to: premed, population genomics, maternal and child health, mental health, cancer, microbiome, aging, anthropology, biology, public health, global health, and medicine.

SECTION D - Administration and Resources

16. Administration

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

The certificate will be coordinated academically by a committee of 2 faculty and the staff program administrator involved in the program in the Center for Evolution and Medicine, with rotating three-year terms. Faculty will be divided between the social sciences and biological sciences specializations. Duties will include recommendations for admissions, approval of projects and coursework. Academic advising for coursework within the program to meet student needs and interests can be recommended by members of the committee but will be executed and added within the student's graduate school. Programs of Study will be approved by the committee and then placed into the system by the Director of the Center for Evolution and Medicine or by the Center's Instructional Designer at the Director's discretion.

The certificate functions as a collaborative effort between the School of Life Sciences (SoLS) and the School for Human Evolution and Social Change (SHESC), but will be awarded and maintained through SoLS.

17. 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, The School of Human Evolution and Social Change, and The Center for Evolution & Medicine.

18. 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. The areas of specialization should refer to

FACULTY NAME	TITLE	AREA(S) OF SPECIALIZATION
Kenneth Buetow	Professor	Bioinformatics, Cancer, Genetics, Complex Systems, Molecular Biology
C Athena Aktipis	Assistant Professor	Cancer, Social Psychology
Katherine Hinde	Associate Professor	Ecological Behavior, Mammalogy, Physiology, Biomedicine, Women's Health, Evolutionary Anthropology, Global Health, and Medical Anthropology
Silvie Huijben	Assistant Professor	Public Health, Evolution, Molecular Biology, Biomedicine, Ecology, HIV, STI and Infectious, Diseases, Health Policy, Disease Modeling

Jeffrey Jensen	Professor	Genetics, Populations, Evolution
Manfred Laubichler	Professor	History of Science, Philosophy of Science, Complex systems, Development Biology, Theoretical biology
Randolph Nesse	Professor	Diseases, Emotion, Evolutio, Stress, Biomedicine, Psychology
Krijn Paaijmans	Assistant Professor	Climate Change, Microclimate, Public Health, Insects, Evolution, Bioengineering, Ecology, HIV, STI and Infectious Diseases, Surveillance
Anne Stone	Professor	Genetics, Evolutionary Anthropology, Evolution and Development Biology
Jesse Taylor	Associate Professor	Epidemiology, Ornithology, Invertebrates, Mathematical Biology, Evolutionary and, Population Genetics
Benjamin Trumble	Assistant Professor	Evolutionary Anthropology, Global Health
Melissa Wilson	Assistant Professor	Population Biology, Bioinformatics, Cancer, Genetics, Evolution, Genomics, Reproduction, Theoretical Biology, Evolutionary and Population Genetics, Computational Biology

SECTION E - Additional Materials

19. Complete and attach the Appendix document.

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

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

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. **Certificate Name:** Certificate in Evolutionary Medicine

2. **Marketing Text** *Optional*, 50 words maximum
The marketing text should make an emotional connection with prospective students to draw them in so they continue reading. Do not repeat content found in the program description.

   Transforming our understanding of disease to improve human health requires framing questions about health and illness in new and innovative ways. Through the connection of evolutionary biology, medicine, global health, and public health learn how to holistically approach ideas about evolution, human vulnerability, and the future of medicine.

3. **Program Description** 150 words maximum
Present factual basic and specialized information about the program to help students decide if the program is the right fit. This section is not the place for hyperbole, information about enrollment or admission, campus, course requirements, or potential careers.

   With rising need for health science-related skills and an aging population in the United States, innovations in health and medicine are in demand. Evolutionary medicine is a new and burgeoning field situated between the life and social sciences that seeks to integrate the fields of evolutionary biology, genetics, medicine, global health and public health to transform our understanding of disease and improve human health. Students that complete this certificate will learn how to integrate perspectives from across fields to answer questions about health and disease in the context of human life history.

   Students will be introduced to integrated approaches within the biological and social sciences that are capable of addressing an emerging, anticipated public need such as reemerging infectious disease, challenges with vaccines, the expansion of chronic disease and other growing public health crises.

4. **Contact and Support Information**

Building code and room number: *(Search ASU map)*	LSC 210
Program office telephone number: (*i.e. 480/965-2100*)	480/965-9944
Program Email Address:	evmed@asu.edu
Program Website Address:	https:// evmed.asu.edu

5. **Program Requirements**
These requirements will be drawn from the "proposed certificate map" that must be submitted with this proposal. Instructions 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. **Keywords**
List all keywords used to search for this program (limit 7). Keywords should be specific to the proposed program. All parts of the certificate name are automatically included as keywords.

   genetics, genomics, darwinian medicine, biology, public health, global health, evolutionary biology

8. **Delivery/Campus Information Options:** Campus immersion (ground and/or iCourses)

9. **Campus/Locations:** Indicate all campus immersion locations where this program will be offered

☐ Downtown Phoenix ☐ Polytechnic ☒ Tempe ☐ West ☐ Other: online