

## Council Approval

Note: This form is intended to track the progress of a proposal (whether from Academic Affairs or Health Sciences) through the Undergraduate and Graduate Councils.

Proposal: Emphasis for Anatomy & Physiology – Biology BA/BS

This proposal needs to go through:

Undergraduate Council

X

Graduate Council

☐

Both Approvals

☐

Grad Approval/Undergrad Notification

☐

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This proposal has been approved by:

Chair of Undergraduate Council



Date: 1-30-17

Chair of Graduate Council

\_\_\_\_\_

Date: \_\_\_\_\_

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Once the appropriate signature(s) have been obtained, please forward this completed form to the Office of the Senior Vice President for Academic Affairs. (NOTE: The SVP-AA is the Chief Academic Officer for the University of Utah and reports to the Board of Regents in this capacity. When necessary, the CAO will get a signature from the SVP-HSC.)

Chief Academic Officer



Date: 7-17-17

Once the Chief Academic Officer's signature has been obtained, this approval document will be forwarded to the **Office of the Academic Senate**.

Utah System of Higher Education  
New Academic Program Proposal  
Cover/Signature Page - Abbreviated Template

**Institution Submitting Request:** University of Utah  
**Proposed Program Title:** BS/BA in Biology with emphasis in Anatomy and Physiology  
**Sponsoring School, College, or Division:** College of Science  
**Sponsoring Academic Department(s) or Unit(s):** Department of Biology  
**Classification of Instructional Program Code<sup>1</sup> :** 26.0901  
**Min/Max Credit Hours Required of Full Program:** / Max Cr Hr  
**Proposed Beginning Term<sup>2</sup>:** Fall 2017  
**Institutional Board of Trustees' Approval Date:**

**Program Type:**

<input type="checkbox"/> Certificate of Proficiency	<input type="checkbox"/> Entry-level CTE CP	<input type="checkbox"/> Mid-level CP
<input type="checkbox"/> Certificate of Completion		
<input type="checkbox"/> Minor		
<input type="checkbox"/> Graduate Certificate		
<input type="checkbox"/> K-12 Endorsement Program		
<input checked="" type="checkbox"/> <b>NEW Emphasis for Regent-Approved Program</b> <i>Credit Hours for NEW Emphasis Only:</i> <b>15</b> / <b>18</b> <i>Current Major CIP:</i> <b>26.01</b> <i>Current Program Title:</i> <b>Biology</b> <i>Current Program BOR Approval Date:</i>		
<input type="checkbox"/> Out of Service Area Delivery Program		

**Chief Academic Officer (or Designee) Signature:**

I, the Chief Academic Officer or Designee, certify that all required institutional approvals have been obtained prior to submitting this request to the Office of the Commissioner.

Please type your first and last name \_\_\_\_\_ Date: \_\_\_\_\_

☐ I understand that checking this box constitutes my legal signature.

<sup>1</sup> For CIP code classifications, please see <http://nces.ed.gov/ipeds/data/cipcodes/>

<sup>2</sup> "Proposed Beginning Term" refers to first term after Regent approval that students may declare this program.

**Utah System of Higher Education  
Program Description - Abbreviated Template**

**Section I: The Request**

University of Utah requests approval to offer the following Emphasis: BS/BA in Biology with emphasis in Anatomy and Physiology effective Fall 2017. This program was approved by the institutional Board of Trustees on .

**Section II: Program Proposal/Needs Assessment**

**Program Description/Rationale**

*Present a brief program description. Describe the institutional procedures used to arrive at a decision to offer the program. Briefly indicate why such a program should be initiated. State how the institution and the USHE benefit by offering the proposed program. Provide evidence of student interest and demand that supports potential program enrollment.*

Modern biology encompasses diverse disciplines covering an enormous span of scientific pursuits ranging from detailed molecular biology to ecosystems. The Department of Biology at the University of Utah is one of the few in the country where academics across this range are housed within the same department. This presents a unique opportunity for undergraduate students, as they are exposed to intellectual connections across the breadth of contemporary biology. Physiology is a major sub-discipline of the biological sciences; it provides the thread linking cellular/molecular biology to ecology/evolutionary biology. The current emphasis offerings do not cover this important area and, as such, the Department of Biology is proposing to introduce a new Biology BS/BA emphasis entitled 'Anatomy and Physiology' to provide formal guidance to those students interested in exploring anatomical structure and physiological function.

The proposed Anatomy and Physiology emphasis was presented to the Department of Biology Executive Committee and received unanimous approval at their meeting on November 7, 2016. The emphasis was then presented to the Biology faculty in their regular meeting on November 8, 2016, where it also received unanimous approval. Subsequently, the College of Science Admissions and Standards committee also approved the emphasis on December 19, 2016.

The proposed emphasis is designed to help students identify the most relevant elective coursework, and to provide a coherent path to the Biology BS/BA that provides a strong foundation in physiological function and anatomical structure. Moreover, this transcriptable emphasis will highlight the students' background and skills, potentially improving their success in applications for professional and graduate schools as well as careers in public and commercial sectors.

Currently there are approximately 1200 majors in Biology. The distribution of undergraduates amongst our current emphases is as follows: 25% Cell & Molecular Biology, 25% Environmental & Organismal Biology, and <5% Biochemistry. About 50% of undergraduates complete their degree with no emphasis. We anticipate that roughly 25% of our student population will follow the proposed, new emphasis. Since there is very little course overlap between the proposed emphasis and existing emphases, we anticipate little impact on participation in the other emphases currently offered.

**Labor Market Demand**

*Provide local, state, and/or national labor market data that speak to the need for this program. Occupational demand, wage, and number of annual openings information may be found at sources such as Utah DWS Occupation Information Data Viewer ([jobs.utah.gov/jsp/wi/utalmis/gotoOccinfo.do](http://jobs.utah.gov/jsp/wi/utalmis/gotoOccinfo.do)) and the Occupation Outlook Handbook ([www.bls.gov/oco](http://www.bls.gov/oco)).*

Students graduating with a degree in biology pursue a wide variety of careers in both public and commercial sectors. A large percentage of Biology majors self identify as preprofessional health (medical, dental, veterinary etc.) or allied health (e.g. physical therapy, pharmacy, physicians assistant) and many pursue additional post-graduate training in their field of choice. Health-related jobs are one of the fastest growing sectors of our nation's economy. The healthcare field encompasses a wide range of careers, including hospitals, health practitioners, nursing and residential care facility workers, home health care services, and laboratory and ambulatory care serves. In 2013, the U.S. Bureau of Labor Statistics (BLS) estimated that these five areas employed approximately 15.9 million workers. And this is a growth industry; a report from the BLS projects an addition of more than 4 million new health-related jobs between 2012 and 2022.

The job outlook for physicians in Utah is also very promising. When considering only General and Family Practitioners, the Department of Workforce Services (DWS) predicts a high number of annual job openings in Utah (80), though more for replacement than growth. There are currently about 1500 Family and General Practitioners in Utah, and a predicted increase of 1.6-3.6% across Utah. These are high paying careers, with median salaries of \$120,000-\$190,000.

A similar picture emerges when considering careers in dentistry. DWS estimates there to currently be 1,475 general dentists in Utah, and there are good prospects for people entering this field. For example, the projection for 2014-2024 in Utah is that 80 positions will be available each year with many openings due to growth. Median annual salaries varied regionally in Utah, and ranged from \$64,000 - \$136,000.

#### Expected Student Learning Outcomes

1. Evolution. Students will be able to apply the principles of natural selection and mechanisms of genetic change, including trait variation and heritability, to explain the observed diversity of life that has arisen over long-term as well as recent evolutionary time frames.
2. Transmission, flow and interpretation of biological information. Students will be able to apply a knowledge of genetics, gene expression, growth and development, signal perception and transduction, and physiological regulation to explain how information is stored, transmitted and utilized in biological contexts.
3. Structure and function. Students will be able to apply knowledge of molecular, cellular, and organismal structures to explain the diverse set of functions – ranging from the sub cellular to behavioral to ecological – that underlie the remarkable diversity of individual organisms as well as communities of organisms.
4. Systems. Students will be able to explain how biological units interact to give rise to emergent properties at multiple levels of biological organization. These interactions range from the cycling of matter and energy at the subcellular to organismal to biogeochemical scales to the interaction and interdependency of organisms, including humans, with their environment.
5. Ability to Apply the Process of Science. Students will be able to apply the process of science to identify knowledge gaps, formulate hypotheses, and test them against experimental and observational data to advance an understanding of the natural world.
6. Ability to use quantitative reasoning. Students will be able to use mathematical and computational methods and tools to describe living systems and be able to apply quantitative approaches, such as statistics, quantitative analysis of dynamic systems, or mathematical modeling.
7. Ability to participate in the interdisciplinary nature of science through clear communication and collaboration with other disciplines. Students will be able to apply concepts and sub-disciplinary knowledge from within and outside of biology in order to interpret biological phenomena, communicate with clear written and oral arguments, and work collaboratively to solve problems.
8. Ability to explain the relationship between science and society. Students will be able to evaluate the interactions between biology and society, including the societal impacts of biological research as well as public perception and decision-making about science, and clearly communicate biological concepts and their implications to broad audiences.

Expected Student Learning Outcome Assessment. The Biology curriculum is currently undergoing reform with the goal of a more coordinated major. One part of this task is to directly link the departmental ESLOs to each individual course. Responsibility for assessment of learning will be with the course instructor. Note that the ESLOs are broadly distributed among the courses, and it is expected that students will be instructed and assessed for each ESLO multiple times during their studies in Biology.

**Consistency with Institutional Mission/Impact on Other USHE Institutions**

*Explain how the program is consistent with the institution's Regents-approved mission, roles, and goals. Institutional mission and roles may be found at [higheredutah.org/policies/policyr312/](http://higheredutah.org/policies/policyr312/) . Indicate if the program will be delivered outside of designated service area; provide justification. Service areas are defined in [higheredutah.org/policies/policyr315/](http://higheredutah.org/policies/policyr315/) .*

Central to the mission of the University of Utah is to provide students of diverse backgrounds with a foundation for future success, including becoming leaders and engaged citizens, and including promotion of education, health and quality of life. The Department of Biology contributes to this mission by providing broad training in the biological sciences. Graduates with a BS/BA in Biology pursue a diversity of careers both in the public and private sectors. Many seek to continue their education with additional postgraduate training in health-related or academic fields. While Biology majors have a high success rate in these endeavors, this emphasis will help students in several ways. First, it guides students along a cohesive intellectual path toward an in-depth yet broad exposure to anatomy and physiology while additionally providing excellent preparation for postgraduate careers and professional schools. Second, because this emphasis will be featured on their transcript and diploma, it will help the students to convey the depth of their preparation to other educational institutions and to potential employers. The program will not be delivered outside of the designated service area.

**Finances**

*What costs or savings are anticipated in implementing the proposed program? If new funds are required, indicate expected sources of funds. Describe any budgetary impact on other programs or units within the institution.*

This new emphasis will have no impact on finances of the University of Utah. All courses in the emphasis are already taught.

### Section III: Curriculum

#### Program Curriculum

List all courses, including new courses, to be offered in the proposed program by prefix, number, title, and credit hours (or credit equivalences). Indicate new courses with an X in the appropriate columns. The total number of credit hours should reflect the number of credits required to receive the award. **For NEW Emphases, skip to emphases tables below.**

For variable credits, please enter the minimum value in the table below for credit hours. To explain variable credit in detail as well as any additional information, use the narrative box below.

Course Number	NEW Course	Course Title	Credit Hours
General Education Courses (list specific courses if recommended for this program on Degree Map)			
<b>General Education Credit Hour Sub-Total</b>			
Required Courses			
Add Another Required Course			
<b>Required Course Credit Hour Sub-Total</b>			
Elective Courses			
Add Another Elective Course			
<b>Elective Credit Hour Sub-Total</b>			
<b>Core Curriculum Credit Hour Sub-Total</b>			0

Are students required to choose an emphasis for the already-existing degree?	Yes or <input checked="" type="checkbox"/> No
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Course Number	NEW Course	Course Title	Credit Hours
Name of Emphasis:		Anatomy & Physiology	
Select 1 of 4		BIOL 3310 Comparative Vertebrate Morphology	3
		BIOL 3320 Comparative Physiology	3
		BIOL 3330 Behavioral Neurobiology	3
		BIOL 3380 Evolution & Physiol. Basis of Health	3
Select 4 of 14		BIOL 2210 Human Genetics	3
		BIOL 2325 Human Anatomy	4
		BIOL 2420 Human Physiology	4
		BIOL 3210 General & Pathogenic Microbiology	4
		BIOL 3310 Comparative Vertebrate Morphology	3
		BIOL 3320 Comparative Physiology	3
		BIOL 3325 Comparative Physiology Lab	3
		BIOL 3330 Behavioral Neurobiology	3
		BIOL 3360 Vertebrate Embryology	3
		BIOL 3380 Evolutionary & Physiological Basis of Health	3
		BIOL 5030 Basic Immunology	3
		BIOL 5140 Genome Biology	3
		BIOL 5315 Advanced Human Anatomy	3
		BIOL 5370 Mammalogy	3
Add Another Emphasis Course			
Emphasis Credit Hour Sub-Total			15
Total Number of Credits to Complete Program			15

Propose a NEW Emphasis to an existing Regent approved program

### Program Curriculum Narrative

*Describe any variable credits. You may also include additional curriculum information, as needed.*

Note that the precise number of credits earned from the "Select 4 of 14" category will vary depending on choices. Eleven of the options are 3CR courses, 3 options are 4CR courses. The minimum number of credits that can be taken for the emphasis is 15, the maximum is 18 (if all three 4CR elective classes are taken).

## Degree Map

Degree maps pertain to undergraduate programs ONLY. Provide a degree map for proposed program. Degree Maps were approved by the State Board of Regents on July 17, 2014 as a degree completion measure. Degree maps or graduation plans are a suggested semester-by-semester class schedule that includes prefix, number, title, and semester hours. For more details see <http://higheredutah.org/pdf/agendas/201407/TAB%20A%202014-7-18.pdf> (Item #3).

Please cut-and-paste the degree map or manually enter the degree map in the table below

### Anatomy & Physiology Biology Emphasis

#### Year 1, Fall Semester

MATH 1210, Calculus I	(4)
CHEM 1210, Gen Chemistry I	(4)
CHEM 1215, Gen Chemistry I lab	(1)
AI (ECON 1740, HIST 1700, or POLS1100)	(3)
Total credits	(12)

#### Year 1, Spring Semester

MATH 1220, Calculus II	(4)
CHEM 1220, Gen Chemistry II	(4)
CHEM 1225, Gen Chemistry II lab	(1)
BIOL 1210, Principles of Biol	(4)
WTG 2010, Writing	(3)
Total credits	(16)

#### Year 2, Fall Semester

CHEM 2310, Organic Chem I	(4)
BIOL 2010, Evol & Diversity	(3)
BIOL 2420, Human Physiol	(4)
BIOL 2425, Human Physiol Lab	(1) [L1]
IE (BF, FF, or HF)	(3)
Total credits	(15)

#### Year 2, Spring Semester

BIOL 2020, Cell Biology	(3)
BIOL 2325, Human Anatomy	(4) [L1]
BIOL 3410, Ecology & Evolution	(3)
IE (BF, FF, or HF)	(3)
DV	(3)
Total credits	(16)

#### Year 3, Fall Semester

BIOL 2030, Principles of Genetics	(3)
BIOL 3240 Intro Cell Neuro	(3)
PHYS 2010, Gen Physics I	(4)
IE (BF, FF, or HF)	(3)
IR	(3)
Total credits	(16)



Year 3, Spring Semester

BIOL 3510, Biochemistry I	(3)
BIOL 5315, Adv. Human Anat.	(3) [L1]
PHYS 2020, Gen Physics II	(4)
IE (BF, FF, or HF)	(3)
CW	(3)
Total credits	(16)

Year 4, Fall Semester

BIOL 3310, Comp Vert Morph	(3) [F&F]
BIOL 3320, Comparative Physiol	(3)
BIOL 5275, Microbial Diversity & Evol	(4)[L1]
IE (BF, FF, or HF)	(3)
QI	(3)
Total credits	(16)

Year 4, Spring Semester

BIOL 3230, Developmental Biol	(3)
BIOL 3325, Comp. Physiol lab	(3) [L2]
BIOL 3470, Conservation Biology	(3)
IE (BF, FF, or HF)	(3)
QI	(3)
Total credits	(15)



THE UNIVERSITY OF UTAH

**College of Science**

December 21, 2016

David B. Kieda  
The Graduate School  
University of Utah  
201 Presidents Circle, Room 302  
Salt Lake City, UT 84112-9016

Dear Dean Kieda:

It is my pleasure to join Distinguished Professor and Chair of Biology M. Denise Dearing in my support of the establishment of a new Anatomy & Physiology (A&P) emphasis in the Department of Biology.

This emphasis will provide official support for a popular educational track already being pursued by our students. As Ed Barbanell, Director of the Bachelor of University Studies (B.U.S.) Program, notes in his letter of support, numerous students with an interest in A&P currently pursue this curriculum via a B.U.S. degree. While this solution is certainly workable, it is far from optimal, particularly for those students who would benefit from the institutional resources and broader disciplinary coverage provided by the Department of Biology.

A large percentage of biology majors intend to pursue professional degrees and careers in medicine, dentistry, or pharmacy. Although these pre-med and pre-professional undergraduates have many of the same requirements as "traditional" biology majors, they also have specific needs that would be well-served by a formal A&P emphasis in the Department.

The A&P emphasis will, at no additional cost to the University, College, or Department, meet a need expressed by our students while improving the quality of education for health science students. Thus, I enthusiastically support this proposal.

Sincerely,

Henry S. White  
Dean, College of Science, and  
Distinguished Professor of Chemistry



December 12, 2016

To Whom It May Concern;

I am writing in support of the new emphasis in Anatomy & Physiology (A&P) being proposed for the Biology B.A and B.S. Degrees. Dozens of students have utilized the Bachelor of University Studies Program (B.U.S.) over the last six years to complete an undergraduate degree in A&P; the vast majority of those students have gone on to graduate school. There are presently thirteen declared B.U.S. - A&P majors. Invariably, these students are interested in pursuing graduate degrees and careers in the health services: Medicine, Pharmacy, Dentistry, Physical Therapy and the like, and they are not necessarily interested in a Biology degree per se. So, the proposed emphasis will certainly not satisfy every student interested in A&P. However, for those Biology majors who also do have interests in A&P, being able to have this emphasis area listed on their transcripts should be an attractive and popular option. And all things considered, students are better served by the mechanisms and resources of an academic department – in particular, a knowledgeable and dedicated advising staff – than they are by the B.U.S. program, which is neither intended nor designed to have lots of students doing quite similar degree programs.

The programs of study for the typical B.U.S. - A&P major include a lot of Biology courses, but they leave out a handful of the core Biology major requirements. Instead, they include several upper-division Biology electives, as well as an Organic Chemistry sequence and some upper-division Physics and Anthropology classes. Because it would be quite difficult for a student to complete in four years such a full-blown A&P curriculum in conjunction with the requirements of a Biology major, those students desiring the proposed A&P emphasis in Biology will need to carefully consider and balance curricular breadth with time to graduation, and so will need to work closely with the undergraduate advisor in Biology.

In any case, having A&P emphasis as an option for Biology students should satisfy the needs of some students whose only other route to date has been via the B.U.S. program.

Sincerely,

Ed Barbanell, Ph.D.

Director, Bachelor of University Studies Program

**Office of Undergraduate Studies**  
University of Utah  
195 S Central Campus Dr  
Salt Lake City, UT 84112-0511  
(801) 581-3811  
FAX (801) 585-3581



December 12, 2016

To Whom It May Concern,

I am writing in strong support of the proposed Anatomy & Physiology emphasis in Biology. This emphasis is designed to assist students with career interests in health-related fields, and especially interest in medical or dental school. These students find it challenging to navigate the requirement for a Biology degree while also emphasizing coursework that specifically prepares them for a future in the health care industry. The emphasis addresses this challenge by assembling lists of the most relevant courses, and a pathway to completion of the degree in four years. The emphasis will also help the students by highlighting their focus in this area.

This proposal has been approved by both the Biology Executive Committee and the Faculty, where it received unanimous support.

The documents that accompany the emphasis request includes the expected learning outcomes for the required courses. Note that all the courses included in the emphasis use courses that are currently taught, and so no new resources, new space, or new courses are required.

Sincerely,

Denise Dearing  
Distinguished Professor and Chair  
Department of Biology  
University of Utah