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**PROGRAM/DEGREE REQUIREMENT CHANGE (MAJOR)**

**SUBMITTED BY:**

Department	Biology and Wildlife	College/School	CNSM
Prepared by	Diane Wagner	Phone	474-5227
Email Contact	<a href="mailto:Diane.wagner@alaska.edu">Diane.wagner@alaska.edu</a>	Faculty Contact	

See <http://www.uaf.edu/uafgov/faculty-senate/curriculum/course-degree-procedures/> for a complete description of the rules governing curriculum & course changes.

**PROGRAM IDENTIFICATION:**

DEGREE PROGRAM	Biological Sciences
Degree Level: (i.e., Certificate, A.A., A.A.S., B.A., B.S., M.A., M.S., Ph.D.)	BA and BS

**A. CHANGE IN DEGREE REQUIREMENTS: (Brief statement of program/degree changes and objectives)**

Two major changes are proposed.

1. A new concentration in Biomedical Science. The objective is to prepare students for employment or advanced study in the fields of human and animal health. The concentration provides prerequisites for medical, veterinary, and other professional degree programs in the health sciences and preparation for the MCAT and GRE exams.
2. An option for students to take computer science instead of physics. Some sub-disciplines of biology rely heavily on computational and computer skills and faculty report that students are generally lacking these skills. Rather than add requirements to the degree programs, we propose to allow BA students to choose either one semester of physics and computer science, and BS students to choose either 2 semesters of physics or 1 semester each of physics and computer science.

Minor changes to the program include deleting redundancies, deleting references to W and O requirements, adjusting disciplinary course lists, and adjusting capstone course lists to reflect new and dropped course offerings. For the BA program, we also propose to change the current requirement that the minor include 3 credits of upper division work to a recommendation. The requirement caused difficulties because some minors do not require upper division courses.

**B. CURRENT REQUIREMENTS AS IT APPEARS IN THE CATALOG:**

Please see the [online catalog](#).

**C. PROPOSED REQUIREMENTS AS IT WILL APPEAR IN THE CATALOG WITH THESE CHANGES:**  
(Underline new wording ~~strike through old wording~~ and use complete catalog format )

**B.A., BIOLOGICAL SCIENCES**

Minimum Requirements for Degree: 120 credits

~~Students must earn a C- grade or better in each course.~~

**General University Requirements**

Complete the general university requirements. (<http://catalog.uaf.edu/bachelors>)

**General Education Requirements**

Complete the general education requirements. (<http://catalog.uaf.edu/bachelors/general-education-requirements>)

As part of the general education requirements, complete:

CHEM F105X and CHEM F106X                      General Chemistry I and General Chemistry II                      8

**B.A. Degree Requirements**

Complete the B.A. Degree Requirements. (<http://catalog.uaf.edu/bachelors/summary-of-bachelors-degree-reqs/#bachelorofartsandbacheloroffineartstext>)

As part of the B.A. degree requirements, complete: <sup>1</sup>

STAT F200X                      Elementary Probability and Statistics                      3

**Program Requirements**

BIOL F115X                      Fundamentals of Biology I                      4

BIOL F116X                      Fundamentals of Biology II                      4

BIOL F260	Principles of Genetics	4
BIOL F481	Principles of Evolution	4
CHEM F321	Organic Chemistry I	4
PHYS F103X	College Physics I	<u>3-4</u>
<u>or CS F103</u>	<u>Introduction to Computer Programming</u>	
<u>or CS F201</u>	<u>Computer Science I</u>	
<b>Biology Breadth Requirements</b>		
Select two from the following: <sup>2</sup>		7-12
BIOL F360	Cell and Molecular Biology	
BIOL F371	Principles of Ecology	
BIOL F310	Animal Physiology	
or BIOL F342	Microbiology	
or BIOL F434	Structure and Function of Vascular Plants	
or BIOL F213X and BIOL F214X	Human Anatomy and Physiology I and Human Anatomy and Physiology II	
<b>Electives</b>		
Select three courses, <u>at least one of which is designated a W course</u> , from the following: <sup>3,4</sup>		9-12
Elective Course Lists A, B, C, <del>or</del> D, or E		
<b>Capstone</b> <sup>5,4</sup>		
BIOL F400	Capstone Project	0
Satisfactory completion of a capstone research project which can be done either working individually with a faculty member or within one of the following courses: <sup>6,5</sup>		0-4
<u>BIOL F403</u>	<u>Metabolism and Biochemistry</u>	
BIOL F434	Structure and Function of Vascular Plants	
BIOL F441	Animal Behavior	
<u>BIOL F459</u>	<u>Wildlife Nutrition</u>	
<u>BIOL F466</u>	<u>Advanced Cell and Molecular Biology Laboratory</u>	
BIOL F472	Community Ecology	
BIOL F473	Limnology	
Total Credits		<u>51-63</u> <u>50-63</u>

<sup>1</sup> As part of the humanities and social science requirement, take at least 9 credits of upper division course work. As part of the minor, take at least 3 credits of upper-division course work are recommended.

<sup>2</sup> Because biology breadth courses for the B.A. degree serve as prerequisites for many upper-division biology electives, course choices should be made with consideration of the elective biology courses the student plans to complete

<sup>3</sup> BIOL 397 or BIOL F497 or BIOL F490, URSA F388 or URSA F488 courses may be substituted by petition for a maximum of two required elective courses in biology (3-4 credits of independent study or research per substituted course). The subject area of the independent study or research will determine which biological subject areas the credits satisfy.

<sup>4</sup> If possible, satisfy all UAF core requirements for W and O courses and the biology capstone requirement with these elective courses.

<sup>5,4</sup> Fulfills the baccalaureate capstone requirement.

<sup>6,5</sup> Students working individually with a faculty member may, for example, take BIOL F490, BIOL F497 or do so without course credits.

## B.S., BIOLOGICAL SCIENCES WITHOUT CONCENTRATION

Minimum Requirements for Degree: 120 credits

Students must earn a C- grade or better in each course.

### General University Requirements

Complete the general university requirements. (<http://catalog.uaf.edu/bachelors>)

### General Education Requirements

Complete the general education requirements. (<http://catalog.uaf.edu/bachelors/general-education-requirements>)

As part of the general education requirements, complete:

MATH F230X	Calculus Essentials with Applications	3
or MATH F251X	Calculus I	
CHEM F105X and CHEM F106X	General Chemistry I and General Chemistry II	8

### B.S. Degree Requirements

Complete the B.S. degree requirements. (<http://catalog.uaf.edu/bachelors/summary-of-bachelors-degree-reqs/#bachelorofsciencetext>)

As part of the B.S. degree requirements, complete:

STAT F200X	Elementary Probability and Statistics	3
or STAT F300	Statistics	

<u>BIOL F115X and F116X</u>	<u>Fundamentals of Biology I and Fundamentals of Biology II</u>	<u>8</u>
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Select one from the following PHYS sequences: 8

PHYS F103X and PHYS F104X College Physics I and College Physics II

PHYS F211X and PHYS F212X General Physics I and General Physics II

### Program Requirements

<u>BIOL F115X</u>	<u>Fundamentals of Biology I</u>	4
<u>BIOL F116X</u>	<u>Fundamentals of Biology II</u>	4
BIOL F260	Principles of Genetics	4
BIOL F360	Cell and Molecular Biology	3
BIOL F371	Principles of Ecology	4
Select one <del>from</del> <u>of</u> the following <u>four</u> options:		4-8
BIOL F310	Animal Physiology	
or BIOL F342	Microbiology	
or BIOL F213X and BIOL F214X	Human Anatomy and Physiology I and Human Anatomy and Physiology II	
or BIOL F434	Structure and Function of Vascular Plants	
BIOL F481	Principles of Evolution	4
CHEM F321	Organic Chemistry I	4
CHEM F325	Organic Chemistry II	3-4
or CHEM F351	General Biochemistry: Metabolism	
<u>PHYS F103</u>	<u>College Physics I</u>	<u>4</u>
<u>or PHYS 211X</u>	<u>General Physics I</u>	
<u>PHYS F104</u>	<u>College Physics II</u>	<u>3-4</u>
<u>or PHYS 212X</u>	<u>General Physics II</u>	
<u>or CS F103</u>	<u>Introduction to Computer Programming</u>	
<u>or CS F201</u>	<u>Computer Science I</u>	
<b>Electives</b> <sup>4,2,1</sup>		
<i>Organismal elective</i>		
Select one additional course from the following:		3-4
List D		
<i>Biology electives</i>		
Select four additional courses at the 200 level or above, at least three of which must be from the following:		16-20
Lists A, B, C, <del>or</del> D, <u>or E</u>		
<b>Capstone</b> <sup>3,2</sup>		
BIOL F400	Capstone Project	0
Satisfactory completion of a capstone research project which can be done either working individually with a faculty member or within one of the following courses: <sup>4,3</sup>		
<del>BIOL F403</del>	<del>Metabolism and Biochemistry</del>	
BIOL F434	Structure and Function of Vascular Plants	
BIOL F441	Animal Behavior	
<u>BIOL F466</u>	<u>Advanced Cell and Molecular Biology Laboratory</u>	
BIOL F472	Community Ecology	
BIOL F473	Limnology	
Total Credits		<u>75-85</u> <u>74-85</u>

<sup>1</sup> ~~At least one must satisfy the W requirement.~~

<sup>2,1</sup> BIOL F397 or BIOL F497 or BIOL F490, URSA F388 or URSA F488 courses may be substituted by petition for a maximum of two required elective courses in biology (3-4 credits of independent study or research per substituted course). The subject area of the independent study or research will determine which biological subject areas the credits satisfy

<sup>3,2</sup> Fulfills the baccalaureate capstone requirement.

<sup>4,3</sup> Students working individually with a faculty member may, for example, take BIOL F490, BIOL F497 or do so without course credits.

## **B.S., BIOLOGICAL SCIENCES WITH CONCENTRATION**

**Concentrations: Cell and Molecular Biology, Physiology, Ecology and Evolutionary Biology, and Biomedical Science**

Minimum Requirements for Degree: 120 credits

~~Students must earn a C- grade or better in each course.~~

### **General University Requirements**

Complete the general university requirements. (<http://catalog.uaf.edu/bachelors>)

### **General Education Requirements**

Complete the general education requirements. (<http://catalog.uaf.edu/bachelors/general-education-requirements>)

As part of the general education requirements, complete:

MATH F230X	Calculus Essentials with Applications	3
or MATH F251X	Calculus I	
CHEM F105X and CHEM F106X	General Chemistry I and General Chemistry II	8

### **B.S. Degree Requirements**

Complete the B.S. degree requirements. (<http://catalog.uaf.edu/bachelors/summary-of-bachelors-degree-reqs/#bachelorofsciencetext>)

As part of the B.S. degree requirements, complete:

STAT F200X	Elementary Probability and Statistics	3
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or STAT F300	Statistics	
<a href="#">BIOL F115X and BIOL F116X</a>	<a href="#">Fundamentals of Biology I and Fundamentals of Biology I</a>	8
Select one <a href="#">PHYS</a> sequence:		8
<a href="#">PHYS F103X</a> and <a href="#">PHYS F104X</a>	<a href="#">College Physics I and College Physics II</a>	
<a href="#">PHYS F211X</a> and <a href="#">PHYS F212X</a>	<a href="#">General Physics I and General Physics II</a>	
<b>Program Requirements</b>		
<a href="#">BIOL F115X</a>	<a href="#">Fundamentals of Biology I</a>	4
<a href="#">BIOL F116X</a>	<a href="#">Fundamentals of Biology II</a>	4
BIOL F260	Principles of Genetics	4
Select one <del>from</del> <a href="#">of</a> the following <a href="#">four</a> options:		4-8
BIOL F310	Animal Physiology	
BIOL F434	Structure and Function of Vascular Plants	
BIOL F342	Microbiology	
BIOL F213X and BIOL F214X	Human Anatomy and Physiology I and Human Anatomy and Physiology II	
BIOL F481	Principles of Evolution	4
CHEM F321	Organic Chemistry I	4
CHEM F325	Organic Chemistry II	3-4
or CHEM F351	General Biochemistry: Metabolism	
<a href="#">PHYS F103X</a>	<a href="#">College Physics I</a>	4
or <a href="#">PHYS 211X</a>	<a href="#">General Physics I</a>	
<a href="#">PHYS F104X</a>	<a href="#">College Physics II</a>	3-4
or <a href="#">PHYS 212X</a>	<a href="#">General Physics II</a>	
or <a href="#">CS F103</a>	<a href="#">Introduction to Computer Programming</a>	
or <a href="#">CS F201</a>	<a href="#">Computer Science I</a>	
<b>Concentration</b>		
Select one from the following concentrations: <a href="#">1,2-1</a>		<del>21-28</del> <a href="#">21-30</a>
Cell and Molecular Biology		
Physiology		
Ecology and Evolutionary Biology		
<a href="#">Biomedical Science</a>		
<b>Capstone <del>3-2</del></b>		
BIOL F400	Capstone Project	0
Satisfactory completion of a capstone research project which can be done either working individually with a faculty member or within one of the following courses: <a href="#">4 3</a>		
<del>—</del> <a href="#">BIOL F403</a>	<a href="#">Metabolism and Biochemistry</a>	
BIOL F434	Structure and Function of Vascular Plants	
BIOL F441	Animal Behavior	
<a href="#">BIOL F466</a>	<a href="#">Advanced Cell and Molecular Biology Laboratory</a>	
BIOL F472	Community Ecology	
BIOL F473	Limnology	
Total Credits		21-27
<b>Concentrations</b>		
<b>Cell and Molecular Biology</b>		
<b><u>As part of the Program Requirements, take:</u></b>		
CHEM F325	Organic Chemistry II	
<b>Complete the following:</b>		
BIOL F360	Cell and Molecular Biology	3
CHEM F450	General Biochemistry: Macromolecules	3
CHEM F351	General Biochemistry: Metabolism	3
<b>Cell and Molecular and Physiology Electives</b>		
Select three additional courses from lists A or B, at least one of which must be from list A		9-12
<b>Biology Breadth Elective</b>		
Select one additional course from lists C or D		3-4
Total Credits		21-25
<a href="#">At least one of the courses above must satisfy the W requirement.</a>		
<b>Physiology</b>		
BIOL F360	Cell and Molecular Biology	3
<b>Physiology or Cell and Molecular Biology Electives</b>		
Select four courses from list A or B, two of which must be from list B		12-16
<b>Biology Breadth Elective</b>		
Select one additional course from lists C or D		3-4
<b>Biology Elective</b>		

Select one additional course from lists A, B, C, <del>or</del> D, <u>or E</u>	3-4
Total Credits	21-27

At least one of the courses above must satisfy the W requirement.

**Ecology or Evolutionary Biology**

BIOL F371	Principles of Ecology	4
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**Ecology and Evolutionary Biology Electives**

Select two additional courses from list C	6-8
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**Organismal Elective**

Select one additional course from list D	3-4
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**Biology Breadth Elective**

Select one additional course from lists A, <del>or</del> B, <u>or E</u>	3-4
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**Biology Elective**

Select one additional course from lists A, B, C, <del>or</del> D, <u>or E</u>	3-4
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STAT F401	Regression and Analysis of Variance	3-4
or STAT F402	Scientific Sampling	3-4

Total Credits	22-28
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At least one of the courses above must satisfy the W requirement.

**Biomedical Science**

As part of the general education requirements, the following courses are recommended:

<u>PSY F101X</u>	<u>Introduction to Psychology</u>
<u>SOC 100X</u>	<u>Individual, Society, and Culture</u>
<u>ECON 100X</u>	<u>Political Economy</u>
or ECON 201X	<u>Principles of Economics I: Microeconomics</u>
or ECON 202X	<u>Principles of Economics II: Macroeconomics</u>

As part of the program requirements, complete:

<u>BIOL F213X and BIOL F214X</u>	<u>Human Anatomy and Physiology I and II</u>
or BIOL F310	<u>Animal Physiology</u>
<u>CHEM F325</u>	<u>Organic Chemistry II</u>
<u>PHYS F104X</u>	<u>College Physics II</u>
or PHYS F212X	<u>General Physics II</u>

Complete the following:

<u>BIOL F342</u>	<u>Microbiology</u>	<u>4</u>
<u>BIOL F360</u>	<u>Cell and Molecular Biology</u>	<u>3</u>
<u>CHEM F351</u>	<u>General Biochemistry: Metabolism</u>	<u>3</u>

**Biomedical Electives**

Select at least three additional courses from list E	12-16
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**Biology Breadth Elective**

Select one additional course from lists C or D	3-4
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<u>Total Credits</u>	<u>25 - 30</u>
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**Biology Elective Course Lists**

Courses that satisfy upper-division elective credit may require prerequisites in addition to the required biology course.

**List A - Cell and Molecular Biology**

BIOL F342	Microbiology	4
BIOL F360	Cell and Molecular Biology	3
BIOL F403	Metabolism and Biochemistry	4
BIOL F417	Neurobiology	3
BIOL F435	Introduction to Biology of Cancer	3
BIOL F460	Principles of Virology	3
BIOL F462	<del>Concepts of</del> Infectious Diseases	3
BIOL F465	Immunology	3
BIOL F466	Advanced Cell and Molecular Laboratory	3
<u>BIOL F494</u>	<u>The Human Microbiome</u>	<u>4</u>
CHEM F325	Organic Chemistry II	4
CHEM F450	General Biochemistry: Macromolecules	3
CHEM F351	General Biochemistry: Metabolism	3
CHEM F470	Cellular and Molecular Neuroscience	3
CHEM F474	Neurochemistry	3

**List B - Physiology**

BIOL F310	Animal Physiology	4
<u>BIOL F312</u>	<u>Medical Physiology</u>	<u>3</u>
BIOL F335	Principles of Epidemiology	3

BIOL F342	Microbiology	4
<a href="#">BIOL F394</a>	<a href="#">Behavioral Neuroscience Research</a>	<a href="#">3</a>
BIOL F412	Exercise Physiology	3
BIOL F417	Neurobiology	3
BIOL F434	Structure and Function of Vascular Plants	4
BIOL F441	Animal Behavior	3
BIOL F455	Environmental Toxicology	3
BIOL F457	Environmental Microbiology	3
BIOL F458	Vertebrate Endocrinology	3
BIOL F459	Wildlife Nutrition	4
BIOL F462	<del>Concepts of</del> Infectious Diseases	3
BIOL F465	Immunology	3

#### List C - Ecology and Evolutionary Biology

BIOL F371	Principles of Ecology	4
BIOL F418	Biogeography	3
BIOL F433	Conservation Genetics	3
BIOL F441	Animal Behavior	3
BIOL F457	Environmental Microbiology	3
BIOL F469	Landscape Ecology and Wildlife Habitat	3
BIOL F471	Population Ecology	3
BIOL F472	Community Ecology	3
BIOL F473	Limnology	3
BIOL F474	Plant Ecology	4
BIOL F476	Ecosystem Ecology	3
BIOL F483	Stream Ecology	3
BIOL F485	Global Change Biology	3
BIOL F486	Vertebrate Paleontology	3
BIOL F487	Conceptual Issues in Evolutionary Biology	3
BIOL F488	Arctic Vegetation Ecology: Geobotany	3
BIOL F489	Vegetation Description and Analysis	3
WLF F301	Design of Wildlife Studies	3
<del>WLF F410</del>	<del>Wildlife Populations and Their Management</del>	<del>3</del>

#### List D - Organismal Biology

<a href="#">BIOL F239</a>	<a href="#">Introduction to Plant Biology</a>	<a href="#">4</a>
BIOL F301	Biology of Fishes	4
BIOL F331	Systematic Botany	4
<a href="#">BIOL F305</a>	<a href="#">Invertebrate Zoology</a>	<a href="#">4</a>
BIOL F406	Entomology	4
BIOL F418	Biogeography	3
BIOL F425	Mammalogy	3
BIOL F426	Ornithology	3
BIOL F427	Ichthyology	4
BIOL F486	Vertebrate Paleontology	3
BIOL F489	Vegetation Description and Analysis	3

#### List E - Biomedical Science\*

<a href="#">BIOL F312</a>	<a href="#">Medical Physiology</a>	
<a href="#">BIOL F335</a>	<a href="#">Principles of Epidemiology</a>	<a href="#">3</a>
<a href="#">BIOL F394</a>	<a href="#">Behavioral Neuroscience Research</a>	<a href="#">3</a>
<a href="#">BIOL F402</a>	<a href="#">Biomedical Research Ethics</a>	<a href="#">3</a>
<a href="#">BIOL F403</a>	<a href="#">Metabolism and Biochemistry</a>	<a href="#">4</a>
<a href="#">BIOL F412</a>	<a href="#">Exercise Physiology</a>	<a href="#">3</a>
<a href="#">BIOL F417</a>	<a href="#">Neurobiology</a>	<a href="#">3</a>
<a href="#">BIOL F435</a>	<a href="#">Introduction to Biology of Cancer</a>	<a href="#">3</a>
<a href="#">BIOL F455</a>	<a href="#">Environmental Toxicology</a>	<a href="#">3</a>
<a href="#">BIOL F460</a>	<a href="#">Principles of Virology</a>	<a href="#">3</a>
<a href="#">BIOL F462</a>	<a href="#">Infectious Diseases</a>	<a href="#">3</a>
<a href="#">BIOL F465</a>	<a href="#">Immunology</a>	<a href="#">3</a>
<a href="#">BIOL F466</a>	<a href="#">Advanced Cell and Molecular Laboratory</a>	<a href="#">3</a>
<a href="#">BIOL F494</a>	<a href="#">The Human Microbiome</a>	<a href="#">4</a>
<a href="#">WLF F305</a>	<a href="#">Wildlife Diseases</a>	<a href="#">3</a>
<a href="#">CHEM F450</a>	<a href="#">General Biochemistry: Macromolecules</a>	<a href="#">3</a>
<a href="#">CHEM F351</a>	<a href="#">General Biochemistry: Metabolism</a>	<a href="#">3</a>
<a href="#">CHEM F470</a>	<a href="#">Cellular and Molecular Neuroscience</a>	<a href="#">3</a>
<a href="#">CHEM F474</a>	<a href="#">Neurochemistry</a>	<a href="#">3</a>

#### D. ESTIMATED IMPACT

*WHAT IMPACT, IF ANY, WILL THIS HAVE ON BUDGET, FACILITIES/SPACE, FACULTY, ETC.*

1. The proposed concentration in Biomedical Science will have no negative impacts on budget, facilities, space, or faculty because it utilizes established courses that are already incorporated in faculty workloads. The number of students enrolled in the Cell and Molecular Biology and Physiology concentrations will likely decrease when Biomedical Science becomes available, but this will cause no administrative impact because those concentrations share "core" biology courses and many elective options. Positive impacts may result from increased student retention and recruitment to UAF. We anticipate the concentration will be popular with students. Approximately half of Biological Sciences majors report that they plan a career in human or animal health, and student polling has indicated that a health-related concentration is in high demand.

2. The option to take computer science rather than physics will have no impact on the Biology and Wildlife budget or administration, but will impact other departments (see below).

#### E. IMPACTS ON PROGRAMS/DEPTS:

*What programs/departments will be affected by this proposed action?*

*Include information on the Programs/Departments contacted (e.g., email, memo)*

1. The concentration in Biomedical Science is unlikely to have a strong impact other departments or programs. We expect the distribution of students enrolled in the Biological Sciences concentration options to shift when Biomedical Sciences becomes available, resulting in fewer students in the Cell and Molecular Biology and Physiology concentrations. The Chemistry department may see a small drop in enrollment in CHEM F450 if enough students shift from Cell and Molecular Biology, which requires CHEM F450, to Biomedical Sciences, which does not require the course but treats it as an disciplinary elective. The Physiology concentration, currently the largest of the concentrations, has the same chemistry requirements as Biomedical Sciences. Tom Green, chair of Chemistry and Biochemistry, was provided with a draft of the Biomedical Sciences curriculum in August 2016 and has not objected to the plan.

2. The proposed computer science option will impact the Physics and Computer Science Departments. Diane Wagner, on behalf of Biology and Wildlife, has communicated with Renate Wackerbauer, chair of Physics, and Jon Genetti, chair of Computer Science, and neither raised objections to the plan. Chairs were provided with rough estimates of the expected impact on their courses, summarized below, but we will conduct polling later this year to generate better estimates of impact.

We expect a minority of our majors to take advantage of the computer science option. About half of Biological Sciences majors in both the BA and BS programs report plans to pursue a career in the health sciences requiring additional education, and many of the programs they target (e.g. medical, veterinary, dentistry, physical therapy programs) require at least one, and usually two, semesters of physics; these students are unlikely to opt for computer science over physics. However, a portion of students headed for other careers in biology will take advantage of the option. Students matriculate into the BA program at a rate of approximately 10-15 per year. BA students currently take PHYS F103, but under the proposed curriculum could opt for CS F103 or CS F201 instead. If 30% of each year's class chooses computer science, that would result in 3-5 fewer students per year in PHYS F103. About 50-60 students per year matriculate into the BS program. BS students currently take a full year of physics (either PHYS F103 & F104 or PHYS F211 & F212; the majority take F103 & F104). Under the proposed curriculum, they would be required to take at least one semester of physics but could replace the second semester with one of the two CS courses named above. If 30% of BS students choose computer science, we expect 15-18 fewer students per year in PHYS F104 and F212 (mostly F104). In total, we expect an increase of roughly 20 students per year in computer science, spread across CS F103 and F201.

Because Biological Sciences majors have a full plate of other courses during freshman and sophomore years, most do not attempt to complete the physics requirement until the junior year. Therefore CS and PHYS courses are unlikely to experience significant changes in enrollment until 2018-19 at the earliest.



**F. IF MAJOR CHANGE - ASSESSMENT OF THE PROGRAM:**

*Description of the student learning outcomes assessment process.)*

**1. Biomedical Science concentration - Our major assessment tool in the biological sciences programs is the ETS Major Field Test in Biology (MFT-B), delivered to all undergraduate majors in the senior year. The test provides an estimate of student performance in the major sub-disciplines of biology (e.g. cell biology, ecology, etc.) as well as an overall performance measure. Once the Biomedical Science concentration has produced sufficient seniors to pursue an analysis, we will compare sub-disciplinary MFT-B scores across concentrations to assess depth and breadth of knowledge.**

**2. Computer science option - The MFT-B provides an assessment of analytical skills, which might provide the means to compare the effects of course choices on quantitative problem-solving.**

**The most meaningful assessment of both of these changes, and of the program as a whole, would be to track our students' subsequent education, employment, and career satisfaction post-graduation, but we lack the administrative resources to do this within the department.**

**JUSTIFICATION FOR ACTION REQUESTED**

The purpose of the department and campus-wide curriculum committees is to scrutinize program/degree change applications to make sure that the quality of UAF education is not lowered as a result of the proposed change. Please address this in your response. This section needs to be self-explanatory. If you drop a course, is it because the material is covered elsewhere? Use as much space as needed to fully justify the proposed change and explain what has been done to ensure that the quality of the program is not compromised as a result.

**1. Biomedical concentration**

Many UAF students plan a career in health science and the opportunity to focus their education on this discipline, with validation on the transcript, is popular among biology majors. When our department first investigated the feasibility of adopting concentrations in 2011-12, polling revealed strong support among students for a health-related concentration (nearly 40% of 92 respondents chose that option). However, at the time the department had few biomedical faculty and few appropriate courses, and faculty voted to forego a health concentration. In 2016 we have 7 biomedical teaching faculty and more who teach courses relevant to the discipline. These faculty have developed a rich set of courses that covers a wide range of topics in biomedicine. The department is now equipped to deliver an excellent biomedical curriculum, and the faculty recently voted to formalize this concentration track. The addition of a concentration will cost nothing, because the courses are already established, and may help to recruit students to UAF.

**2. Computer science option**

Technical advances in genetic sequencing have created a new challenge in biology: making sense of the large, multivariate data sets that we can now produce with speed and efficiency. As a result, there is a growing need for expertise in bioinformatics. To encourage biology majors to develop competency in computation, biology faculty propose that basic computer science be integrated into the baccalaureate curricula. Adding an additional course requirement was not an attractive option, but faculty found the idea of letting students choose between physics and computer sciences to be acceptable. While BA students may graduate without taking physics under this proposal, BS students will still have exposure to basic physics because they will be required to take at least one semester. Students targeting disciplines in which a year of physics is advisable (e.g. Biomedical Science) are instructed to complete a year of physics within the concentration requirements.

**APPROVALS: SIGNATURES MUST BE OBTAINED PRIOR TO SUBMISSION TO THE GOVERNANCE OFFICE** See next page.

	Date	
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Signature, Chair, Program/Department of:

	Date	
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Signature, Chair, College/School Curriculum Council for:

	Date	
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Signature, Dean, College/School of:



**F. IF MAJOR CHANGE - ASSESSMENT OF THE PROGRAM:**

*Description of the student learning outcomes assessment process.)*

**1. Biomedical Science concentration -** Our major assessment tool in the biological sciences programs is the ETS Major Field Test in Biology (MFT-B), delivered to all undergraduate majors in the senior year. The test provides an estimate of student performance in the major sub-disciplines of biology (e.g. cell biology, ecology, etc.) as well as an overall performance measure. Once the Biomedical Science concentration has produced sufficient seniors to pursue an analysis, we will compare sub-disciplinary MFT-B scores across concentrations to assess depth and breadth of knowledge.

**2. Computer science option -** The MFT-B provides an assessment of analytical skills, which might provide the means to compare the effects of course choices on quantitative problem-solving.

The most meaningful assessment of both of these changes, and of the program as a whole, would be to track our students' subsequent education, employment, and career satisfaction post-graduation, but we lack the administrative resources to do this within the department.

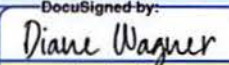
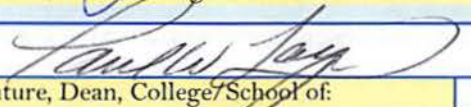
**JUSTIFICATION FOR ACTION REQUESTED**

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**APPROVALS: SIGNATURES MUST BE OBTAINED PRIOR TO SUBMISSION TO THE GOVERNANCE OFFICE**

DocuSigned by:  Signature, Chair, Program/Department of:	Date: September 29, 2016
Signature, Chair, College/School Curriculum Council for:	Date: 9-29-16 CNSM
 Signature, Dean, College/School of:	Date: 8/30/16 CNSM

**CHAIR SIGNATURE OBTAINED FOLLOWING APPROVAL BY FACULTY SENATE COMMITTEE**

Date

Signature, Chair, UAF Faculty Senate  
\_\_\_Curriculum Review Committee

\_\_\_Graduate Academic and Advisory Committee





**COLLEGE OF NATURAL  
SCIENCE & MATHEMATICS**

University of Alaska Fairbanks  
P.O. Box 7555940, Fairbanks, Alaska 99775-5940

**Paul W. Layer, Dean**  
907-474-7608  
907-474-5101 fax  
pwwayer@alaska.edu  
www.uaf.edu

September 30, 2016

To: UAF Curriculum Committee

From: Paul Layer, Dean, CNSM

A handwritten signature in blue ink that reads 'Paul W. Layer'.

Re: Biology BA/BS modifications

This note is intended to supplement the Biological Sciences BA/BS program changes from the Department of Biology and Wildlife. These proposed changes have been approved by a majority vote of the department and by the CNSM curriculum council.

I completely support the modifications to incorporate a Biomedical concentration. This proposal has been discussed by all of our 'biomedical' departments (Chemistry and Biochemistry, Veterinary Medicine and Biology and Wildlife) and has also been presented to the UAA health science programs for their endorsement. This change is an effective way to provide pathways for students interested in biomedicine and will feed into programs such as our DVM program or WWAMI.

I am less supportive of the change to reduce the physics requirement in the BA and BS through substitution with CS courses. The physics requirement was instituted only a few years ago as a way to ensure that our graduates will meet the requirements of professional schools, and also to ensure that students will have a good understanding of areas such as biophysics. This change will have a negative impact on CNSM enrollments, and an increase on CS enrollments as well. This proposal leaves physics as an option, so it is possible that students will continue to enroll in physics courses.

It is important that these changes to the concentrations be implemented for the next catalog. Because of this, and because it was the will of the majority of the faculty, I am willing to go along with the proposed changes to the physics requirement.