Undergraduate Academic Board
Agenda

October 10, 2014
2:00-5:00
ADM 204

I. Roll

( ) Alberta Harder (FS)
( ) Utpal Dutta (FS)
( ) Francisco Miranda (CAS, Chair)
( ) Barbara Harville (CAS)
( ) Vacant (CAS)
( ) Vacant (CAS)
( ) Vacant (CBPP)
( ) Vacant (COH)
( ) Vacant (COH)
( ) Irasema Ortega (COE)
( ) Carrie King (CTC)
( ) Jeff Hoffman (SOE)
( ) Kevin Keating (LIB)
( ) Rick Adams (KPC)
( ) Sheri Denison (Mat-su)
( ) Jared Griffin (Kod)
( ) Christina Stuive (ADV)

Ex-Officio Members
( ) Susan Kalina
( ) Lora Volden
( ) Scheduling and Publications

II. Approval of the Agenda (pg. 1-2)

III. Approval of Meeting Summary (pg. 3-4)

IV. Administrative Report

A. Vice Provost for Undergraduate Academic Affairs Susan Kalina

B. University Registrar Lora Volden

V. Chair's Report

A. UAB Chair- Francisco Miranda

B. GERC

VI. Program/Course Action Request- Second Readings

Chg	ENGL A109	Introduction to Writing in Academic Contexts (3 cr)(3+0)(pg. 5-10)
Chg	BIOL A473	Conservation Biology (GER)(3 cr)(3+0)(pg. 11-15)
Chg	BIOL A481	Marine Biology (GER)(3 cr)(3+0)(pg. 16-20)

VII. Program/Course Action Request- First Readings

Add	BIOL A482	Spatial Ecology (3 cr)(3+0)(pg. 21-25)
Add	BIOL A483	Exploration Ecology (2 cr)(2+0)(pg. 26-30)
Add	BIOL A484	Experiential Learning: Exploration Ecology Field Study (4 cr)(0+8)(pg. 31-35)
Add	BIOL A486	Evolutionary Ecology (3 cr)(3+0)(pg. 36-40)
Chg	BIOL A487	Comparative Anatomy of Vetebrates (3 cr)(3+0)(pg. 41-43)
Chg	BIOL A488	Experiential Learning: Development Biology (4 cr)(2+4)(pg. 44-47)
Chg	BIOL A489	Population Genetics and Evolutionary Processes (GER)(3 cr)(3+0)(pg. 48-52)
Chg	BIOL A495	Instructional Practicum: Laboratory (1 cr)(0+3)(pg. 53-55)

Chg	Bachelor of Arts, Biological Sciences (pg. 56-57)
Chg	Bachelor of Science, Biological Sciences (pg. 58-80)
Chg	Bachelor of Science, Natural Sciences (pg. 81-107)

VIII. Old Business

IX. New Business

X. Informational Items and Adjournment

A. **Credit Hour Review Process**: In response to a new NWCCU policy on credit hours, an AY14 subcommittee of the UAB and GAB recommended a process to review class scheduling practices relative to approved CAR/CCG credit hours. In Fall 2014 UAA ran a pilot, which focused on traditional face-to-face offerings. After filtering for apparent face-to-face delivery, a total of 143 course sections were sent to the colleges for review. Findings and Actions: Most of the courses integrated nontraditional components, such as a practicum or 0-credit lab, and were found to be in compliance. Sixteen sections were rescheduled to meet the required contact hours. Departments will revise the curriculum documents for nine courses in order to reflect current practice.

Undergraduate Academic Board
Summary

September 26, 2014
2:00-5:00
ADM 204

I. Roll

(x) Alberta Harder (FS)
(x) Utpal Dutta (FS)
(x) Francisco Miranda (CAS, Chair)
(x) Barbara Harville (CAS)
( ) Vacant (CAS)
( ) Vacant (CAS)
( ) Vacant (CBPP)
( ) Vacant (COH)
( ) Vacant (COH)
(x) Irasema Ortega (COE)
(x) Carrie King (CTC)
(x) Jeff Hoffman (SOE)
(x) Kevin Keating (LIB)
(x) Rick Adams (KPC)
(x) Sheri Denison (Mat-su)
(x) Jared Griffin (Kod)
(e) Christina Stuive (ADV)

Ex-Officio Members
(x) Susan Kalina
( ) Lora Volden
(x) Scheduling and Publications

II. Approval of the Agenda (pg. 1)
Remove item C (GELO Motion) under new business as it is still under review by the GERC
Approved as amended

III. Approval of Meeting Summary (pg. 2-4)
Approved

IV. Administrative Report

A. Vice Provost for Undergraduate Academic Affairs Susan Kalina
Written report is posted on the agenda website
Post-Bac certificate in Speech Pathology was approved by BOR

B. University Registrar Lora Volden
Continuing to work on the workflow process for CIM

V. Chair's Report

A. UAB Chair- Francisco Miranda

B. GERC
Approved ANTH A464 and STAT A253
Approved the GERC 14-15 goals
Approved the workflow motion whereas all GER courses will be reviewed by the GERC first before being reviewed by the UAB
Approved the General Course Requirements for AA and AAS written communication Skills English A111

VI. Program/Course Action Request- Second Readings

Add ANTH A464 Culture and Globalization (GER)(stacked with ANTH A664) (3 cr)(3+0)(pg. 5-13)
Unanimously Approved

Chg STAT A253 Applied Statistics for the Sciences (GER)(4 cr)(4+0)(pg. 14-19)
Unanimously Approved

VII. Program/Course Action Request- First Readings

VIII. Old Business

IX. New Business

A. UAB Goals for 2014-2015 Academic Year (pg. 20)
Approved the goals with minor edits

B. **Motion:** After reviewing the workflow for GER courses, the eCurriculum Workflow subcommittee proposes that all GER courses be reviewed by the General Education Committee (GERC) first, before being reviewed by the Undergraduate Academic Board (UAB). This changes the current process of having the courses be reviewed by UAB before and after going to the GERC.
Justification: This shift will allow for a more efficient workflow process in the eCurriculum software (CIM) and avoid unnecessary delays in approval.
Unanimously Approved

~~**C.** GELO Outcomes motion reconsidered as catalog copy change (pg. 21)~~

D. General Course Requirements for AA and AAS written communication Skills English A111 (pg. 22)
Unanimously Approved

X. Informational Items and Adjournment

Adjourned 2:37

Course Action Request
University of Alaska Anchorage
Proposal to Initiate, Add, Change, or Delete a Course

1a. School or College	1b. Division	1c. Department
AS CAS	AHUM Division of Humanities	ENGL

2. Course Prefix	3. Course Number	4. Previous Course Prefix & Number	5a. Credits/CEUs	5b. Contact Hours (Lecture + Lab)
ENGL	A109	N/A	3	(3+0)

6. Complete Course Title
Introduction to Writing in Academic Contexts
Intro Writing Acad Contexts
Abbreviated Title for Transcript (30 character)

7. Type of Course ☒ Academic ☐ Preparatory/Development ☐ Non-credit ☐ CEU ☐ Professional Development

8. Type of Action: ☐ Add *or* ☒ Change *or* ☐ Delete

If a change, mark appropriate boxes:

- ☐ Prefix
- ☐ Credits
- ☐ Title
- ☐ Grading Basis
- ☒ Course Description
- ☒ Test Score Prerequisites
- ☐ Automatic Restrictions
  - ☐ Class ☐ Level
  - ☐ College ☐ Major
- ☐ Other (please specify)
- ☐ Course Number
- ☐ Contact Hours
- ☐ Repeat Status
- ☐ Cross-Listed/Stacked
- ☒ Course Prerequisites
- ☐ Co-requisites
- ☒ Registration Restrictions
- ☐ General Education Requirement

9. Repeat Status No # of Repeats Max Credits

10. Grading Basis ☒ A-F ☐ P/NP ☐ NG

11. Implementation Date semester/year
From: Spring/2015 To: 9999/

12. ☐ Cross Listed with N/A
☐ Stacked with N/A
Cross-Listed Coordination Signature

13a. Impacted Courses or Programs: List any programs or college requirements that require this course.
Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at www.uaa.alaska.edu/governance.

Impacted Program/Course	*Date of Coordination*	*Chair/Coordinator Contacted*
1. See attached coordination table		
2.		
3.		

Initiator Name (typed): SAD Initiator Signed Initials: _____ Date:_____

13b. Coordination Email Date: 4/24/12
submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)

13c. Coordination with Library Liaison Date: 4/24/12

14. General Education Requirement *Mark appropriate box:*
☐ Oral Communication ☐ Written Communication ☐ Quantitative Skills ☐ Humanities
☐ Fine Arts ☐ Social Sciences ☐ Natural Sciences ☐ Integrative Capstone

15. Course Description *(suggested length 20 to 50 words)*
Emphasizes longer essays, annotated bibliography, and digital literacy skills in a computerized environment. Teaches students to analyze audience, purpose, and context; to apply conventions of academic writing and basic research; and to use sound revision strategies (including editing for grammar and punctuation). Special Note: Serves as an alternative to PRPE A108 and prepares students for ENGL A111.

16a. Course Prerequisite(s) *(list prefix and number or test code and score)*
[PRPE A086 with a minimum grade of C] OR [Accuplacer-Reading Comprehension with a score of 065 and Accuplacer-Sentence Skills with a score of 075]

16b. Co-requisite(s) *(concurrent enrollment required)*
N/A

16c. Automatic Restriction(s)
☐ College ☐ Major ☐ Class ☐ Level

16d. Registration Restriction(s) *(non-codable)*
N/A

17. ☒ Mark if course has fees standard ENGL fees

18. ☐ Mark if course is a selected topic course

19. Justification for Action
To update course CCG and pedagogy.

Initiator (faculty only) Date

Sheri Denison

Initiator (TYPE NAME)

☐ Approved

☐ Disapproved Department Chair Date

☐ Approved

☐ Disapproved College/School Curriculum Committee Chair Date

☐ Approved

☐ Disapproved Dean/Director of School/College Date

☐ Approved

☐ Disapproved Undergraduate/Graduate Academic Board Chair Date

☐ Approved

☐ Disapproved Provost or Designee Date

UNIVERSITY OF ALASKA ANCHORAGE
COURSE CONTENT GUIDE

I. Revision Date: **February 25, 2014**

II. Course Information

A. College:	College of Arts and Sciences
B. Course Prefix:	ENGL—English
C. Course Number:	ENGL A109
D. Credits:	3.0
E. Contact Hours:	(3 + 0)
F. Course Title:	Introduction to Writing in Academic Contexts
G. Grading Basis:	A-F
H. Implementation Date:	Spring 2015
I. Cross Listing/Stacking:	N/A
J. Course Description:	Emphasizes longer essays, annotated bibliography, and digital literacy skills in a computerized environment. Teaches students to analyze audience, purpose, and context; to apply conventions of academic writing and basic research; and to use sound revision strategies (including editing for grammar and punctuation). Special Note: Serves as an alternative to PRPE A108 and prepares students for ENGL A111.
K. Special Attributes:	N/A
L. Course Prerequisites:	[PRPE A086 with a minimum grade of C] OR [Accuplacer-Reading Comprehension with a score of 065 and Accuplacer-Sentence Skills with a score of 075]
M. Course Fees:	Yes

III. Course Level Justification

ENGL A109 prepares students for successful completion of ENGL A111 and serves as an introductory course to college composition.

IV. Instructional Goals and Student Learning Outcomes

A. Instructional Goals:

The instructor will:

- Familiarize students with digital environments, including basic word processing tools and Blackboard.
- Demonstrate basic research strategies, including information literacy practices, source handling, and APA documentation.
- Introduce principles of academic writing generated for specific purposes, including summary and response, explanatory, analytical, and persuasive writing.

- Demonstrate effective revision strategies.

B. Student Learning Outcomes and Assessment Methods. The student will:

Student Learning Outcomes	Assessment Methods
Construct papers using word processing tools and submit assignments on Blackboard	Word-processed essays, group work, electronic discussion boards, quizzes, and/or class exercises
Analyze, synthesize, summarize, and use sources responsibly	Word-processed essays, annotated bibliographies, group work, quizzes, reading journals, and/or class exercises
Prepare papers in a variety of academic genres, each focused on fulfilling a specific purpose	Word-processed essays, short writing assignments, and exams
Analyze written texts prior to revision, revise papers, and proofread for appropriate use of Standard American English	Peer reviews, drafts, exams, quizzes, and/or class exercises

V. Course Outline

A. Digital Environment
1. Electronic techniques for writing papers
2. Electronic techniques for in-class writing
3. Electronic techniques for revising writing
4. Electronic course platforms such as Blackboard

B. Academic Writing
1. Rhetorical situation
2. Summaries
3. Reading responses
4. Annotated bibliographies
5. Writing generated by specific purposes as selected from the following choices (generally, 3-4 per semester):
    a. Explanatory essays
    b. Analytical essays
    c. Persuasive essays
    d. Investigative essays
    e. Evaluative essays

f. Observational essays
g. Research-supported essays (400-800 words)

C. Basic Research Strategies
1. Libraries and databases
2. Internet sources
3. Source evaluation and information literacy
4. APA documentation

D. Conventions and Style of Standard American English
1. Structure
2. Correctness
3. Error patterns
4. Academic style

E. Revision
1. Drafting
a. Technology aids
b. Drafting and revising
2. Coherence and focus
3. Purpose
4. Editing and proofreading

VI. Suggested Texts

Hacker, D., & Sommers, N. (2012). *Rules for writers* (7th ed.). Boston, MA: Bedford.

Muller, G. H. (2013). *The McGraw-Hill reader: Issues across the disciplines* (12th ed.). Boston, MA: McGraw-Hill.

Reid, S. (2011). *The Prentice Hall guide for college writers* (9th ed.). Upper Saddle River, NJ: Prentice Hall.

VII. Bibliography

Addison, J., & McGee, S. J. (2010). Writing in high school /Writing in college: Research trends and future directions. *College Composition and Communication, 62*(1), 147-180.

Bateman, E. (2011). Teaching writing style and revision. *Teaching English in the Two Year College, 39*(1), 80-82.

Hjortshoi, K. (2009). *The transition to college writing* (2nd ed.). Boston, MA: Bedford.

Kellogg, R. T., & Raulerson, B. A., III. (2007). Improving the writing skills of college students. *Psychonomic Bulletin & Review, 14*(2), 237-245.

Menary, R. (2007). *Writing as thinking*. New South Wales, Australia: Department of Philosophy, The University of Wollongong.

Nussbaum, E. M., & Schraw, G. (2007). Promoting argument-counterargument integration in students' writing. *The Journal of Experimental Education, 76*(1), 59-123.

Patterson, J. J., & Duer, D. (2006). High school teaching and college expectations in writing and reading. *English Journal, 95*(3), 81-91.

Soles, D. (2005). An analysis of the style of exemplary first-year writing. *Teaching English in the Two Year College, 33*(1), 38-48.

Sommers, N., & Saltz, L. (2004). The novice as expert: Writing the freshman year. *College Composition and Communication, 56*(1), 124-150.

Stout, R. P. (2011). Teaching good writing, why bother? *Journal of College Science Teaching, 40*(6), 10-12.

Sullivan, P. (2003). What is "college-level" writing? *Teaching English in the Two Year College, 30*(4), 374-384.

Thomas, K. M., & Austin, M. (2005). Fun with fundamentals: Games and electronic activities to reinforce grammar in the college writing classroom. *Teaching English in the Two Year College, 33*(1), 62-70.

Course Action Request
University of Alaska Anchorage
Proposal to Initiate, Add, Change, or Delete a Course

1a. School or College	1b. Division	1c. Department
AS CAS	AMSC Division of Math Science	Biological Sciences

2. Course Prefix	3. Course Number	4. Previous Course Prefix & Number	5a. Credits/CEUs	5b. Contact Hours (Lecture + Lab)
BIOL	A473	A373	3	(3+0)

6. Complete Course Title
Conservation Biology
Conservation Biology
Abbreviated Title for Transcript (30 character)

7. Type of Course ☒ Academic ☐ Preparatory/Development ☐ Non-credit ☐ CEU ☐ Professional Development

8. Type of Action: ☐ Add *or* ☒ Change *or* ☐ Delete

If a change, mark appropriate boxes:

- ☐ Prefix
- ☐ Credits
- ☐ Title
- ☐ Grading Basis
- ☐ Course Description
- ☐ Test Score Prerequisites
- ☐ Other Restrictions
  - ☐ Class ☐ Level
  - ☐ College ☐ Major
- ☒ Other CCG (please specify)
- ☒ Course Number
- ☐ Contact Hours
- ☐ Repeat Status
- ☐ Cross-Listed/Stacked
- ☐ Course Prerequisites
- ☐ Co-requisites
- ☐ Registration Restrictions

9. Repeat Status No # of Repeats Max Credits

10. Grading Basis ☒ A-F ☐ P/NP ☐ NG

11. Implementation Date semester/year
From: Fall/2015 To: Fall/9999

12. ☐ Cross Listed with

☐ Stacked with _____
Cross-Listed Coordination Signature

13a. Impacted Courses or Programs: List any programs or college requirements that require this course.

Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at www.uaa.alaska.edu/governance.

Impacted Program/Course	*Date of Coordination*	*Chair/Coordinator Contacted*
1. Environment and Society, BA	6Jan14	Dorn VanDommelen, dvandommelen@uaa.alaska.edu
2. Environment and Society, BS	6Jan14	Dorn VanDommelen, dvandommelen@uaa.alaska.edu
3. Environment and Society, Minor, Environmental Science	6Jan14	Dorn VanDommelen, dvandommelen@uaa.alaska.edu

Initiator Name (typed): Khrys Duddleston Initiator Signed Initials: _____ Date:_____

13b. Coordination Email Date: 6Jan14
submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)

13c. Coordination with Library Liaison Date: 6Jan14

14. General Education Requirement
Mark appropriate box:
☐ Oral Communication ☐ Written Communication ☐ Quantitative Skills ☐ Humanities
☐ Fine Arts ☐ Social Sciences ☐ Natural Sciences ☒ Integrative Capstone

15. Course Description *(suggested length 20 to 50 words)*
Reviews the human drivers of global environmental change (human population growth and consumption of resources) and the consequences of environmental degradation. Discusses the use of standard protocols and modern instruments to assess environmental change. Special Note: This is a service-learning course and includes fieldwork outside of class time.

16a. Course Prerequisite(s) *(list prefix and number or test code and score)*
[BIOL A271 or ENVI A211] with minimum grade of C

16b. Co-requisite(s) *(concurrent enrollment required)*

16c. Other Restriction(s)
☐ College ☐ Major ☐ Class ☐ Level

16d. Registration Restriction(s) *(non-codable)*
Completion of all GER Tier 1 courses is required

17. ☐ Mark if course has fees

18. ☐ Mark if course is a selected topic course

19. Justification for Action
The course number is being changed to be consistent with the level at which the course has been taught, and so that graduate students can take the course for credit. Also, this is part of our overall curriculum revision, which seeks to streamline completion of the B.S. in Biological Sciences degree and align our degree with the core concepts and competencies outlined in Vision and Change in Undergraduate Biology Education (National Science Foundation and American Association for the Advancement of Science).

Initiator (faculty only) Khrys Duddleston Initiator (TYPE NAME)	Date	☐ Approved ☐ Disapproved	Dean/Director of School/College — Date
☐ Approved ☐ Disapproved	Department Chair — Date	☐ Approved ☐ Disapproved	Undergraduate/Graduate Academic Board Chair — Date
☐ Approved ☐ Disapproved	College/School Curriculum Committee Chair — Date	☐ Approved ☐ Disapproved	Provost or Designee — Date

University of Alaska Anchorage
College of Arts and Sciences
Course Content Guide

I. Date of Initiation: Spring 2014

II. Curriculum Action Request

A. College:	College of Arts and Sciences
B. Course Prefix:	BIOL
C. Course Number:	A473
D. Number of Credits:	3.0
E. Contact Hours:	3+0
F. Course Title:	Conservation Biology
G. Grading Basis:	A-F
H. Implementation Date:	Spring 2014
I. Cross-listed/Stacked:	N/A
J. Course Description:	Reviews the human drivers of global environmental change (human population growth and consumption of resources) and the consequences of environmental degradation. Discusses the use of standard protocols and modern instruments to assess environmental change. Special Note: This is a service-learning course and includes fieldwork outside of class time.
K. Course Prerequisites:	[BIOL A271 or ENVI A211] with minimum grade of C.
L. Course Co-requisites:	N/A
M. Other Restrictions:	N/A
N. Registration Restrictions:	Completion of all GER Tier 1 courses is required
O. Course Fees:	No

III. Instructional Goals and Student Learning Outcomes

A. Instructional Goals. The instructor will:

1. Guide students in understanding the roles of habitat preservation, population integrity, and application of conservation policy to maintain natural ecosystems and biota.
2. Teach students to analyze conservation problems in a multidisciplinary manner with considerations of economics, law, policy and biological principles.
3. Teach students to assess environmental degradation using standardized protocols and modern instruments, and analyze resulting data.

B. Student Learning Outcomes and Assessment Measures

Student Learning Outcomes	Assessment Procedures	Integrative Capstone Goals
1. Explain the drivers and consequences of environmental problems	Case studies, analysis of hypotheticals, examinations	Knowledge integration, critical thinking, information literacy,

		evolving realities of the 21st Century
2. Report and interpret major environmental problems	Examinations	Knowledge integration, effective communications, critical thinking
3. Explain how problems interact in synergism	Examinations	Knowledge integration, critical thinking, evolving realities of the 21st Century
4. Explain the use and application of standardized protocols and modern instruments for solving environmental problems	Project Report	Effective communication, information literacy, quantitative perspectives

IV. Course Level Justification

Students are required to learn and integrate information from a variety of scientific disciplines; to read, to understand, and to apply ideas conveyed by primary scientific literature; to synthesize chemical, geological, ecological and biological knowledge and social considerations; and to apply course materials to this topic.

V. Topical Course Outline

A. Impacts and Drivers
   1. What is Conservation Biology?
   2. Status of Biodiversity
   3. Predicting Biodiversity
   4. Conservation Hotspots
   5. Extinctions and Its Consequences
   6. Rarity and Small Populations
   7. Habitat Change
   8. Environmental Change
   9. Climate Change
   10. Invasive Species

B. Problems and Approaches
   1. Metapopulations and Populations
   2. Conserving Metapopulations
   3. Habitat Fragmentation
   4. Landscape Analysis and Corridors
   5. Edges, Areas, and Reserves
   6. Habitat Mitigation and Environmental Reconstruction
   7. Conservation Management
   8. Risk Analysis and Decisions
   9. Complex Decision Making

C. Issues and Controversies
    1. Biodiversity and Human Health
    2. Sustainable Development
    3. Endangered Species Act
    4. Ecological Services and Ecosystem Functions
    5. Reserves and Ecological Justice
    6. Environmental Security

VI. Suggested Texts

Groom M, M Meffe, L Carroll. Principles of Conservation Biology. Sinauer Publ. 2009.

Primack RB. Essentials of Conservation Biology. Sinauer Publ. 2010.

VII. Bibliography

Causey D and 6 coauthors. 2005. The paleoenvironment of humans and marine birds of the Aleutian Islands. Fisheries Oceanogr 14: 259-276.

Clavero M and E Garcia-Berthon. 2005. Invasive species are a leading cause of animal extinctions. Trends in Ecology and Evolution 20: 110.

Hebert PDV, EH Penton, JM Burns, DH Janzen, W Hallwachs. 2004. Ten species in one: DNA barcoding reveals cryptic species in Neotropic Skipper butterfly Astraptes fulginator. Proc Natl Acad Sciences 101: 14812-14817.

Klubnikin K and D Causey. 2002. Environmental Security and Conflict: Paradigm for the 21st Century. Journal of Diplomacy and International Relations 3: 104-133.

Klubnikin K and D Causey. 2005. Beyond Trees: Forests, War, and Uneasy Peace. European Tropical Forest Research 43: 27-28.

Lennon JJ, P Koleff, JJD Greenwood, KJ Gaston. 2004. Contribution of rarity and comWedness to patterns of species richness. Ecology Letters 7: 81-87.

Myers N, RA Mittermeier, CG Mittermeier, GAB da Fonseca, J Katt. 2000. Biodiversity Hotspots for conservation priorities. Nature 403: 853-858.

Course Action Request
University of Alaska Anchorage
Proposal to Initiate, Add, Change, or Delete a Course

1a. School or College	1b. Division	1c. Department
AS CAS	AMSC Division of Math Science	Biological Sciences

2. Course Prefix	3. Course Number	4. Previous Course Prefix & Number	5a. Credits/CEUs	5b. Contact Hours (Lecture + Lab)
BIOL	A481	BIOL A378	3	(3+0)

6. Complete Course Title
Marine Biology
Marine Biology
Abbreviated Title for Transcript (30 character)

7. Type of Course ☒ Academic ☐ Preparatory/Development ☐ Non-credit ☐ CEU ☐ Professional Development

8. Type of Action: ☐ Add *or* ☒ Change *or* ☐ Delete

If a change, mark appropriate boxes:

- ☐ Prefix
- ☐ Credits
- ☐ Title
- ☐ Grading Basis
- ☒ Course Description
- ☐ Test Score Prerequisites
- ☒ Automatic Restrictions
  - ☐ Class ☒ Level
  - ☐ College ☐ Major
- ☒ Other CCG (please specify)
- ☒ Course Number
- ☐ Contact Hours
- ☐ Repeat Status
- ☐ Cross-Listed/Stacked
- ☒ Course Prerequisites
- ☐ Co-requisites
- ☒ Registration Restrictions
- ☐ General Education Requirement

9. Repeat Status No # of Repeats Max Credits

10. Grading Basis ☒ A-F ☐ P/NP ☐ NG

11. Implementation Date semester/year
From: Fall/2015 To: Fall/9999

12. ☐ Cross Listed with
☐ Stacked with
Cross-Listed Coordination Signature

13a. Impacted Courses or Programs: List any programs or college requirements that require this course.

Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at www.uaa.alaska.edu/governance.

Impacted Program/Course	*Date of Coordination*	*Chair/Coordinator Contacted*
1. Environment and Society, BA	6Jan14	Dorn VanDommelen, dvandommelen@uaa.alaska.edu
2. Environment and Society, BS	6Jan14	Dorn VanDommelen, dvandommelen@uaa.alaska.edu
3.		

Initiator Name (typed): Khrys Duddleston Initiator Signed Initials: _____ Date:_____

13b. Coordination Email Date: 6Jan14
submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)

13c. Coordination with Library Liaison Date: 6Jan14

14. General Education Requirement
Mark appropriate box:
☐ Oral Communication ☐ Written Communication ☐ Quantitative Skills ☐ Humanities
☐ Fine Arts ☐ Social Sciences ☐ Natural Sciences ☒ Integrative Capstone

15. Course Description *(suggested length 20 to 50 words)*
Examines marine biology with a focus on understanding the pathways and transformation of energy and matter in coastal, pelagic, and benthic, waters, particularly those in Alaska. Studies the influence of the physical environment, climate change, and human activities on marine species diversity, food webs, and tropho-dynamics.

16a. Course Prerequisite(s) *(list prefix and number or test code and score)*
[BIOL A271 or ENVI A211] with minimum grade of C

16b. Co-requisite(s) *(concurrent enrollment required)*

16c. Automatic Restriction(s)
☐ College ☐ Major ☐ Class ☒ Level

16d. Registration Restriction(s) *(non-codable)*
Completion of all GER Tier 1 courses is required

17. ☐ Mark if course has fees

18. ☐ Mark if course is a selected topic course

19. Justification for Action
Renumbering course to comply with revision to BIOL undergraduate curricula; prerequisites revised to reflect changes to ENVI curricula (ENVI 202 no longer exists)

Initiator (faculty only) Date
Khrys Duddleston
Initiator (TYPE NAME)

☐ Approved
☐ Disapproved
Department Chair Date

☐ Approved
☐ Disapproved
College/School Curriculum Committee Chair Date

☐ Approved
☐ Disapproved
Dean/Director of School/College Date

☐ Approved
☐ Disapproved
Undergraduate/Graduate Academic Board Chair Date

☐ Approved
☐ Disapproved
Provost or Designee Date

University of Alaska Anchorage
College of Arts and Sciences
Course Content Guide

I. Date of Initiation: Spring 2014

II. Curriculum Action Request

A. College:	College of Arts and Sciences
B. Course Prefix:	BIOL
C. Course Number:	A481
D. Number of Credits:	3
E. Contact Hours:	3+0
F. Course Title:	Marine Biology
G. Grading Basis:	A-F
H. Implementation Date:	Fall 2015
I. Cross-listed/Stacked:	N/A
J. Course Description:	Examines marine biology with a focus on understanding the pathways and transformation of energy and matter in coastal, pelagic, and benthic, waters, particularly those in Alaska. Studies the influence of the physical environment, climate change, and human activities on marine species diversity, food webs, and tropho-dynamics.
K. Course Prerequisites:	[BIOL A271 or ENVI A211] with minimum grade of C.
L. Course Co-requisites:	N/A
M. Other Restrictions:	N/A
N. Registration Restrictions:	Completion of all GER Tier 1 courses is required.
O. Course Fees:	No

III. Instructional Goals and Student Learning Outcomes

A. Instructional Goals. The instructor will:

1. Provide a basic description of the physical, chemical, and geological properties of the ocean, and the different ocean habitats
2. Build on this conceptual framework to describe how physical and biological ocean systems are impacted by changing climate and human activities
3. Link physical features of the ocean habitat (pre- and post- human impact) to ocean trophic dynamics and food webs.
4. Emphasize the extent and historical/geographic patterns of human impacts on the marine environment, and describe how these impacts are mediated by and through biological and physical processes.
5. Provide detailed examples of how the physiological traits of organisms are uniquely linked to their habitat, and how changes in that habitat may influence species diversity and abundance through impacts on physiological properties
6. Relate current issues in Alaskan marine ecosystems and resources with a focus on balancing the many values represented in our environment.
7. Teach students how to evaluate and integrate information from a variety of different sources and perspectives.

B. Student Learning Outcomes and Assessment Measures

Student Learning Outcomes: Upon completion of this course, the student will be able to:	Assessment Measures
1. Identify and assess the linkages between the chemistry and physiology of living organisms and the physical and biological aspects of the marine environment.	Written assignments and examinations
2. Integrate information from scientific articles, lecture and textbook assignments, to evaluate the scientific accuracy of popular press (TV, newspaper, magazine, web) reports on marine issues	Exams, written assignments, and graded discussions
3. Communicate to peers an understanding of the marine ecosytem, and the direct and indirect impacts that humans are having on the system	In-class presentation, exams, and writing assignment
4. Analyze, assess, and evaluate the impact that humans are having on the marine system through in depth study of current 'hot topics' such as global warming, fisheries collapse etc.	Presentations, exams, and written assignments

IV. Course Level Justification

This course builds on concepts presented in 200 level courses. Students are required to learn and integrate information from a variety of scientific disciplines as it relates to marine ecosystems, to read, understand, and apply ideas conveyed by primary scientific literature, to synthesize biological knowledge and social considerations; and to apply course materials to current problems.

V. Topical Course Outline

A. Basic Principles of Physical Oceanography
    1. Properties of water, salt, temperature, light
    2. Coriolis effect and tides
    3. Wind-driven and thermohaline circulation
B. Major Ocean Currents and Domains
    1. Global circulation patterns
    2. Alaskan circulation patterns
    3. Thermoclines, fronts, gyres, eddies
C. Ocean Climates & Impact of Global Warming
    1. Seasonal patterns of heat flux
    2. Impact of ice on currents
    3. Feedback loops
D. Ecology of the Open Ocean
    1. Sources of organic and inorganic nutrients
    2. Phytoplankton diversity & adaptations
    3. Factors influencing primary productivity
E. Pelagic food webs
    1. Zooplankton and methods for exploiting phytoplankton
    2. Necton and foraging adaptations
F. Trophic dynamics and foods webs
    1. Fisheries and their ecological and social impacts

2. Major fisheries species & locations

G. Methods of resource exploitation
   1. Impact of overfishing on ecosystem
   2. Management methods and legislation
   3. Impact of different management regimes on fishers

H. Ecology of the coastal zones
   1. Physical challenges and adaptations
   2. Nutrients and tropho-dynamics in various marine environments

I. Coastal polar ecosystems

J. Impacts of coastal development and use
   1. On physical habitat
   2. On biological habitats
   3. On health of the ecosystem
   4. Potential solutions / remediation

VI. Suggested Texts

Kaiser, M.J., M.J. Attrill, S. Jennings, and D.N. Thomas. Marine Ecology, Processes, Systems, and Impacts. 2nd edition, Oxford University Press. 2011.

Nybakken , J.D., and Bertness, M.W. Marine Biology, 6th Edition. Benjamin Cummings, 592pp. 2004.

VII. Bibliography

*Barber, R.T. and F.P. Chavez. 1983. Biological Consequences of El Nino. Science 222 (4629):1203-1210

Benson, A. and A. Trites. 2002. Ecological effects of regime shifts in the Bering Sea and Eastern North Pacific Ocean. Fish and Fisheries 3: 95-113

Estes, J.A., E.M. Danner, D.F. Doak, B. Konar, A.M. Springer, P.D. Steinberg, M.T. Tinker, T.M. Williams. 2004. Complex Trophic Interactions in Kelp Forest Ecosystems. Bulletin of Marine Science 74(3): 621-638.

*Estes, J.A., M. T. Tinker, T. M. Williams, D. F. Doak. 1998. Killer Whale Predation on Sea Otters Linking Oceanic and Nearshore Ecosystems. Science 282: 473-476

Frank, K.T., Petrie, B., Choi, J.S., Leggett, W.C. 2005. Trophic Cascades in a Formerly Cod-Dominated Ecosystem. Science 308: 1621-1623

Grebmeier,J.M., J.E. Overland, S.E. Moore, E.V. Farley, E.C. Carmack, L.W. Cooper, K.E. Frey, J.H. Helle, F.A. McLaughlin, S.L. McNutt (2006) A Major Ecosystem Shift in the Bering Sea.

Greene, C.H. and Pershing, A.J. 2007. Climate Drives Sea Change. Science 315: 1084-1085

Levinton, J.S. Marine Biology: Function, Biodiversity, Ecology. 4th Edition. Oxford University Press, 576pp. 2013.

Overpeck, J.T., M. Sturm, J.A. Francis, D.K., Perovich, et. Al. 2005. Arctic System on Trajectory to new, seasonally ice-free state. EOS 86 (34): 309,312-313.

Springer et al. Springer, A.M., Estes, J.A., van Vliet, G.B., Williams, T.M., Doak, D.F., Danner, E.M., Forney, K.A., Pfister, B., 2003. Sequential megafaunal collapse in the North Pacific Ocean: an ongoing legacy of industrial whaling? Proceedings of the National Academy of Sciences 100 (21), 12,223–12,228.

*Seminal works

Course Action Request
University of Alaska Anchorage
Proposal to Initiate, Add, Change, or Delete a Course

1a. School or College	1b. Division	1c. Department
AS CAS	AMSC Division of Math Science	Biological Sciences

2. Course Prefix	3. Course Number	4. Previous Course Prefix & Number	5a. Credits/CEUs	5b. Contact Hours (Lecture + Lab)
BIOL	A482	N/A	3	(3+0)

6. Complete Course Title
Spatial Ecology
Spatial Ecology
Abbreviated Title for Transcript (30 character)

7. Type of Course ☒ Academic ☐ Preparatory/Development ☐ Non-credit ☐ CEU ☐ Professional Development

8. Type of Action: ☒ Add *or* ☐ Change *or* ☐ Delete

If a change, mark appropriate boxes:

- ☐ Prefix
- ☐ Credits
- ☐ Title
- ☐ Grading Basis
- ☐ Course Description
- ☐ Test Score Prerequisites
- ☐ Automatic Restrictions
  - ☐ Class ☐ Level
  - ☐ College ☐ Major
- ☐ Other (please specify)
- ☐ Course Number
- ☐ Contact Hours
- ☐ Repeat Status
- ☐ Cross-Listed/Stacked
- ☐ Course Prerequisites
- ☐ Co-requisites
- ☐ Registration Restrictions
- ☐ General Education Requirement

9. Repeat Status No # of Repeats Max Credits

10. Grading Basis ☒ A-F ☐ P/NP ☐ NG

11. Implementation Date semester/year
From: Fall/2015 To: Fall/9999

12. ☐ Cross Listed with

☐ Stacked with _____ Cross-Listed Coordination Signature

13a. Impacted Courses or Programs: List any programs or college requirements that require this course.

Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at www.uaa.alaska.edu/governance.

Impacted Program/Course	*Date of Coordination*	*Chair/Coordinator Contacted*
1.		
2.		
3.		

Initiator Name (typed): Khrys Duddleston Initiator Signed Initials: _____ Date:_____

13b. Coordination Email Date: 6Jan14
submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)

13c. Coordination with Library Liaison Date: 6Jan14

14. General Education Requirement *Mark appropriate box:*
☐ Oral Communication ☐ Written Communication ☐ Quantitative Skills ☐ Humanities
☐ Fine Arts ☐ Social Sciences ☐ Natural Sciences ☐ Integrative Capstone

15. Course Description *(suggested length 20 to 50 words)*
An examination of spatial ecology including: 1) the physical and ecological nature of landscapes, 2) the use of GIS tools to map and understand patterns in physical and biological properties and 3) the use of case studies that apply GIS tools to ecological and abiotic processes such as migration of ungulates and birds; local-regional-continental and global patterns of precipitation chemistry and associations of societal practices and spatial patterns in the water and carbon cycles.

16a. Course Prerequisite(s) *(list prefix and number or test code and score)*
BIOL A271 with minimum grade of C.

16b. Co-requisite(s) *(concurrent enrollment required)*

16c. Automatic Restriction(s)
☐ College ☐ Major ☐ Class ☐ Level

16d. Registration Restriction(s) *(non-codable)*

17. ☐ Mark if course has fees

18. ☐ Mark if course is a selected topic course

19. Justification for Action
New course which meets the needs of students interested in graduate work or careers in ecology. This is part of our overall curriculum revision, which seeks to streamline completion of the B.S. in Biological Sciencs degree and align our degree with the core cocepts and competencies outlined in Vision and Change in Undergraduate Biology Education (National Science Foundation and American Association for the Advancement of Science).

Initiator (faculty only) Date

Khrys Duddleston

Initiator (TYPE NAME)

☐ Approved

☐ Disapproved

Department Chair Date

☐ Approved

☐ Disapproved

College/School Curriculum Committee Chair Date

☐ Approved

☐ Disapproved

Dean/Director of School/College Date

☐ Approved

☐ Disapproved

Undergraduate/Graduate Academic Board Chair Date

☐ Approved

☐ Disapproved

Provost or Designee Date

University of Alaska Anchorage
College of Arts and Sciences
Course Content Guide

I. Date of Initiation: Spring 2014

II. Curriculum Action Request

A. College:	College of Arts and Sciences
B. Course Prefix:	BIOL
C. Course Number:	A482
D. Number of Credits:	3
E. Contact Hours:	3+0
F. Course Title:	Spatial Ecology
G. Grading Basis:	A-F
H. Implementation Date:	Fall 2015
I. Cross-listed/Stacked:	N/A
J. Course Description:	An examination of spatial ecology including: 1) the physical and ecological nature of landscapes, 2) the use of GIS tools to map and understand patterns in physical and biological properties and 3) the use of case studies that apply GIS tools to ecological and abiotic proceses such as migration of ungulates and birds; local-regional-continential and global patterns of preciptation chemisry and associations of societial practices and spatial patterns in the water and carbon cycles.
K. Course Prerequisites:	BIOL A271 with minimum grade of C.
L. Course Co-requisites:	N/A
M. Other Restrictions:	N/A
N. Registration Restrictions:	N/A
O. Course Fees:	No

III. Instructional Goals and Student Learning Outcomes

A. Instructional Goals. The instructor will:

1. Provide a description of the abiotic and biotic environments from the micro to the global scale.
2. Discuss the role of key abiotic processes that vary spatially and temporally that have major effects on organisms, ecosystems and landscapes.
3. Provide advanced information on food web ecology, atmospheric processes, land use patterns and migration ecology.
4. Introduce the vocabulary of Geographic Information Systems.
5. Introduce GIS concepts through discussion of spatial patterns in abiotic traits, animal distributions and migration dynamics.
6. Conduct class exercises in ArcGIS.
7. Encourage class discussion of spatial issues that are of relevance to Alaska, the Arctic and the global community.
8. Help students understand GIS applications to research and resource management.

B. Student Learning Outcomes and Assessment Measures:

Student Learning Outcomes: Upon completion of	Assessment Measures

this course, the student will be able to:	
1. Describe traits of the abiotic and biotic environment that have important spatial and temporal patterns.	Written assignments and examinations
2. Describe key migration and food web traits in northern systems and key spatial patterns.	Written assignments and examinations
3. Explain and use the key facets of GIS tools and their application to spatial ecology	Written assignments, examinations and classroom exercises
4. Explain some of the causes of spatial and temporal patterns of animal distributions, atmospheric chemistry, the water and the carbon cycles.	Written assignments and examinations
5. Describe how important societal processes- land use change- is being manifested spatially in Arctic and Temperate systems.	Written assignments and examinations, classroom discussions
6. Interpret the causes of spatial and temporal patterns in abiotic and biotic traits.	Written assignments and examinations, classroom discussions

IV. Course Level Justification

The class builds upon a foundation of basic biological, ecological and environmental knowledge. It assumes some proficiency with the vocabulary of biology and environmental sciences. It is similar to other senior level courses in ecology at other universities.

V. Topical Course Outline

A. Overview of Landscape Ecology
   1. Facets of Abiotic Traits-micro to global scales
      a. Precipitation
      b. Temperature
   2. Properties of Key Biotic traits
      a. Animal Abundances
      b. Species Distributions
   3. Watershed and Ecosystem Processes
      a. Biogeochemical Cycles
      b. Linkages between system components
   4. Food web Ecology
      a. Land
      b. Aquatic
      c. Marine
   5. Migration Ecology
      a. Birds
      b. Fish
      c. Mammals

B. Spatial and temporal patterns in Landscapes
   1. Spatial and temporal variation in Abiotic traits
      a. Precipitation
      b. Atmospheric Chemistry
      c. Temperature
   2. Spatial and temporal variation in biotic traits
      a. Birds
      b. Fish

c. Mammals
d. Insects
e. Human activities

C. Geographic Information Systems
1. ArcGIS Introduction
2. Data Collection
3. Data Management
4. Types of GIS files
a. Shapefiles/geodata bases
5. Retrieval of data-bases
6. Development of Data layers
7. Modeling techniques for GIS data

D. Application exercises in GIS and Spatial Ecology
1. Compare existing techniques for modeling species distribution, habitat use, and niche selection
2. Apply advanced spatial analysis techniques to real-world migration ecology, conservation biology, precipitation and biogeochemistry, food web ecology, and case examples based on Alaska, Arctic, Boreal and Global ecology.

VI. Suggested Texts

Harvey, F. Primer of GIS: Fundamentals of Geographic and Cartographic Concepts. 2008

Gorr, W and K. Kurland. GIS Tutorial 1: Basic Workbook. 2010

VII. Bibliography

Journals that feature Spatial Ecology:

Ecology. Ecological Society of America. Ithaca, NY
Ecological Monographs. Ecological Society of America. Ithaca, NY
Functional Ecology. Journals of the British Ecological Society
Oecologica. International Association for Ecology. Berlin
Landscape Ecology, Springer Verlag, NY

Course Action Request
University of Alaska Anchorage
Proposal to Initiate, Add, Change, or Delete a Course

1a. School or College	1b. Division	1c. Department
AS CAS	AMSC Division of Math Science	Biological Sciences

2. Course Prefix	3. Course Number	4. Previous Course Prefix & Number	5a. Credits/CEUs	5b. Contact Hours (Lecture + Lab)
BIOL	A483	N/A	2	(2+0)

6. Complete Course Title
Exploration Ecology
Exploration Ecology
Abbreviated Title for Transcript (30 character)

7. Type of Course ☒ Academic ☐ Preparatory/Development ☐ Non-credit ☐ CEU ☐ Professional Development

8. Type of Action: ☒ Add *or* ☐ Change *or* ☐ Delete

If a change, mark appropriate boxes:

- ☐ Prefix
- ☐ Credits
- ☐ Title
- ☐ Grading Basis
- ☐ Course Description
- ☐ Test Score Prerequisites
- ☐ Automatic Restrictions
  - ☐ Class ☐ Level
  - ☐ College ☐ Major
- ☐ Other (please specify)
- ☐ Course Number
- ☐ Contact Hours
- ☐ Repeat Status
- ☐ Cross-Listed/Stacked
- ☐ Course Prerequisites
- ☐ Co-requisites
- ☐ Registration Restrictions
- ☐ General Education Requirement

9. Repeat Status No # of Repeats Max Credits

10. Grading Basis ☒ A-F ☐ P/NP ☐ NG

11. Implementation Date semester/year
From: Fall/2015 To: Fall/9999

12. ☐ Cross Listed with

☐ Stacked with _____ Cross-Listed Coordination Signature

13a. Impacted Courses or Programs: List any programs or college requirements that require this course.

Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at www.uaa.alaska.edu/governance.

Impacted Program/Course	*Date of Coordination*	*Chair/Coordinator Contacted*
1.		
2.		
3.		

Initiator Name (typed): Khrys Duddleston Initiator Signed Initials: _____ Date:_____

13b. Coordination Email Date: 6Jan14
submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)

13c. Coordination with Library Liaison Date: 6Jan14

14. General Education Requirement *Mark appropriate box:*
☐ Oral Communication ☐ Written Communication ☐ Quantitative Skills ☐ Humanities
☐ Fine Arts ☐ Social Sciences ☐ Natural Sciences ☐ Integrative Capstone

15. Course Description *(suggested length 20 to 50 words)*
An exploration of the principles and techniques used for study and collection of baseline ecological data in remote landscapes. Course activities will focus on survey and analytical resources, and design of simple ecological projects as well as those with complex and multidisciplinary components

16a. Course Prerequisite(s) *(list prefix and number or test code and score)*
BIOL A271 with minimum grade of C.

16b. Co-requisite(s) *(concurrent enrollment required)*
BIOL A484

16c. Automatic Restriction(s)
☐ College ☐ Major ☐ Class ☐ Level

16d. Registration Restriction(s) *(non-codable)*
Instructor Approval

17. ☐ Mark if course has fees

18. ☐ Mark if course is a selected topic course

19. Justification for Action
The course is needed to provide majors in Biological Sciences and Natural Sciences with an upper division course in advanced ecological techniques.The addition is part of an overall curriculum revision in the Biological Sciences in which we aim to align our curriculum with the core concepts and competencies outlined in Vision and Change in Undergraduate Biology Education (National Science Foundation and American Association for the Advancement of Science).

Initiator (faculty only)	Date	☐ Approved ☐ Disapproved	Dean/Director of School/College	Date
Khrys Duddleston Initiator (TYPE NAME)				
☐ Approved ☐ Disapproved	Department Chair	Date	☐ Approved ☐ Disapproved	Undergraduate/Graduate Academic Board Chair	Date
☐ Approved ☐ Disapproved	College/School Curriculum Committee Chair	Date	☐ Approved ☐ Disapproved	Provost or Designee	Date

University of Alaska Anchorage
College of Arts and Sciences
Course Content Guide

I. Date of Initiation: Spring 2014

II. Curriculum Action Request

A. College:	College of Arts and Sciences
B. Course Prefix:	BIOL
C. Course Number:	A483
D. Number of Credits:	2
E. Contact Hours:	2+0
F. Course Title:	Exploration Ecology
G. Grading Basis:	A-F
H. Implementation Date:	Fall 2015
I. Cross-listed/Stacked:	N/A
J. Course Description:	An exploration of the principles and techniques used for study and collection of baseline ecological data in remote landscapes. Course activities will focus on survey and analytical resources, and design of simple ecological projects as well as those with complex and multidisciplinary components.
K. Course Prerequisites:	BIOL A271 with minimum grade of C
L. Course Co-requisites:	BIOL A484
M. Other Restrictions:	N/A
N. Registration Restrictions:	Instructor Approval
O. Course Fees:	No

III. Instructional Goals and Student Learning Outcomes

A. Instructional Goals. The instructor will:

1. Provide a basic understanding of ecological survey and analysis
2. Enable students to apply theory to field-based settings.
3. Assist students in acquiring skills needed for acquisition and analysis of data, interpretation of results, and preparation of reports and publication.

B. Student Learning Outcomes and Assessment Measures

Student Learning Outcomes: Upon completion of this course, the student will be able to:	Assessment Measures
1. Deomonstrate understanding of critical aspects of ecological theory relating to acquisition of baseline data and information.	Exams and written assignments
2. Read, understand, and integrate information from scientific articles with that provided in lecture and textbook assignments, and to use this information to evaluate the scientific accuracy of reports from the popular press or public science.	Exams, written assignments, in-class presentations.
3. Communicate to others the results of original research they have conducted	Written reports, in-class presentations.

IV. Course Level Justification This course is proposed to build field course offerings in the department and greater course depth in advanced ecology and environmental biology.

V. Topical Course Outline

A. Introduction
    1. Field Safety
    2. Planning a Research Program
B. Research Design
    1. Principles of Sampling
    2. Data Acquisition
    3. General Census Methods
    4. Data Mining
    5. General Survey Methods
    6. Data Reduction
    7. Introduction to Analysis
C. Introduction to Analysis
    1. Using R For Analysis
    2. Free-ware Software Programs
    3. Data Screening
D. Statistical Analysis
    1. Univariate Statistics
    2. Multivariate Statistics
    3. Group Analysis
E. Testing and Discrimination
    1. Multivariate Gradient Analysis
    2. Ordination
F. Photogrammetry and Image Analysis
G. Time Series Analysis
H. Reporting and Results Selection

VI. Suggested Texts

Braude S, Low BS. An Introduction to Methods and Models in Ecology. Princeton. 2010.

Morris WF, Doak DF. Quantitative Conservation Biology. Sinauer Publ. 2002.

VII. Bibliography

Anderson, DR and KP Burnham. 2002. Avoiding pitfalls when using information-theoretic methods. J. Wildl. Manage. 66:912-918.

Anderson, DR, KP Burnham, WL Thompson. 2000. Null hypothesis testing: Problems, prevalence, and an alternative. J. Wildl. Manage. 64:912-923.

Burnham, KP and DR Anderson. 2001. Kullback-Leibler information as a basis for strong inference in ecological studies. Wildlife Research 28:111-119.

Cox TF, and MAA Cox. Multidimensional scaling. Second Edition. Chapman & Hall/CRC. 2001.

Grand J, and SA Cushman. 2003. Multiple-scale analysis of bird-habitat relationships: breeding birds in a pitch pine-scrub oak (Pinus rigida-Quercus ilicifolia) community. Biological Conservation. 12(3):307-317.

Manly BFJ. Multivariate statistical methods: a primer. Chapman & Hall. 2004.

Mills LS. Ethics and the wildlife population biologist," pp. 33-37 in: Mills LS. Conservation of Wildlife Populations. Blackwell Pub., Malden MA. 2007. "

Sutherland, WJ, ed. Ecological Census Techniques. Cambridge Univ. Press, Cambridge, UK. 1996.

Ter Braak CJF, and PFM Verdonschot. Canonical correspondence analysis and related multivariate. 1995.

Wilson, DE, et al., eds. Measuring and Monitoring Biological Diversity: Standard Methods for Mammals. Smithsonian Inst. Press, Washington D.C. 1996.

Wong C. 2007. Preparing for the field season. ESA Bulletin 88(1).

Course Action Request
University of Alaska Anchorage
Proposal to Initiate, Add, Change, or Delete a Course

1a. School or College	1b. Division	1c. Department
AS CAS	AMSC Division of Math Science	Biological Sciences

2. Course Prefix	3. Course Number	4. Previous Course Prefix & Number	5a. Credits/CEUs	5b. Contact Hours (Lecture + Lab)
BIOL	A484	N/A	4	(0+8)

6. Complete Course Title
Experiential Learning: Exploration Ecology Field Study
EL: Exploration Ecology Field
Abbreviated Title for Transcript (30 character)

7. Type of Course ☒ Academic ☐ Preparatory/Development ☐ Non-credit ☐ CEU ☐ Professional Development

8. Type of Action: ☒ Add *or* ☐ Change *or* ☐ Delete

If a change, mark appropriate boxes:

- ☐ Prefix
- ☐ Credits
- ☐ Title
- ☐ Grading Basis
- ☐ Course Description
- ☐ Test Score Prerequisites
- ☐ Automatic Restrictions
  - ☐ Class ☐ Level
  - ☐ College ☐ Major
- ☐ Other (please specify)
- ☐ Course Number
- ☐ Contact Hours
- ☐ Repeat Status
- ☐ Cross-Listed/Stacked
- ☐ Course Prerequisites
- ☐ Co-requisites
- ☐ Registration Restrictions
- ☐ General Education Requirement

9. Repeat Status No # of Repeats Max Credits

10. Grading Basis ☒ A-F ☐ P/NP ☐ NG

11. Implementation Date semester/year
From: Fall/2015 To: Fall/9999

12. ☐ Cross Listed with
☐ Stacked with _____ Cross-Listed Coordination Signature

13a. Impacted Courses or Programs: List any programs or college requirements that require this course.
Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at www.uaa.alaska.edu/governance.

Impacted Program/Course	*Date of Coordination*	*Chair/Coordinator Contacted*
1.		
2.		
3.		

Initiator Name (typed): Khrys Duddleston Initiator Signed Initials: _____ Date:_____

13b. Coordination Email Date: 6Jan14
submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)

13c. Coordination with Library Liaison Date: 6Jan14

14. General Education Requirement *Mark appropriate box:*
☐ Oral Communication ☐ Written Communication ☐ Quantitative Skills ☐ Humanities
☐ Fine Arts ☐ Social Sciences ☐ Natural Sciences ☐ Integrative Capstone

15. Course Description *(suggested length 20 to 50 words)*
Field exploration of the principles and techniques used for study and collection of baseline ecological data in remote landscapes. Course activities will focus on field survey and methodology, and design of simple ecological projects as well as those with complex and multidisciplinary components

16a. Course Prerequisite(s) *(list prefix and number or test code and score)*

16b. Co-requisite(s) *(concurrent enrollment required)*
BIOL A483

16c. Automatic Restriction(s)
☐ College ☐ Major ☐ Class ☐ Level

16d. Registration Restriction(s) *(non-codable)*
Instructor Approval

17. ☒ Mark if course has fees

18. ☐ Mark if course is a selected topic course

19. Justification for Action
The course is needed to provide majors in Biological Sciences and Natural Sciences with an upper division course in advanced ecological techniques.The addition is part of an overall curriculum revision in the Biological Sciences in which we aim to align our curriculum with the core concepts and competencies outlined in Vision and Change in Undergraduate Biology Education (National Science Foundation and American Association for the Advancement of Science).

Initiator (faculty only)	Date	☐ Approved ☐ Disapproved	Dean/Director of School/College	Date
Khrys Duddleston Initiator (TYPE NAME)				
☐ Approved ☐ Disapproved	Department Chair	Date	☐ Approved ☐ Disapproved	Undergraduate/Graduate Academic Board Chair	Date
☐ Approved ☐ Disapproved	College/School Curriculum Committee Chair	Date	☐ Approved ☐ Disapproved	Provost or Designee	Date

University of Alaska Anchorage
College of Arts and Sciences
Course Content Guide

I. Date of Initiation: Spring 2014

II. Curriculum Action Request

A. College:	College of Arts and Sciences
B. Course Prefix:	BIOL
C. Course Number:	A484
D. Number of Credits:	4
E. Contact Hours:	0+8
F. Course Title:	Experiential Learning: Exploration Ecology Field Study
G. Grading Basis:	A-F
H. Implementation Date:	Fall 2015
I. Cross-listed/Stacked:	N/A
J. Course Description:	Field exploration of the principles and techniques used for study and collection of baseline ecological data in remote landscapes. Course activities will focus on field survey and methodology, and design of simple ecological projects as well as those with complex and multidisciplinary components
K. Course Prerequisites:	N/A
L. Course Co-requisites:	BIOL A483
M. Other Restrictions:	N/A
N. Registration Restrictions:	Instructor Approval
O. Course Fees:	Yes

III. Instructional Goals and Student Learning Outcomes

A. Instructional Goals. The instructor will:

1. Provide a basic understanding of ecological survey and analysis
2. Enable students to apply theory to field-based settings.
3. Assist students in acquiring skills needed for acquisition and analysis of data, interpretation of results, and preparation of reports and publication.

B. Student Learning Outcomes and Assessment Measures

Student Learning Outcomes: Upon completion of this course, the student will be able to:	Assessment Measures
1. Design and conduct field based ecological research	Written assignments and data logs.
2. Utilize field-collected data in scientific analysis	Written assignments and reports
3. Initiate, understand, and follow appropriate safety, collection, landuse, and other regulations	Permits, forms, and reports

IV. Course Level Justification

This course builds field course offerings in the department and greater course depth in advanced ecology and environmental biology.

V. Topical Course Outline

Lab 1: Lab and Field Safety
Lab 2: Techniques of Sample Counts (Mark-Recapture, N-mixture Models)
Lab 3: Techniques of Sample Counts 2
Lab 4: Field Survey Techniques
Lab 5: Distance Sampling, Indices, and Metrics
Lab 6: Indirect Sampling by Proxy
Lab 7: Indirect Sampling by Proxy 2
Lab 8: Introduction to R Programming
Lab 9: Multivariate Analysis, Groups
Lab 10: Multivariate Analysis, Gradients
Lab 11: Multivariate Analysis, Higher-order and Discrete
Lab 12: Meta-Analysis.

VI. Suggested Texts

Braude S, Low BS. An Introduction to Methods and Models in Ecology. Princeton. 2010.

Morris WF, Doak DF. Quantitative Conservation Biology. Sinauer Publ. 2002.

VII. Bibliography

Anderson, DR and KP Burnham. 2002. Avoiding pitfalls when using information-theoretic methods. J. Wildl. Manage. 66:912-918.

Anderson, DR, KP Burnham, WL Thompson. 2000. Null hypothesis testing: Problems, prevalence, and an alternative. J. Wildl. Manage. 64:912-923.

Burnham, KP and DR Anderson. 2001. Kullback-Leibler information as a basis for strong inference in ecological studies. Wildlife Research 28:111-119.

Cox TF, and MAA Cox. Multidimensional scaling. Second Edition. Chapman & Hall/CRC. 2001.

Grand J, and SA Cushman. 2003. Multiple-scale analysis of bird-habitat relationships: breeding birds in a pitch pine-scrub oak (Pinus rigida-Quercus ilicifolia) community. Biological Conservation. 12(3):307-317.

Manly BFJ. Multivariate statistical methods: a primer. Chapman & Hall. 2004.

Mills LS. "Ethics and the wildlife population biologist," pp. 33-37 in: Mills LS. Conservation of Wildlife Populations. Blackwell Pub., Malden MA. 2007.

Sutherland, WJ, ed. 1996. Ecological Census Techniques. Cambridge Univ. Press, Cambridge, UK.

Wilson, DE, et al., eds. Measuring and Monitoring Biological Diversity: Standard Methods for Mammals. Smithsonian Inst. Press, Washington D.C. 1996.

Wong C. 2007. Preparing for the field season. ESA Bulletin 88(1).

Course Action Request
University of Alaska Anchorage
Proposal to Initiate, Add, Change, or Delete a Course

1a. School or College	1b. Division	1c. Department
AS CAS	AMSC Division of Math Science	Biological Sciences

2. Course Prefix	3. Course Number	4. Previous Course Prefix & Number	5a. Credits/CEUs	5b. Contact Hours (Lecture + Lab)
BIOL	A486	N/A	3	(3+0)

6. Complete Course Title
Evolutionary Ecology
Evolutionary Ecology
Abbreviated Title for Transcript (30 character)

7. Type of Course ☒ Academic ☐ Preparatory/Development ☐ Non-credit ☐ CEU ☐ Professional Development

8. Type of Action: ☒ Add *or* ☐ Change *or* ☐ Delete

If a change, mark appropriate boxes:

- ☐ Prefix
- ☐ Credits
- ☐ Title
- ☐ Grading Basis
- ☐ Course Description
- ☐ Test Score Prerequisites
- ☐ Automatic Restrictions
  - ☐ Class ☐ Level
  - ☐ College ☐ Major
- ☐ Other (please specify)
- ☐ Course Number
- ☐ Contact Hours
- ☐ Repeat Status
- ☐ Cross-Listed/Stacked
- ☐ Course Prerequisites
- ☐ Co-requisites
- ☐ Registration Restrictions
- ☐ General Education Requirement

9. Repeat Status No # of Repeats Max Credits

10. Grading Basis ☒ A-F ☐ P/NP ☐ NG

11. Implementation Date semester/year
From: Fall/2015 To: Fall/9999

12. ☐ Cross Listed with
☐ Stacked with _____ Cross-Listed Coordination Signature

13a. Impacted Courses or Programs: List any programs or college requirements that require this course.

Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at www.uaa.alaska.edu/governance.

Impacted Program/Course	*Date of Coordination*	*Chair/Coordinator Contacted*
1.		
2.		
3.		

Initiator Name (typed): Khrys Duddleston Initiator Signed Initials: _____ Date:_____

13b. Coordination Email Date: 6Jan14
submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)

13c. Coordination with Library Liaison Date: 6Jan14

14. General Education Requirement *Mark appropriate box:*
☐ Oral Communication ☐ Written Communication ☐ Quantitative Skills ☐ Humanities
☐ Fine Arts ☐ Social Sciences ☐ Natural Sciences ☐ Integrative Capstone

15. Course Description *(suggested length 20 to 50 words)*
Explores conceptual issues in the evolution of life histories and species interactions, as well as foundational and contemporary research in topics such as quantitative genetics, natural selection, and the evolution of sex. The course includes collection, interpretation, and integration of data into papers and presentations. Themes, including readings and case studies, will change with instructor.

16a. Course Prerequisite(s) *(list prefix and number or test code and score)*
[BIOL A271 and BIOL A288] with minimum grade of C

16b. Co-requisite(s) *(concurrent enrollment required)*

16c. Automatic Restriction(s)
☐ College ☐ Major ☐ Class ☐ Level

16d. Registration Restriction(s) *(non-codable)*

17. ☐ Mark if course has fees

18. ☐ Mark if course is a selected topic course

19. Justification for Action
The course is needed to provide majors in Biological Sciences and Natural Sciences with an upper division course in evolutionary ecology.Creating new, permanent course as part of our overall curriculum revision, which seeks to streamline completion of the B.S. in Biological Sciencs degree and align our degree with the core cocepts and competencies outlined in Vision and Change in Undergraduate Biology Education (National Science Foundation and American Association for the Advancement of Science).

Initiator (faculty only)	Date	☐ Approved ☐ Disapproved	Dean/Director of School/College	Date
Khrys Duddleston Initiator (TYPE NAME)				
☐ Approved ☐ Disapproved	Department Chair	Date	☐ Approved ☐ Disapproved	Undergraduate/Graduate Academic Board Chair	Date
☐ Approved ☐ Disapproved	College/School Curriculum Committee Chair	Date	☐ Approved ☐ Disapproved	Provost or Designee	Date

University of Alaska Anchorage
College of Arts and Sciences
Course Content Guide

I. Date of Initiation: Spring 2014

II. Curriculum Action Request

A. College:	College of Arts and Sciences
B. Course Prefix:	BIOL
C. Course Number:	A486
D. Number of Credits:	3
E. Contact Hours:	3+0
F. Course Title:	Evolutionary Ecology
G. Grading Basis:	A-F
H. Implementation Date:	Fall 2015
I. Cross-listed/Stacked:	N/A
J. Course Description:	Explores conceptual issues in the evolution of life histories and species interactions, as well as foundational and contemporary research in topics such as quantitative genetics, natural selection, and the evolution of sex. The course includes collection, interpretation, and integration of data into papers and presentations.
K. Course Prerequisites:	[BIOL A271 and BIOL A288] with minimum grade of C
L. Course Co-requisites:	N/A
M. Other Restrictions:	N/A
N. Registration Restrictions:	NoneN/ANo

III. Instructional Goals and Student Learning Outcomes

A. Instructional Goals. The instructor will:

1. Provide a basis for understanding the principles of the evolution.
2. Explain common themes in the evolution of life histories
3. Present foundational and contemporary studies for discussion.
4. Contrast a range of approaches in the study of evolutionary ecology.
5. Present important themes and primary literature in evolutionary ecology in the instructor's area of expertise (e.g., vertebrate evolution, plant-animal interactions, etc.)

B. Student Learning Outcomes and Assessment Measures

Student Learning Outcomes: Upon completion of this course, the student will be able to:	Assessment Measures
1. Contrast the ecological contexts that result in the evolution of various life history traits.	Examinations and/or written assignments
2. Synthesize the relationships of trait variation, heritability, and phenotypic selection to explain responses to evolution.	Examinations and/or written assignments
3. Evaluate foundational and contemporary research in evolutionary ecology.	Discussions and/or student presentations

4. Discuss key elements of evolutionary ecology in the focus area	Examinations and/or written assignments
5. Compose and present a review paper that includes synthesis of multiple scientific papers and/or data.	Examinations and/or written and oral assignments

IV. Course Level Justification

This course employs fundamental elements in evolution, genetics, and ecology in a synthetic approach to explore contemporary research questions in the field and is similar to other 400-level ecology courses offered at other universities.

V. Topical Course Outline

A. Introduction and Basic Principles
B. Fundamental Patterns in Evolution
    1. Macroevolutionary perspective: Speciation, Extinction, and Diversification Rates
C. Trait Variation and Natural Selection
    1. Phenotypic, Genotypic, Environmental Sources of Variation
    2. Changes in Trait Distribution Within Generations
D. Phenotypic Plasticity
    1. Genotype by Environmental Interactions
E. Fitness and Evolutionarily Stable Strategies
F. Quantitative Genetics and Heritability
    1. Additive and Non-Additive sources of Phenotypic Variation
    2. Measuring Trait Heritability
    3. Response to Selection
    4. Correlated Trait Evolution
G. Allocation and Trade-Offs
H. Evolution of Sex and Mating Systems
    1. Costs and Benefits of Gene Exchange
    2. Patterns of Outcrossing, Mixed Mating, and Self-fertilization
I. Sexual Selection
J. Evolutionary Patterns in Birth, Growth, and Death
    1. Offspring Number and Size
    2. Growth Rates
    3. Timing of Reproduction
    4. Senescence
K. Evolution of Species Interactions
    1. Coevolution
    2. Character Displacement
    3. Defense
    4. Mutualism
L. Patterns Specialization and Generalization

VI. Suggested Texts

Fox, CW, Roff DA, Fairbairn DJ. Evolutionary Ecology: Concepts and Case Studies. Oxford, UK: Oxford University Press; 2001.

Poulin, R. Evolutionary Ecology of Parasites. 2nd ed. Princeton, NJ: Princeton University Press; 2011.

Patiny, S. Evolution of Plant-Pollinator Relationships. Cambridge, UK: Cambridge University Press; 2012.

VII. Bibliography

Journal articles from the primary literature (Evolution, Nature, Science, Proceedings of the National Academy of Sciences, Trends in Ecology and Evolution, etc.).

Additional reference books in thematic areas, for example:

Bell, MJ., Foster, SA. The Evolutionary Biology of the Threespine Stickleback. New York, NY: Oxford University Press; 1994.

Fritz, RS, Simms EL. Plant Resistance to Herbivores and Pathogens: Ecology, Evolution, and Genetics. Chicago, IL: University of Chicago Press: 1992.

Schafer MH, Ruxton, GD. Plant-Animal Communication. Oxford, UK: Oxford University Press; 2011.

Waser, NM, Ollerton J. Plant-Pollinator Interactions: From Specialization to Generalization. Chicago, IL: University of Chicago Press; 2006.

Wilmer, P. Pollination and Floral Ecology. Princeton, NJ; Princeton University Press; 2011.

Course Action Request
University of Alaska Anchorage
Proposal to Initiate, Add, Change, or Delete a Course

1a. School or College	1b. Division	1c. Department
AS CAS	AMSC Division of Math Science	Biological Sciences

2. Course Prefix	3. Course Number	4. Previous Course Prefix & Number	5a. Credits/CEUs	5b. Contact Hours (Lecture + Lab)
BIOL	A487	N/A	3.0	(3+0)

6. Complete Course Title
Comparative Anatomy of Vertebrates
Comp. Anatomy of Vertebrates
Abbreviated Title for Transcript (30 character)

7. Type of Course ☒ Academic ☐ Preparatory/Development ☐ Non-credit ☐ CEU ☐ Professional Development

8. Type of Action: ☐ Add *or* ☒ Change *or* ☐ Delete

If a change, mark appropriate boxes:

- ☐ Prefix
- ☒ Credits
- ☐ Title
- ☐ Grading Basis
- ☒ Course Description
- ☐ Test Score Prerequisites
- ☐ Automatic Restrictions
  - ☐ Class ☐ Level
  - ☐ College ☐ Major
- ☒ Other CCG (please specify)
- ☐ Course Number
- ☒ Contact Hours
- ☐ Repeat Status
- ☐ Cross-Listed/Stacked
- ☒ Course Prerequisites
- ☐ Co-requisites
- ☐ Registration Restrictions
- ☐ General Education Requirement

9. Repeat Status No # of Repeats Max Credits

10. Grading Basis ☒ A-F ☐ P/NP ☐ NG

11. Implementation Date semester/year
From: Fall/2015 To: Fall/9999

12. ☐ Cross Listed with
☐ Stacked with
Cross-Listed Coordination Signature

13a. Impacted Courses or Programs: List any programs or college requirements that require this course.
Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at www.uaa.alaska.edu/governance.

Impacted Program/Course	*Date of Coordination*	*Chair/Coordinator Contacted*
1.		
2.		
3.		

Initiator Name (typed): Khrys Duddleston Initiator Signed Initials: _____ Date:_____

13b. Coordination Email Date: 6Jan14
submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)

13c. Coordination with Library Liaison Date: 6Jan14

14. General Education Requirement *Mark appropriate box:*
☐ Oral Communication ☐ Written Communication ☐ Quantitative Skills ☐ Humanities
☐ Fine Arts ☐ Social Sciences ☐ Natural Sciences ☐ Integrative Capstone

15. Course Description *(suggested length 20 to 50 words)*
A comparative exploration of vertebrate anatomy. The aim of the course is to investigate the links between the forms and functions of shared organ systems and to discuss their evolutionary, ecological and physiological implications.

16a. Course Prerequisite(s) *(list prefix and number or test code and score)*
BIOL A288 with minimum grade of C

16b. Co-requisite(s) *(concurrent enrollment required)*

16c. Automatic Restriction(s)
☐ College ☐ Major ☐ Class ☐ Level

16d. Registration Restriction(s) *(non-codable)*

17. ☐ Mark if course has fees

18. ☐ Mark if course is a selected topic course

19. Justification for Action
We are removing the laboratory portion of the course. The course has been modified as part of our overall curriculum revision in which we aim to streamline the B.S. in Biological Sciences degree and align our curriculum with the core concepts and competencies outlined in Vison and Change in Undergraduate Biology Education (National Science Foundation and American Association for the Advancement of Science).

Initiator (faculty only) Date
Khrys Duddleston
Initiator (TYPE NAME)

☐ Approved
☐ Disapproved
Department Chair Date

☐ Approved
☐ Disapproved
College/School Curriculum Committee Chair Date

☐ Approved
☐ Disapproved
Dean/Director of School/College Date

☐ Approved
☐ Disapproved
Undergraduate/Graduate Academic Board Chair Date

☐ Approved
☐ Disapproved
Provost or Designee Date

University of Alaska Anchorage
College of Arts and Sciences
Course Content Guide

I. Date of Initiation: Spring 2014

II. Curriculum Action Request

A. College:	College of Arts and Sciences
B. Course Prefix:	BIOL
C. Course Number:	A487
D. Number of Credits:	3
E. Contact Hours:	3+0
F. Course Title:	Comparative Anatomy of Vertebrates
G. Grading Basis:	A-F
H. Implementation Date:	Fall 2015
I. Cross-listed/Stacked:	N/A
J. Course Description:	A comparative exploration of vertebrate anatomy. The aim of the course is to investigate the links between the forms and functions of shared organ systems and to discuss their evolutionary, ecological and physiological implications
K. Course Prerequisites:	BIOL A288 with minimum grade of C.
L. Course Co-requisites:	N/A
M. Other Restrictions:	N/A
N. Registration Restrictions:	N/A
O. Course Fees:	No

III. Instructional Goals and Student Learning Outcomes

A. Instructional Goals. The instructor will:

1. Present the principles of comparative vertebrate anatomy and integrate biological principles of chordate (particularly vertebrate) structure, function and ecology.
2. Characterize how organ systems within the vertebrates are related phylogenetically and evolutionarily.
3. Describe important anatomical features and phylogenetic relationships within the vertebrates, including the comprehension of phylogenetic relationships.

B. Student Learning Outcomes and Assessment Measures

Student Learning Outcomes: Upon completion of this course, the student will be able to:	Assessment Measures
1. Describe principles of comparative vertebrate anatomy mirrored by evolutionary associations between the structure, function and ecology of chordate phyla (particularly vertebrates).	Written assignments and examinations
2. Master and apply the necessary background knowledge and intellectual skills required to discuss and critically evaluate the fundamental features associated with vertebrate functional morphology and its evolution.	Written assignments and examinations

3. Identify vertebrate organ systems and their structure and functions	Written assignments and examinations
4. Master the vocabulary and nomenclature associated with the anatomy of the vertebrate organ systems	Written assignments and examinations

IV. **Course Level Justification**

This course is designed for Biological and Natural Sciences majors as an elective undergraduate course comparable to 400-level comparative anatomy of vertebrates courses offered at other universities. This course covers the principle concepts and processes of comparative vertebrate anatomy in the context of evolution and is essential to the student's ability to succeed and integrate content with other 400-level courses in biological sciences.

V. **Topical Course Outline**

A. Evolution and Morphology
B. Origins of the Chordates
C. Vertebrate Diversity
    1. Aquatic vertebrates: Jawless fish, Cartilagenous fish, Bony fish
    2. Terrestrial vertebrates: Amphibians and Amniotes
D. Biological Design
    1. Size and shape
    2. Biomechanics
E. Life History and Vertebrate Development
F. Integumentary system (the skin)
G. Skeletal system
    1. Skull
    2. Axial skeleton
    3. Appendicular skeleton
H. Muscular system
I. Respiratory system
J. Circulatory system
K. Digestive system

VI. **Suggested Texts**

Kardong, K.V. Vertebrates: Comparative Anatomy, Function, Evolution. New York, NY: McGraw Hill; 2012.

VII. Bibliography

Pough, F.H., C.M. Janis, and J.B. Heiser. Vertebrate Life. Boston, MA: Pearson Education; 2013.

Course Action Request
University of Alaska Anchorage
Proposal to Initiate, Add, Change, or Delete a Course

1a. School or College	1b. Division	1c. Department
AS CAS	AMSC Division of Math Science	Biological Sciences

2. Course Prefix	3. Course Number	4. Previous Course Prefix & Number	5a. Credits/CEUs	5b. Contact Hours (Lecture + Lab)
BIOL	A488	N/A	4	(2+4)

6. Complete Course Title
Experiential Learning: Developmental Biology
EL: Developmental Biology
Abbreviated Title for Transcript (30 character)

7. Type of Course ☒ Academic ☐ Preparatory/Development ☐ Non-credit ☐ CEU ☐ Professional Development

8. Type of Action: ☐ Add *or* ☒ Change *or* ☐ Delete

If a change, mark appropriate boxes:

- ☐ Prefix
- ☐ Credits
- ☒ Title
- ☐ Grading Basis
- ☒ Course Description
- ☐ Test Score Prerequisites
- ☐ Automatic Restrictions
  - ☐ Class ☐ Level
  - ☐ College ☐ Major
- ☒ Other CCG (please specify)
- ☐ Course Number
- ☒ Contact Hours
- ☐ Repeat Status
- ☐ Cross-Listed/Stacked
- ☐ Course Prerequisites
- ☐ Co-requisites
- ☐ Registration Restrictions
- ☐ General Education Requirement

9. Repeat Status No # of Repeats Max Credits

10. Grading Basis ☒ A-F ☐ P/NP ☐ NG

11. Implementation Date semester/year
From: Fall/2015 To: Fall/9999

12. ☐ Cross Listed with

☐ Stacked with _____ Cross-Listed Coordination Signature

13a. Impacted Courses or Programs: List any programs or college requirements that require this course.

Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at www.uaa.alaska.edu/governance.

Impacted Program/Course	*Date of Coordination*	*Chair/Coordinator Contacted*
1.		
2.		
3.		

Initiator Name (typed): Khrys Duddleston Initiator Signed Initials: _____ Date:_____

13b. Coordination Email Date: 6Jan14
submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)

13c. Coordination with Library Liaison Date: 6Jan14

14. General Education Requirement *Mark appropriate box:*
☐ Oral Communication ☐ Written Communication ☐ Quantitative Skills ☐ Humanities
☐ Fine Arts ☐ Social Sciences ☐ Natural Sciences ☐ Integrative Capstone

15. Course Description *(suggested length 20 to 50 words)*
An in depth study of the molecular and cellular principles which underlie the development of tissues and organ systems in animals, including classical embryology through utilization of numerous laboratory techniques within an authentic experiential learning environment.

16a. Course Prerequisite(s) *(list prefix and number or test code and score)*
BIOL A252 with minimum grade of C

16b. Co-requisite(s) *(concurrent enrollment required)*

16c. Automatic Restriction(s)
☐ College ☐ Major ☐ Class ☐ Level

16d. Registration Restriction(s) *(non-codable)*

17. ☒ Mark if course has fees

18. ☐ Mark if course is a selected topic course

19. Justification for Action
The title, description and contact hours are being updated to reflect course design and content. As part of our overall curriculum revision, which seeks to align our degree with the core concepts and competencies in Vision and Change in Undergraduate Biology Eduction (National Science Foundation and American Association for the Advancement of Science), this course will become part of our rotation of upper division electives in molecular biology. It is being revised as an experiential learning course which combines conceptual theory and an authentic laboratory experience into a single course.

Initiator (faculty only)	Date	☐ Approved ☐ Disapproved	Dean/Director of School/College	Date
Khrys Duddleston Initiator (TYPE NAME)				
☐ Approved ☐ Disapproved	Department Chair	Date	☐ Approved ☐ Disapproved	Undergraduate/Graduate Academic Board Chair	Date
☐ Approved ☐ Disapproved	College/School Curriculum Committee Chair	Date	☐ Approved ☐ Disapproved	Provost or Designee	Date

University of Alaska Anchorage
College of Arts and Sciences
Course Content Guide

I. Date of Initiation: Spring 2014

II. Curriculum Action Request

A. College:	College of Arts and Sciences
B. Course Prefix:	BIOL
C. Course Number:	A488
D. Number of Credits:	4
E. Contact Hours:	2+4
F. Course Title:	Experiential Learning: Developmental Biology
G. Grading Basis:	A-F
H. Implementation Date:	Fall 2015
I. Cross-listed/Stacked:	N/A
J. Course Description:	An in depth study of the molecular and cellular principles which underlie the development of tissues and organ systems in animals, including classical embryology through utilization of numerous laboratory techniques within an authentic experiential learning environment.
K. Course Prerequisites:	BIOL A252 with minimum grade of C.
L. Course Co-requisites:	N/A
M. Other Restrictions:	N/A
N. Registration Restrictions:	None
O. Course Fees:	Yes

III. Instructional Goals and Student Learning Outcomes

A. Instructional Goals. The instructor will:

1. Explain and provide a framework for understanding the principles and key concepts of development, and describe the process.
2. Provide hands-on examples by which genes in the fertilized egg control cell behavior in the embryo to determine its pattern, form and behavior.
3. Discuss the latest research findings relevant to embryogenesis and how genes and epigenetics control cell behavior and development.
4. Train students in classical histology and in the latest research techniques in developmental biology.

B. Student Learning Outcomes and Assessment Measures

Student Learning Outcomes: Upon completion of this course, the student will be able to:	Assessment Measures
1. Illustrate the fundamental concepts of development in animals.	In class discussions, written assignments
2. Evaluate the mechanisms by which gene expression controls specific aspects of development in different model organisms.	Hands-on experiential learning including mating/fertilization, developmental staging, and RNA interference and analysis; written lab reports; in-class discussions
3. Analyze data presented in the primary literature on developmental biology.	Presentations, in class discussions

4. Formulate and test hypotheses regarding the role of specific genes or epigenetic effects on development.	Experimental design and implementation, data analysis, written assignment, in class discussion

IV. Course Level Justification

This course is designed for Biological and Natural Sciences majors as an elective undergraduate course comparable to 400-level developmental biology courses offered at other universities.

V. Topical Course Outline

A. Basic concepts of development
B. Model organisms
   1. *Xenopus*, axolotls, *Drosophila*, sea urchin, chick, pig
C. Developmental genes
D. Vertebrate body axes
E. Specification of vertebrate germ layers
F. Gastrulation
G. Somite formation and patterning
H. Organizer region and neural induction
I. Maternal and early embryonic genes
J. Segmentation and homeotic genes
K. Neural tube formation, neural crest migration and other cell movements
L. Epigenetics and gene expression in development
M. Inheritance of patterns of gene expression
N. Control of gene expression
O. Organogenesis and limb formation
P. Axonal guidance and synapse formation
Q. Sex determination
R. Germ cells and fertilization
S. Regeneration
T. Growth, metamorphosis, aging
U. Evolution and development

VI. Suggested Texts

Gilbert, S.F. Developmental Biology. 10th edition. Sinauer Associates, Inc. 2013.

VII. Bibliography

Slack, J.M.W. Essential Developmental Biology. 3rd edition. Wiley-Blackwell. 2012.

Primary literature from journals such as Development, Mechanisms of Development, Science, Cell, Nature, and similar titles.

Course Action Request
University of Alaska Anchorage
Proposal to Initiate, Add, Change, or Delete a Course

1a. School or College	1b. Division	1c. Department
AS CAS	AMSC Division of Math Science	Biological Sciences

2. Course Prefix	3. Course Number	4. Previous Course Prefix & Number	5a. Credits/CEUs	5b. Contact Hours (Lecture + Lab)
BIOL	A489	N/A	3	(3+0)

6. Complete Course Title
Population Genetics and Evolutionary Processes
Popn Genetics Evol Processes
Abbreviated Title for Transcript (30 character)

7. Type of Course ☒ Academic ☐ Preparatory/Development ☐ Non-credit ☐ CEU ☐ Professional Development

8. Type of Action: ☐ Add *or* ☒ Change *or* ☐ Delete

If a change, mark appropriate boxes:

- ☐ Prefix
- ☐ Credits
- ☐ Title
- ☐ Grading Basis
- ☐ Course Description
- ☐ Test Score Prerequisites
- ☐ Automatic Restrictions
  - ☐ Class ☐ Level
  - ☐ College ☐ Major
- ☒ Other CCG (please specify)
- ☐ Course Number
- ☐ Contact Hours
- ☐ Repeat Status
- ☐ Cross-Listed/Stacked
- ☒ Course Prerequisites
- ☐ Co-requisites
- ☐ Registration Restrictions
- ☐ General Education Requirement

9. Repeat Status No # of Repeats Max Credits

10. Grading Basis ☒ A-F ☐ P/NP ☐ NG

11. Implementation Date semester/year
From: Fall/2015 To: Fall /9999

12. ☐ Cross Listed with
☐ Stacked with
Cross-Listed Coordination Signature

13a. Impacted Courses or Programs: List any programs or college requirements that require this course.
Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at www.uaa.alaska.edu/governance.

Impacted Program/Course	*Date of Coordination*	*Chair/Coordinator Contacted*
1.		
2.		
3.		

Initiator Name (typed): Khrys Duddleston Initiator Signed Initials: _____ Date:_____

13b. Coordination Email Date: 6Jan14
submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)

13c. Coordination with Library Liaison Date: 6Jan14

14. General Education Requirement *Mark appropriate box:*
☐ Oral Communication ☐ Written Communication ☐ Quantitative Skills ☐ Humanities
☐ Fine Arts ☐ Social Sciences ☐ Natural Sciences ☒ Integrative Capstone

15. Course Description *(suggested length 20 to 50 words)*
A comprehensive examination of the primary forces and processes involved in shaping genetic variation in natural populations (mutation, drift, selection, migration, recombination, mating patterns, population size and population subdivision), methods of measuring genetic variation in nature, and experimental tests of important ideas in population genetics.

16a. Course Prerequisite(s) *(list prefix and number or test code and score)*
[BIOL A252 or BIOL A288] with minimum grade of C

16b. Co-requisite(s) *(concurrent enrollment required)*

16c. Automatic Restriction(s)
☐ College ☐ Major ☐ Class ☐ Level

16d. Registration Restriction(s) *(non-codable)*
Completion of all GER Tier 1 courses is required.

17. ☐ Mark if course has fees

18. ☐ Mark if course is a selected topic course

19. Justification for Action
One of the prerequisites (BIOL A288) has been renumbered through departmental curriculum revisions.

Initiator (faculty only) Date
Khrys Duddleston
Initiator (TYPE NAME)

☐ Approved
☐ Disapproved
Department Chair Date

☐ Approved
☐ Disapproved
College/School Curriculum Committee Chair Date

☐ Approved
☐ Disapproved
Dean/Director of School/College Date

☐ Approved
☐ Disapproved
Undergraduate/Graduate Academic Board Chair Date

☐ Approved
☐ Disapproved
Provost or Designee Date

University of Alaska Anchorage
College of Arts and Sciences
Course Content Guide

I. Date of Initiation: Spring 2014

II. Curriculum Action Request

A. College:	College of Arts and Sciences
B. Course Prefix:	BIOL
C. Course Number:	A489
D. Number of Credits:	3
E. Contact Hours:	3+0
F. Course Title:	Population Genetics and Evolutionary Processes
G. Grading Basis:	A-F
H. Implementation Date:	Fall 2015
I. Cross-listed/Stacked:	N/A
J. Course Description:	A comprehensive examination of the primary forces and processes involved in shaping genetic variation in natural populations (mutation, drift, selection, migration, recombination, mating patterns, population size and population subdivision), methods of measuring genetic variation in nature, and experimental tests of important ideas in population genetics
K. Course Prerequisites:	BIOL A252 or BIOL A288 with minimum grade of C.
L. Course Co-requisites:	N/A
M. Other Restrictions:	N/A
N. Registration Restrictions:	Senior Standing
O. Course Fees:	No

III. Instructional Goals and Student Learning Outcomes

A. Instructional Goals. The instructor will:

1. Provide a basic description of evolutionary theory and concepts
2. Build on the conceptual framework to describe how evolutionary process results in evolutionary pattern
3. Link current research on microevolutionary processes relate to observed responses to environmental and climate change
4. Emphasize the underlying quantitative processes that structure the living world, and enable students to undertake analyses and conceptualization of processes on their own
5. Provide detailed examples of modern evolutionary analysis and theory as mechanisms of biotic change and diversification
6. Relate all of the above to current issues in local and national debate on endangered populations, relevance of evolution thought to modern life (evolutionary medicine, emerging disease and virulence, endangered species, etc.)
7. Assist students to learn how to evaluate and integrate information from a variety of sources and perspectives.

B. Student Learning Outcomes and Assessment Measures

Students will be able to:	Assessment Method:
1. Read, understand, and integrate information from scientific articles with that provided in lecture and textbook assignments, and to use this information to evaluate the scientific accuracy of reports from the popular press or public science.	Exams, written assignments, in-class presentations.
2. Demonstrate an in-depth understanding of evolutionary process, microevolution mechanisms, and macroevolutionary patterns.	Exams and written assignments
3. Demontrate an in-depth understanding of evolutionary process, microevolution mechanisms, and macroevolutionary patterns.	Written assignments, in-class presentations.

IV. Course Level Justification

Students are required to learn and integrate information from a variety of scientific disciplines as it relates to applied genetics, advanced evolutionary analysis, and microevolutionary proesses; to read, understand, and apply ideas conveyed by primary scientific literature; to synthesize current biological knowledge and evolutionary theory; and to apply course materials to current problems

GER Integrative Capstone Justification:

Justifications for designating BIOL A489 Population Genetics and Evolutionary Theory as a GER Integrative Capstone course include:

1. Knowledge Integration/Interrelationships and synergy among GER disciplines: The overall theme of the course is understanding the relationship of evolutionary processes to other natural and social sciences. The course will focus on the interfaces among physical sciences (biochemistry, geological history, mathematics), biological sciences (biology, ecology, conservation, molecular biology, etc.), and the social sciences (particularly human biology, sociology, anthropology).

2. Effective Communication Skills: Course success demands effective communicaiton through essay examinations, individual classroom presentations, brief reports (oral and written) on current controversies surrounding evolution and evolutionary processes, and a final research product.

3. Critical Thinking: Students will not be able to succeed in the course unless they are are able to integrate information across disciplines, and critically evaluate the reliability of data and positions presented in lecture, texts, scientific, and popular viewpoints. Student ability to criticallly evaluate diverse material will be determined based on writing assignments, class presentations, and examinations.

4. Information Literacy: Students are expected to achieve and demonstrate computer and internet skills for acquiring information relevant to current topics in evolutionary biology. This will involve research in the primary scientific literature, and the collection of information from unpublished sources such as popular press and public statements. Students will be required to show that they can critically winnow facts and scientific content from diverse non-scientific sources.

5. Quantitative Perspectives: A critical understanding of evolutionary processes is grounded in many quantitative disciplines, including statistical analysis, applied maths (algegra, calculus, probability and combinatorics, etc.), general and advanced genetics, molecular biology. In addition, students must be able to read and interpret scientific data in graphical and tabular form, and to generate appropriate graphical displays of their own results. Microevolutionary analysis is only possible using sophisticated computer-based analytical techniques including: Bayesian analysis, Monte Carlo simulation, maximum likelihood analysis, and discrete graph analysis. Exams will specifically test on these skills.

6. Evolving realities of the 21st century: The growing understanding that evolution is a dynamic and everpresent component of modern life, particularly in the context of climate change and anthropogenic change, touches many aspects of science, policy, and social attitudes. This course will help students understand the implication of evolutionary process in a changing environment, and provide them with effective means to communicate its important and relevance for individuals and society.

V. Topical Course Outline

A. Population Structure
   1. Hardy Weinberg Equilibrium
   2. Systems of Mating
   3. Demographics
   4. Genetic Drift
   5. Neutrality and Molecular Evolution
   6. Coalescence
   7. Gene Flow & Subdivision
   8. Founders and Survivors
   9. mtDNA, Y-DNA: Separating History From Gene Flow

B. Genotype and Phenotype
   1. Quantitative Genetics: Means
   2. Quantitative Genetics: Variances
   3. The Unmeasured Genotype Approach
   4. The Measured Genotype Approach

C. Selection
   1. Measures of Fitness
   2. Constant Fitness Models
   3. Selection on Quantitative Traits and FFTNS
   4. Pleiotropy and Developmental Constraints
   5. The Shifting Balance Theory

D. Units and Targets of Selection
   1. The Unit of Selection
   2. Meiotic and Molecular Drive
   3. Sexual, Frequency and Density Dependent Selection I
   4. Asexual selection, lateral gene transfer

E. Ecological Genetics
   1. Environmental Heterogeneity
   2. Niche and Mimicry
   3. Coevolution and Host-parasite Systems
   4. Life History Evolution

F. Human Evolution and Sociobiology
   1. Hominid Evolution
   2. Altruism and Group Selection

3. Cultural Evolution

VI. Suggested Texts

Hamilton MB. Population Genetics. Wiley-Blackwell Publ. 2010.

Herron JC, Freeman S. Evolutionary Analysis, 5th Edition. Pearson Publ. 2014.

VII. Bibliography

Epperson BK. Geographical Genetics. Princeton U Press. 2003.

Erickson DL et al. 2004. Quantitative trait locus analyses and the study of evolutionary process. Molecular Ecology 13: 2505-2522.

Kimura M. 1989. The neutral theory of molecular evolution. Genome 31: 24-31.

Roff DA. 2007. A centennial celebration for quantitative genetics. Evolution 61: 1017-1032.

Wolf JB, Brodie ED, Wade MJ (Eds.). Epistasis and the Evolutionary Process. Oxford U Press. 2000.

Course Action Request
University of Alaska Anchorage
Proposal to Initiate, Add, Change, or Delete a Course

1a. School or College	1b. Division	1c. Department
AS CAS	AMSC Division of Math Science	Biological Sciences

2. Course Prefix	3. Course Number	4. Previous Course Prefix & Number	5a. Credits/CEUs	5b. Contact Hours (Lecture + Lab)
BIOL	A495	N/A	1.0	(0+3)

6. Complete Course Title
Instructional Practicum: Laboratory
Instructional Practicum: Lab
Abbreviated Title for Transcript (30 character)

7. Type of Course ☒ Academic ☐ Preparatory/Development ☐ Non-credit ☐ CEU ☐ Professional Development

8. Type of Action: ☐ Add *or* ☒ Change *or* ☐ Delete

If a change, mark appropriate boxes:

- ☐ Prefix
- ☐ Credits
- ☐ Title
- ☐ Grading Basis
- ☒ Course Description
- ☐ Test Score Prerequisites
- ☐ Automatic Restrictions
  - ☐ Class ☐ Level
  - ☐ College ☐ Major
- ☒ Other CCG (please specify)
- ☐ Course Number
- ☐ Contact Hours
- ☐ Repeat Status
- ☐ Cross-Listed/Stacked
- ☐ Course Prerequisites
- ☐ Co-requisites
- ☒ Registration Restrictions
- ☐ General Education Requirement

9. Repeat Status Yes # of Repeats 1 Max Credits 2

10. Grading Basis ☒ A-F ☐ P/NP ☐ NG

11. Implementation Date semester/year
From: Fall/2015 To: Fall/9999

12. ☐ Cross Listed with
☐ Stacked with
Cross-Listed Coordination Signature

13a. Impacted Courses or Programs: List any programs or college requirements that require this course.
Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at www.uaa.alaska.edu/governance.

Impacted Program/Course	*Date of Coordination*	*Chair/Coordinator Contacted*
1.		
2.		
3.		

Initiator Name (typed): Khrys Duddleston Initiator Signed Initials: _____ Date:_____

13b. Coordination Email Date: 6Jan14
submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)

13c. Coordination with Library Liaison Date: 6Jan14

14. General Education Requirement *Mark appropriate box:*
☐ Oral Communication ☐ Written Communication ☐ Quantitative Skills ☐ Humanities
☐ Fine Arts ☐ Social Sciences ☐ Natural Sciences ☐ Integrative Capstone

15. Course Description *(suggested length 20 to 50 words)*
Supervised instructional experience in a 2-hr, 3-hr or 4-hr biology laboratory or experiential learning course. Planning, presentation of material, achievement testing and correlation with lecture under the direct supervision of department faculty. Add Special Note about Repeat and mimic original description.

16a. Course Prerequisite(s) *(list prefix and number or test code and score)*
N/A

16b. Co-requisite(s) *(concurrent enrollment required)*

16c. Automatic Restriction(s)
☐ College ☐ Major ☐ Class ☐ Level

16d. Registration Restriction(s) *(non-codable)*
Minimum 20 credits in BIOL

17. ☐ Mark if course has fees

18. ☐ Mark if course is a selected topic course

19. Justification for Action
Update of CCG: modifying instructional goals and student expectations

Initiator (faculty only) Date
Khrys Duddleston
Initiator (TYPE NAME)

☐ Approved
☐ Disapproved
Department Chair Date

☐ Approved
☐ Disapproved
College/School Curriculum Committee Chair Date

☐ Approved
☐ Disapproved
Dean/Director of School/College Date

☐ Approved
☐ Disapproved
Undergraduate/Graduate Academic Board Chair Date

☐ Approved
☐ Disapproved
Provost or Designee Date

University of Alaska Anchorage
College of Arts and Sciences
Course Content Guide

I. Date of Initiation: Spring 2014

II. Curriculum Action Request

A. College:	College of Arts and Sciences
B. Course Prefix:	BIOL
C. Course Number:	A495
D. Number of Credits:	1
E. Contact Hours:	0+3
F. Course Title:	Instructional Practicum: Laboratory
G. Grading Basis:	A-F
H. Implementation Date:	Fall 2015
I. Cross-listed/Stacked:	N/A
J. Course Description:	Supervised instructional experience in a 2-hr, 3-hr or 4-hr biology laboratory or experiential learning course. Planning, presentation of material, achievement testing and correlation with lecture under the direct supervision of department faculty. Special Note : May be repeated once for credit.
K. Course Prerequisites:	N/A
L. Course Co-requisites:	N/A
M. Other Restrictions:	N/A
N. Registration Restrictions:	Minimum 20 credits in BIOL
O. Course Fees:	No

III. Instructional Goals and Student Learning Outcomes

A. Instructional Goals. The instructor will:

1. Mentor students in learning how to teach effectively
2. Model appropriate instructor/student relationship and instructor ethics in and out of the classroom
3. Actively guide students in pedagogical methods and techniques to assist and answer student questions
4. Provide supervisory coordination to maintain the coordinated delivery of practical and lecture materials and presentations

B. Student Learning Outcomes and Assessment Measures

Students will be able to:	Assessment Method:
1. Apply basic pedagogical skills by delivering instructional presentations in an experiential learning or laboratory setting.	Presentations, assisting instructor and students
2. Apply theoretical and practical teaching tools to organize, plan, present, demonstrate, assess and nurture student learning in an experiential learning or laboratory setting.	Presentations, assisting instructor and students

3. Effectively communicate skills in an experiential learning or laboratory setting.	Presentations, assisting instructor and students

IV. Course Level Justification

Designed for Biological and Natural Sciences majors and as elective undergraduate course comparable to 400-level teaching practica offered at other universities. Enables students to plan and present materials, conduct exams and quizzes, and correlate laboratory presentations with lecture material under direct supervision and mentoring of department faculty.

V. Topical Course Outline

A. Student will attend all weekly laboratory sessions for the course assigned
B. Student will attend all weekly planning meetings
C. Student will assist course enrollees with experiments and answer questions during class
D. Student will prepare and deliver 2 separate laboratory/experiential learning lead-ins
    1. Student will help prepare quizzes, exam questions and homework questions associated with the 2 laboratory lead-ins they prepare
    2. Student will help grade quizzes, exam questions and homework questions associated with the 2 laboratory lead-ins they prepare

VI. Suggested Texts

The text will vary depending on the assigned class for instructor practicum.

VII. Bibliography

Handelsman, J., S. Miller, C. Pfund. Scientific Teaching. W.H. Freeman and Co. NY. 2007.

McKeachie, Wilbert J. McKeachie's Teaching Tips: Strategies, Research and Theory for College and University Teachers. 10th ed. Houghton Mifflin Co. NY. 1999.

Department of Biological Sciences
University of Alaska Anchorage

3211 Providence Drive
Anchorage, Alaska 99508-4614
T 907.786.4770 • F 907.786.4607
http://www.uaa.alaska.edu/biology/

8Jan14

To: CAS Course and Curriculum Committee
Undergraduate Academic Board

From: Khrys Duddleston, Chair
Department of Biological Sciences Curriculum Committee

RE: Changes to the B.A. in Biological Sciences Degree

The Department of Biological Sciences proposes the following changes to the B.A. in Biological Sciences Degree

1. Changes to the core course requirements
2. Organize upper division electives into five areas
3. Updating upper division course offerings

These changes are intended to ensure that core course requirements prepare students for upper division electives as well as improve the depth and breadth of exposure to sub disciplines within the biological sciences. The purpose for making these changes is to improve the time to completion of the degree and align our curriculum with the core concepts and competencies outlined in Vision and Change in Undergraduate Biology Education: A Call to Action (2013), a report of a national conference organized by the American Association for the Advancement of Science with support from the National Science Foundation.

Please contact me if you have any additional questions.

Program/Prefix Action Request
University of Alaska Anchorage
Proposal to Initiate, Add, Change, or Delete a Program of Study or Prefix

1a. School or College	1b. Department
AS CAS	Biological Sciences

2. Complete Program Title/Prefix
Bachelor of Arts, Biological Sciences

3. Type of Program

Choose one from the appropriate drop down menu: Undergraduate: Bachelor of Arts or Graduate: CHOOSE ONE

This program is a Gainful Employment Program: ☐ Yes or ☒ No

4. Type of Action:

PROGRAM	PREFIX
☐ Add	☐ Add
☒ Change	☐ Change
☐ Delete	☐ Inactivate

5. Implementation Date (semester/year)
From: Fall/2015 To: Fall/9999

6a. Coordination with Affected Units Department, School, or College: CAS

Initiator Name (typed): Khrys Duddleston Initiator Signed Initials: _____
Date:_____

6b. Coordination Email submitted to Faculty Listserv (uaa-faculty@lists.uaa.alaska.edu) Date: 6Jan14

6c. Coordination with Library Liaison Date: 6Jan14

7. Title and Program Description - Please attach the following:

☒ Cover Memo ☒ Catalog Copy in Word using the track changes function

8. Justification for Action

The purpose for making these changes is to improve the time to completion of the degree and align our curriculum with the core concepts and competencies outlined in Vision and Change in Undergraduate Biology Education: A Call to Action (2013), a report of a national conference organized by the American Association for the Advancement of Science with support from the National Science Foundation.

Initiator (faculty only) Date Khrys Duddleston Initiator (TYPE NAME)	☐ Approved ☐ Disapproved Dean/Director of School/College Date
☐ Approved ☐ Disapproved Department Chair Date	☐ Approved ☐ Disapproved Undergraduate/Graduate Academic Board Chair Date
☐ Approved ☐ Disapproved College/School Curriculum Committee Chair Date	☐ Approved ☐ Disapproved Provost or Designee Date

Department of Biological Sciences
University of Alaska Anchorage

3211 Providence Drive
Anchorage, Alaska 99508-4614
T 907.786.4770 • F 907.786.4607
http://www.uaa.alaska.edu/biology/

8Jan14

To: CAS Course and Curriculum Committee
Undergraduate Academic Board

From: Khrys Duddleston, Chair
Department of Biological Sciences Curriculum Committee

RE: Changes to the B.S. in Biological Sciences Degree

The Department of Biological Sciences proposes the following changes to the B.S. in Biological Sciences Degree

1. Changes to the core course requirements
2. Organize upper division electives into five areas
3. Require students to take a minimum of three credits in four of the five areas, and a minimum of six experiential learning credits from 2 of the five areas

These changes are intended to ensure that core course requirements prepare students for upper division electives as well as improve the depth and breadth of exposure to sub disciplines within the biological sciences. The purpose for making these changes is to improve the time to completion of the degree and align our curriculum with the core concepts and competencies outlined in Vision and Change in Undergraduate Biology Education: A Call to Action (2013), a report of a national conference organized by the American Association for the Advancement of Science with support from the National Science Foundation.

Please contact me if you have any additional questions.

Program/Prefix Action Request
University of Alaska Anchorage
Proposal to Initiate, Add, Change, or Delete a Program of Study or Prefix

1a. School or College	1b. Department
AS CAS	Biological Sciences

2. Complete Program Title/Prefix
Bachelor of Science, Biological Sciences

3. Type of Program

Choose one from the appropriate drop down menu: Undergraduate: Bachelor of Science or Graduate: CHOOSE ONE

This program is a Gainful Employment Program: ☐ Yes or ☒ No

4. Type of Action:

PROGRAM	PREFIX
☐ Add	☐ Add
☒ Change	☐ Change
☐ Delete	☐ Inactivate

5. Implementation Date (semester/year)
From: Fall/2015 To: Fall/9999

6a. Coordination with Affected Units Department, School, or College: CAS

Initiator Name (typed): Khrys Duddleston Initiator Signed Initials: _____
Date:_____

6b. Coordination Email submitted to Faculty Listserv (uaa-faculty@lists.uaa.alaska.edu) Date: 6Jan14

6c. Coordination with Library Liaison Date: 6Jan14

7. Title and Program Description - Please attach the following:

☒ Cover Memo ☒ Catalog Copy in Word using the track changes function

8. Justification for Action

The purpose for making these changes is to improve the time to completion of the degree and align our curriculum with the core concepts and competencies outlined in Vision and Change in Undergraduate Biology Education: A Call to Action (2013), a report of a national conference organized by the American Association for the Advancement of Science with support from the National Science Foundation.

Initiator (faculty only) Date Khrys Duddleston Initiator (TYPE NAME)	☐ Approved ☐ Disapproved Dean/Director of School/College Date
☐ Approved ☐ Disapproved Department Chair Date	☐ Approved ☐ Disapproved Undergraduate/Graduate Academic Board Chair Date
☐ Approved ☐ Disapproved College/School Curriculum Committee Chair Date	☐ Approved ☐ Disapproved Provost or Designee Date

BIOLOGICAL SCIENCES

ConocoPhillips Integrated Sciences Building (CPSB), Room 101P, (907) 786-4770
www.uaa.alaska.edu/biology

Biology is the science concerned with the study of living organisms. It encompasses a vast range of biological disciplines, from the study of microbes and molecular biology to the study of plants, animals and the environment. The undergraduate program in the Biological Sciences includes courses that provide students with a broad understanding of both traditional and modern biological sciences. These courses are suitable as preparation for professional degrees, teaching, or careers in government or industry. Both the Bachelor of Arts and the Bachelor of Science degrees are available for undergraduates. A Master of Science degree program in Biological Sciences as well as a joint UAA-UAF Doctor of Science degree program is available for students already holding a baccalaureate degree.

A program of study in the biological sciences requires completion of a basic science core curriculum in the chemical, physical and mathematical sciences as well as required and elective courses in the biological sciences. A degree in the biological sciences prepares students who wish to pursue careers in medicine, dentistry, veterinary medicine, ecology and the environmental sciences in the private or public sector, or who wish to attend graduate school. Students are strongly encouraged to consult with their academic advisors within the Department of Biological Sciences to determine which electives best suit their programmatic needs and career requirements.

The Bachelor of Arts and the Bachelor of Science degree programs require a total of 120-125 credits for graduation and can be completed in four years by students who have had adequate high school preparation in math and sciences. Refer to the beginning of this chapter for recommended high school courses.

Program Student Learning Outcomes

It is expected that graduates of the Biological Sciences program will:

1. Demonstrate an understanding of the core concepts in the biological sciences: evolution; structure and function relationships; information flow, exchange and storage; transformation of energy and matter
2. Apply the process of science and construct knowledge through observations, experimentation, quantitative reasoning and hypothesis testing
3. Read, analyze and synthesize primary literature, and communicate scientific concepts and data in written and oral form

Community Service Courses

The department offers a wide range of community service courses as a service to the people in the Anchorage area and extended campuses who wish to become more knowledgeable about the science of biology and how it relates to them. Unless noted otherwise in the course description, community service courses do not satisfy either core requirements or elective credit toward any degree programs in the biological sciences. All are offered as demand warrants.

BIOL A074	Field Natural History
BIOL A075	Local Flora
BIOL A100	Human Biology
BIOL A124	Biota of Alaska: Selected Topics
BIOL A126	Birds in Field and Laboratory

Departmental Honors in Biology

Undergraduate Biological Science majors may be recognized for exceptional performance by earning departmental honors in Biology. In order to receive honors in biology, a student must meet each of the following requirements:

1. Meet the requirements for Graduation with Honors as listed in Chapter 7.
2. Meet the requirements for a BA/BS degree in Biological Sciences.
3. Earn a grade point average of 3.50 or above in the major requirements.

4. During the senior year of their academic program, the student must gain faculty approval for and complete, with a grade of B or better, a senior thesis research project, with enrollment in BIOL A499 Senior Thesis. Biological Science faculty members must approve the project proposal and final written report.

Bachelor of Arts, Biological Sciences

Admission Requirements

Complete the Admission to Baccalaureate Programs Requirements in Chapter 7.

Academic Progress

To graduate with a BA in Biological Sciences, the student must complete all courses covered under Major Requirements for a BA in Biological Sciences with a grade of C or better. All prerequisites for Biology courses must be completed with a grade of C or better. Students who audit, or are unable to earn a grade of C or better in, a lower-division (100 or 200 level) course in the Department of Biological Sciences (BIOL) may repeat the course two additional times on a space available basis. Students who audit, or are unable to earn a grade of C or better in, an upper-division (300 or 400 level) course in the Department of Biological Sciences may repeat the course one additional time on a space available basis. Students repeating a course in the Department of Biological Sciences are required to complete all components of that course during the semester in which the course is retaken. When repeating a course with a linked lecture and laboratory component, both components must be repeated. Students enrolled in a laboratory or Experiential Learning course in the Department of Biological Sciences must attend the lab or course the first week of class or they may be administratively dropped.

Graduation Requirements

Students must complete the following graduation requirements:

A. General University Requirements

Complete the General University Requirements for All Baccalaureate Degrees located at the beginning of this chapter.

B. General Education Requirements

Complete the General Education Requirements for Baccalaureate Degrees listed at the beginning of this chapter.

C. College of Arts and Sciences Requirements

Complete the College of Arts and Sciences Requirements listed at the beginning of the CAS section.

D. Major Requirements

1. Complete these required core courses (34-35 credits):

BIOL A108	Principles and Methods in Biology	6
BIOL A242	Fundamentals of Cell Biology	3
BIOL A252	Principles of Genetics	3
BIOL A271	Principles of Ecology	3
BIOL A288	Principles of Evolution	3
BIOL A243	Experiential Learning: Genetics and Cell Biology	4
	or	
BIOL A273	Experiential Learning: Ecology and Evolution	4
BIOL A492	Undergraduate Seminar	1
CHEM A105	General Chemistry I	3
CHEM A105L	General Chemistry I Laboratory	1
CHEM A106	General Chemistry II	3
CHEM A106L	General Chemistry II Laboratory	1
STAT A252	Elementary Statistics (3)	3-4

or

STAT A253 Applied Statistics for the Sciences (4)

or

STAT A307 Probability and Statistics (4)

2. Complete 18-19 credits of upper division program electives from the following areas.
   a. A minimum of 3 credits must come from each of 4 of the 5 areas.*
   b. A minimum of 6 credits must be Experiential Learning from 2 areas**. 18-19

Genetics, Cellular and Molecular Biology

BIOL A340 Microbial Biology (3)
BIOL A451 Microbial Biotechnology (3)
BIOL A452 Human Genome (3)
BIOL A461 Molecular Biology (3)
BIOL A462 Virology (3)
BIOL A463 Molecular Biology of Cancer (3)
BIOL A464 Metals in Biology (3)
BIOL A471 Immunology (3)

BIOL A342 Experiential Learning: Microbial Biology (4)
BIOL A403 Experiential Learning: Microscopical Tissue Techniques (6)
BIOL A454 Experiential Learning: Microbial Biotechnology (4)
BIOL A455 Experiential Learning: Bioinformatics (4)
BIOL A465 Experiential Learning: Molecular Biology (4)
BIOL A488 Experiential Learning: Developmental Biology (4)

Ecology and Evolution

BIOL A365 Astrobiology (3)
BIOL A430 Marine Mammals and Seabirds (3)
BIOL A441 Animal Behavior (3)
BIOL A445 Plant-Herbivore Ecology (4)
BIOL A450 Microbial Ecology (3)
BIOL A472 Biogeography (3)
BIOL A473 Conservation Biology (3)
BIOL A474 Ecotoxicology (3)
BIOL A475 Fish Ecology (3)
BIOL A476 Wildlife Population Dynamics and Management (3)
BIOL A477 Tundra and Taiga Ecosystems (3)
BIOL A478 Biological Oceanography (3)
BIOL A479 Physiological Plant Ecology (3)
BIOL A480 Ecological and Conservation Genetics (3)
BIOL A481 Marine Biology (3)
BIOL A482 Spatial Ecology (3)
BIOL A483 Exploration Ecology (2)
BIOL A486 Evolutionary Ecology (3)
BIOL A489 Population Genetics and Evolutionary Processes (3)

BIOL A442 Experiential Learning: Animal Behavior (3)
BIOL A453 Experiential Learning: Microbial Ecology (4)
BIOL A484 Experiential Learning: Exploration Ecology Field Study (4)

Diversity and Organismal Biology

BIOL A320	Vertebrate Biology (3)
BIOL A330	Plant Biology (3)
BIOL A340	Microbial Biology (3)
BIOL A423	Ichthyology (3)
BIOL A427	Marine Invertebrate Biology (3)
BIOL A430	Marine Mammals and Seabirds (3)
BIOL A431	Plant Diversity and Evolution (3)
BIOL A487	Comparative Anatomy of Vertebrates (3)

BIOL A321	Experiential Learning: Vertebrate Biology (2)
BIOL A332	Experiential Learning: Plant Biology (2)
BIOL A342	Experiential Learning: Microbial Biology (4)

Physiology

BIOL A310	Principles of Animal Physiology (3)
BIOL A316	Principles of Plant Physiology (3)
BIOL A412	Behavioral Endocrinology (3)
BIOL A413	Neurophysiology (3)
BIOL A414	Chronobiology (3)
BIOL A415	Comparative Animal Physiology (3)
BIOL A416	Exercise Physiology (3)
BIOL A418	Fish Physiology (3)
BIOL A479	Physiological Plant Ecology (3)
BIOL A487	Comparative Anatomy of Vertebrates (3)

Additional Upper Division Electives

BIOL A456	Nonlinear Dynamics and Chaos (3)
BIOL A490	Selected Lecture Topics in Biology (1-3)
BIOL A495	Instructional Practicum: Laboratory (1)
BIOL A497	Independent Study in Biology (1-12)
BIOL A498	Individual Research (1-6)
BIOL A499	Senior Thesis (3)
BIOL A490L	Selected Laboratory Topics in Biology (1-3)

BIOL A406	Experiential Learning: Biostatistics (4)
BIOL A408	Experiential Learning: Scanning Electron Microscopy (SEM)

**Several courses are listed under more than one area. Each course can only count toward the credit requirement in one area.*

***BIOL A498 credits may not be counted toward the Experiential Learning minimum requirement*

***BIOL A490L credits may be counted toward the Experiential Learning minimum requirement*

3. It is recommended that students complete 8 credits from the following: 8

GEOL A111	Physical Geology (4)
GEOL A221	Historical Geology (4)
	or
PHYS A123	Basic Physics I (3)
	and
PHYS A123L	Basic Physics I Laboratory (1)
PHYS A124	Basic Physics II (3)

	and
PHYS A124L	Basic Physics II Laboratory (1)
	or
PHYS A211	General Physics I (3)
	and
PHYS A211L	General Physics I Laboratory (1)
PHYS A212	General Physics II (3)
	and
PHYS A212L	General Physics II Laboratory (1)

4. A total of 124 credits is required for the degree, 42 credits of which must be upper division.

Bachelor of Science, Biological Sciences

The Bachelor of Science degree includes a single core program of coursework with electives selected from 4 sub-disciplines within the biological sciences. A wide selection of electives is available to all students, including courses offered under BIOL A490, which is a selected topics course. It is imperative that students consult their academic advisors within the Department of Biological Sciences to determine which electives are most appropriate to their career interests. Some of these elective courses are offered periodically, depending on demand. Refer to course descriptions to identify these courses.

Admission Requirements

Complete the Admission to Baccalaureate Programs Requirements in Chapter 7.

Academic Progress

To graduate with a BS in Biological Sciences, the student must complete all courses covered under Major Requirements for a BS in Biological Sciences with a grade of C or better. All prerequisites for Biology courses must be completed with a grade of C or better. Students who audit, or are unable to earn a grade of C or better in, a lower-division (100 or 200 level) course in the Department of Biological Sciences (BIOL) may repeat the course two additional times on a space available basis. Students who audit, or are unable to earn a grade of C or better in, an upper-division (300 or 400 level) course in the Department of Biological Sciences may repeat the course one additional time on a space available basis. Students repeating a course in the Department of Biological Sciences are required to complete all components of that course during the semester in which the course is retaken. When repeating a course with a linked lecture and laboratory component, both components must be repeated. Students enrolled in a laboratory or Experiential Learning course in the Department of Biological Sciences must attend the lab or course the first week of class or they may be administratively dropped.

Graduation Requirements

Students must complete the following graduation requirements:

A. General University Requirements

Complete the General University Requirements for All Baccalaureate Degrees located at the beginning of this chapter.

B. General Education Requirements

Complete the General Education Requirements for Baccalaureate Degrees listed at the beginning of this chapter.

C. College of Arts and Sciences Requirements

Complete the College of Arts and Sciences Requirements listed at the beginning of the CAS section.

D. Major Requirements

1. Some major requirements may also be used to satisfy the College of Arts and Sciences BS requirements.
2. Complete these required support courses (36 credits):

CHEM A105	General Chemistry I	3
CHEM A105L	General Chemistry I Laboratory	1
CHEM A106	General Chemistry II	3

CHEM A106L	General Chemistry II Laboratory	1
CHEM A321	Organic Chemistry I	3
CHEM A322	Organic Chemistry II	3
CHEM A323L	Organic Chemistry Laboratory	2
MATH A200	Calculus I	4
MATH A201	Calculus II	4
PHYS A123	Basic Physics I (3)	8
PHYS A123L	Basic Physics I Laboratory (1)	
	and	
PHYS A124	Basic Physics II (3)	
PHYS A124L	Basic Physics II Laboratory (1)	
	or	
PHYS A211	General Physics I (3)	
PHYS A211L	General Physics I Laboratory (1)	
	and	
PHYS A212	General Physics II (3)	
PHYS A212L	General Physics II Laboratory (1)	
STAT A253	Applied Statistics for the	
	Sciences (4)	4
	or	
STAT A307	Probability and Statistics (4)	

3. Complete Biological Sciences core courses (22 credits):

BIOL A108	Principles and Methods in Biology	6
BIOL A242	Fundamentals of Cell Biology	3
BIOL A252	Principles of Genetics	3
BIOL A271	Principles of Ecology	3
BIOL A288	Principles of Evolution	3
BIOL A243	Experiential Learning: Genetics and	
	Cell Biology	4
	or	
BIOL A273	Experiential Learning: Ecology and	
	Evolution	4
BIOL A492	Undergraduate Seminar	1

4. Complete at least 24 credits of upper division program electives from the following areas.
   - *a.* A minimum of 3 credits must come from each of 4 of the five 5 areas*.
   - *b.* A minimum of 6 credits must be Experiential Learning from 2 areas**. 24

Genetics, Cellular and Molecular Biology

BIOL A340	Microbial Biology (3)
BIOL A451	Microbial Biotechnology (3)
BIOL A452	Human Genome (3)
BIOL A461	Molecular Biology (3)
BIOL A462	Virology (3)
BIOL A463	Molecular Biology of Cancer (3)
BIOL A464	Metals in Biology (3)
BIOL A471	Immunology (3)
BIOL A342	Experiential Learning: Microbial Biology (4)
BIOL A403	Experiential Learning: Microscopical Tissue Techniques (6)

BIOL A454 Experiential Learning: Microbial Biotechnology (4)
BIOL A455 Experiential Learning: Bioinformatics (4)
BIOL A465 Experiential Learning: Molecular Biology (4)
BIOL A488 Experiential Learning: Developmental Biology (4)

Ecology and Evolution

BIOL A365 Astrobiology (3)
BIOL A430 Marine Mammals and Seabirds (3)
BIOL A441 Animal Behavior (3)
BIOL A445 Plant-Herbivore Ecology (4)
BIOL A450 Microbial Ecology (3)
BIOL A472 Biogeography (3)
BIOL A473 Conservation Biology (3)
BIOL A474 Ecotoxicology (3)
BIOL A475 Fish Ecology (3)
BIOL A476 Wildlife Population Dynamics and Management (3)
BIOL A477 Tundra and Taiga Ecosystems (3)
BIOL A478 Biological Oceanography (3)
BIOL A479 Physiological Plant Ecology (3)
BIOL A480 Ecological and Conservation Genetics (3)
BIOL A481 Marine Biology (3)
BIOL A482 Spatial Ecology (3)
BIOL A483 Exploration Ecology (2)
BIOL A486 Evolutionary Ecology (3)
BIOL A489 Population Genetics and Evolutionary Processes (3)

BIOL A442 Experiential Learning: Animal Behavior (3)
BIOL A453 Experiential Learning: Microbial Ecology (4)
BIOL A484 Experiential Learning: Exploration Ecology Field Study (4)

Diversity and Organismal Biology

BIOL A320 Vertebrate Biology (3)
BIOL A330 Plant Biology (3)
BIOL A340 Microbial Biology (3)
BIOL A423 Ichthyology (3)
BIOL A427 Marine Invertebrate Biology (3)
BIOL A430 Marine Mammals and Seabirds (3)
BIOL A431 Plant Diversity and Evolution (3)
BIOL A487 Comparative Anatomy of Vertebrates (3)

BIOL A321 Experiential Learning: Vertebrate Biology (2)
BIOL A332 Experiential Learning: Plant Biology (2)
BIOL A342 Experiential Learning: Microbial Biology (4)

Physiology

BIOL A310 Principles of Animal Physiology (3)
BIOL A316 Principles of Plant Physiology (3)
BIOL A412 Behavioral Endocrinology (3)
BIOL A413 Neurophysiology (3)
BIOL A414 Chronobiology (3)

BIOL A415	Comparative Animal Physiology (3)
BIOL A416	Exercise Physiology (3)
BIOL A418	Fish Physiology (3)
BIOL A479	Physiological Plant Ecology (3)
BIOL A487	Comparative Anatomy of Vertebrates (3)

Additional Upper Division Electives

BIOL A456	Nonlinear Dynamics and Chaos (3)
BIOL A490	Selected Lecture Topics in Biology (1-3)
BIOL A495	Instructional Practicum: Laboratory (1)
BIOL A497	Independent Study in Biology (1-12)
BIOL A498	Individual Research (1-6)
BIOL A499	Senior Thesis (3)
BIOL A490L	Selected Laboratory Topics in Biology (1-3)
CHEM A441	Principles of Biochemistry I (3)
CHEM A442	Principles of Biochemistry II (3)
CHEM A443	Biochemistry Laboratory (2)

BIOL A406	Experiential Learning: Biostatistics (4)
BIOL A408	Experiential Learning: Scanning Electron Microscopy (SEM)

**Several courses are listed under more than one area. Each course can only count toward the credit requirement in one area.*

***BIOL A498 credits may not be counted toward the Experiential Learning minimum requirement*

***BIOL A490L credits may be counted toward the Experiential Learning minimum requirement*

5. A total of 122-125 credits is required for the degree, 42 credits of which must be upper division.

Bachelor of Science, Natural Sciences

The Department of Biological Sciences also oversees the Bachelor of Science in Natural Sciences. This curriculum emphasizes the interrelationships among the sciences. A program of study in the Natural Sciences requires that students select an option within the degree, and complete all courses required within the option, as well as sufficient science elective courses to meet minimum unit requirements for graduation. Students accepted into this flexible degree program select one of three options: the General Sciences Option is designed for students who are interested in understanding the interrelationships among various scientific fields, or in teaching science at the secondary level. The Pre-Health Professions Option is designed to meet the admission requirements of specific professional schools in medicine, dentistry, and veterinary medicine. The Environmental Sciences Option is designed to prepare students for graduate school or for employment in the private or public sector.

For a complete program description see the Natural Sciences section of this chapter.

Minor, Biological Sciences

Students majoring in another subject who wish to minor in Biological Sciences must complete the following requirements. A total of 28 credits is required for the minor, 12 of which must be upper division.

BIOL A108	Principles and Methods in Biology	6
BIOL A242	Fundamentals of Cell Biology	3
BIOL A252	Principles of Genetics	3
BIOL A288	Principles of Evolution	3
Upper division Biological Sciences electives		12

FACULTY

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BIOLOGICAL SCIENCES

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Biology is the science concerned with the study of living organisms. It encompasses a vast range of biological disciplines, from the study of microbes and molecular biology to the study of plants, animals and the environment. The undergraduate program in the Biological Sciences includes courses that provide students with a broad understanding of both traditional and modern biological sciences. These courses are suitable as preparation for professional degrees, teaching, or careers in government or industry. Both the Bachelor of Arts and the Bachelor of Science degrees are available for undergraduates. A Master of Science degree program in Biological Sciences as well as a joint UAA-UAF Doctor of Science degree program is available for students already holding a baccalaureate degree.

A program of study in the biological sciences requires completion of a basic science core curriculum in the chemical, physical and mathematical sciences as well as required and elective courses in the biological sciences. A degree in the biological sciences prepares students who wish to ~~Two general divisions are recognized in the biology program: the cell-molecular and the organismal ecology-evolution areas. The cell-molecular area focuses on pre-professional sciences for students wishing to~~ pursue careers in medicine, dentistry, ~~and~~ veterinary medicine, ecology and the environmental sciences in the private or public sector, or who wish to attend graduate school. ~~The organismal ecology-evolution area is a more diversified curriculum emphasizing environmental, organismal, evolutionary, and general biological sciences preparatory for graduate school or for employment in the private or public sector.~~ Students are strongly encouraged to consult with their academic advisors within the Department of Biological Sciences to determine which electives best suit their programmatic needs and career requirements.

The Bachelor of Arts and the Bachelor of Science degree programs require a total of 124~~0~~-125 credits for graduation and can be completed in four years by students who have had adequate high school preparation in math and sciences. Refer to the beginning of this chapter for recommended high school courses.

Program Student Learning Outcomes

It is expected that graduates of the Biological Sciences program will~~: have the ability to:~~

~~1. Demonstrate an understanding of Accept challenges and think through problems until solutions are derived and effectively communicate the solutions to supervisors.~~

1. ~~Design and conduct projects that include fieldwork, laboratory analyses, and interpretation in the discipline.~~the core concepts in the biological sciences: evolution; structure and function relationships; information flow, exchange and storage; transformation of energy and matter
2. Apply the process of science and construct knowledge through observations, experimentation, quantitative reasoning and hypothesis testing
~~2.~~3. Read, analyze and synthesize primary literature, and communicate scientific concepts and data in written and oral form

Community Service Courses

The department offers a wide range of community service courses as a service to the people in the Anchorage area and extended campuses who wish to become more knowledgeable about the science of biology and how it relates to them. Unless noted otherwise in the course description, community service courses do not satisfy either core requirements or elective credit toward any degree programs in the biological sciences. All are offered as demand warrants.

BIOL A074	Field Natural History
BIOL A075	Local Flora
BIOL A100	Human Biology
BIOL A124	Biota of Alaska: Selected Topics
BIOL A126	Birds in Field and Laboratory

Departmental Honors in Biology

Undergraduate Biological Science majors may be recognized for exceptional performance by earning departmental honors in Biology. In order to receive honors in biology, a student must meet each of the following requirements:

1. Meet the requirements for Graduation with Honors as listed in Chapter 7.
2. Meet the requirements for a BA/BS degree in Biological Sciences.
3. Earn a grade point average of 3.50 or above in the major requirements.
4. During the senior year of their academic program, the student must gain faculty approval for and complete, with a grade of B or better, a senior thesis research project, with enrollment in BIOL A499 Senior Thesis. Biological Science faculty members must approve the project proposal and final written report.

Bachelor of Arts, Biological Sciences

Admission Requirements

Complete the Admission to Baccalaureate Programs Requirements in Chapter 7.

Academic Progress

To graduate with a BA in Biological Sciences, the student must complete all courses covered under Major Requirements for a BA in Biological Sciences with a grade of C or better. All prerequisites for Biology courses must be completed with a grade of C or better. Students who audit, or are unable to earn a grade of C or better in, a lower-division (100 or 200 level) course in the Department of Biological Sciences (BIOL) may repeat the course two additional times on a space available basis. Students who audit, or are unable to earn a grade of C or better in, an upper-division (300 or 400 level) course in the Department of Biological Sciences may repeat the course one additional time on a space available basis. Students repeating a course in the Department of Biological Sciences are required to complete all components of that course during the semester in which the course is retaken. When repeating a course with a linked lecture and laboratory component, both components must be repeated. Students enrolled in a laboratory or Experiential Learning course in the Department of Biological Sciences must attend the lab or course the first week of class or they may be administratively dropped.

Graduation Requirements

Students must complete the following graduation requirements:

A. General University Requirements

Complete the General University Requirements for All Baccalaureate Degrees located at the beginning of this chapter.

B. General Education Requirements

Complete the General Education Requirements for Baccalaureate Degrees listed at the beginning of this chapter.

C. College of Arts and Sciences Requirements

Complete the College of Arts and Sciences Requirements listed at the beginning of the CAS section.

D. Major Requirements

1. Complete these required core courses (~~35~~34 ~~36~~35 credits):

~~BIOL A115~~	~~Fundamentals of Biology I~~	~~4~~			
~~BIOL A116~~	~~Fundamentals of Biology II~~	~~4~~	BIOL A108	Principles and Methods in Biology	6
BIOL A242	Fundamentals of Cell Biology	~~4~~3			
BIOL A252	Principles of Genetics	~~4~~3			
BIOL A271	Principles of Ecology	~~4~~3			
BIOL ~~A308~~A288	Principles of Evolution	3			
BIOL A243	Experiential Learning: Genetics and Cell Biology	4			
	or				

BIOL A273	Experiential Learning: Ecology and Evolution	4
BIOL A492	Undergraduate Seminar	1
CHEM A105	General Chemistry I	3
CHEM A105L	General Chemistry I Laboratory	1
CHEM A106	General Chemistry II	3
CHEM A106L	General Chemistry II Laboratory	1
STAT A252	Elementary Statistics (3)	3-4
	or	
STAT A253	Applied Statistics for the Sciences (4)	
	or	
STAT A307	Probability and Statistics (4)	

2. Complete ~~15~~18 ~~17~~19 credits of upper division program electives from the following ~~four~~ areas.

a. ~~At least~~A minimum of ~~one~~ 3 credits ~~course~~ must come from each of 4 of the 5 areas.*

~~2.~~b. A minimum of 6 credits must be Experiential Learning from 2 areas**. 18-19

~~Genetics,~~ Cellular and ~~-~~ Molecular Biology

BIOL A340	~~General Microbiology~~Microbial Biology (~~5~~3)
BIOL A451	~~Applied Microbiology~~Microbial Biotechnology (3)
BIOL A452	Human Genome (3)
~~BIOL A452~~	~~Human Genome (3)~~
BIOL A461	Molecular Biology (3)
BIOL A462	Virology (3)
BIOL A463	Molecular Biology of Cancer (3)
BIOL A464	Metals in Biology (3)
~~BIOL A461L~~	~~Molecular Biology Laboratory (3)~~
BIOL~~/~~	
~~CHEM~~ A471	~~Immunochemistry~~ Immunology (~~4~~3)

BIOL A342	Experiential Learning: Microbial Biology (4)
BIOL A403	Experiential Learning: Microscopical Tissue Techniques (6)
BIOL A454	Experiential Learning: Microbial Biotechnology (4)
BIOL A455	Experiential Learning: Bioinformatics (4)
BIOL A465	Experiential Learning: Molecular Biology (4)

~~BIOL A403~~	~~Microtechnique (4)~~
BIOL A488	Experiential Learning: Developmental Biology (4)

Ecology and -Evolution

BIOL A365	Astrobiology (3)
BIOL A430	Marine Mammals and Seabirds (3)
BIOL A441	Animal Behavior (3)
BIOL A445	Plant-Herbivore Ecology (4)
BIOL A450	Microbial Ecology (3)
BIOL ~~A309~~A472	Biogeography (3)
BIOL ~~A373~~A473	Conservation Biology (3)
BIOL A474	Ecotoxicology (3)
BIOL A475	Fish Ecology (3)
BIOL A476	Wildlife Population Dynamics and Management (3)

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BIOL A477 Tundra and Taiga Ecosystems (3)
BIOL A478 Biological Oceanography (3)
BIOL A479 Physiological Plant Ecology (3)
BIOL A480 Ecological and Conservation Genetics (3)
BIOL ~~A378~~A481 Marine Biology (3)
BIOL A482 Spatial Ecology (3)
BIOL A483 Exploration Ecology (2)
BIOL A486 Evolutionary Ecology (3)
~~BIOL A430 Marine Mammal Biology (4)~~
~~BIOL A441 Animal Behavior (4)~~
~~BIOL A445 Plant Herbivore Ecology (4)~~
~~BIOL A450 Microbial Ecology (3)~~
~~BIOL A477 Tundra and Taiga Ecosystems (3)~~
~~BIOL A478 Biological Oceanography (4)~~
~~BIOL A479 Physiological Plant Ecology (3)~~
BIOL A489 Population Genetics and Evolutionary Processes (3)

BIOL A442Experiential Learning: Animal Behavior (3)
BIOL A453 Experiential Learning: Microbial Ecology (4)
BIOL A484 Experiential Learning: Exploration Ecology Field Study (4)

Diversity and Organismal Biology

BIOL A320 Vertebrate Biology (3)
BIOL A330 Plant Biology (3)
BIOL A340 Microbial Biology (3)
BIOL A423 Ichthyology (3)
BIOL A427 Marine Invertebrate Biology (3)
BIOL A430 Marine Mammals and Seabirds (3)
BIOL ~~A331~~A431 ~~Systematic Botany (4)~~Plant Diversity and Evolution (3)
~~BIOL A333 Biology of Non-Vascular Plants (4)~~
~~BIOL A334 Biology of Vascular Plants (4)~~
~~BIOL A340 General Microbiology (5)~~
~~BIOL A423 Ichthyology (4)~~
~~BIOL A425 Mammalogy (3)~~
~~BIOL A426 Ornithology (4)~~
~~BIOL A427 Invertebrate Zoology (4)~~
~~BIOL A430 Marine Mammal Biology (4)~~BIOL A487Comparative Anatomy of Vertebrates (3)

BIOL A321Experiential Learning: Vertebrate Biology (2)
BIOL A332 Experiential Learning: Plant Biology (2)
BIOL A342 Experiential Learning: Microbial Biology (4)

Physiology

BIOL A310 Principles of Animal Physiology (43)
BIOL A316 ~~Introduction~~ Principles of~~to~~ Plant Physiology (3)
BIOL A412 Behavioral Endocrinology (3)
BIOL A413 Neurophysiology (3)

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BIOL A414 Chronobiology (3)
BIOL A415 Comparative Animal Physiology (3)
BIOL A416 Exercise Physiology (3)
BIOL A418 Fish Physiology (3)
BIOL A479 Physiological Plant Ecology (3)

BIOL A487 Comparative Anatomy of Vertebrates (3)

Additional Upper Division Electives~~4~~)

~~ASTR/~~
~~BIOL A365 Astrobiology (3)~~
BIOL~~/CHEM/~~
~~PHYS~~ A456 Nonlinear Dynamics and Chaos (3)
BIOL A490 Selected Lecture Topics in Biology (1-3)
~~BIOL A490L Selected Laboratory Topics in Biology (1-3)~~
BIOL A495 Instructional Practicum: Laboratory (1)
BIOL A497 Independent Study in Biology (1-12)
BIOL A498 Individual Research (1-6)
BIOL A499 Senior Thesis (3)
BIOL A490L Selected Laboratory Topics in Biology (1-3)

BIOL A406 Experiential Learning: Biostatistics (4)
BIOL A408 Experiential Learning: Scanning Electron Microscopy (SEM) (6)

**Several courses are listed under more than one area. Each course can only count toward the credit requirement in one area.*
***BIOL A498 credits may not be counted toward the Experiential Learning minimum requirement*
***BIOL A490L credits may be counted toward the Experiential Learning minimum requirement*

~~3. The following may be taken for upper division elective credit in addition to the 15-17 credits required as stated in 2 above.~~
~~ASTR/~~
~~BIOL A365 Astrobiology (3)~~
~~BIOL/CHEM/~~
~~PHYS A456 Nonlinear Dynamics and Chaos (3)~~
~~BIOL A490 Selected Lecture Topics in Biology (1-3)~~
~~BIOL A490L Selected Laboratory Topics in Biology (1-3)~~
~~BIOL A495 Instructional Practicum: Laboratory (1)~~
~~BIOL A497 Independent Study in Biology (1-12)~~
~~BIOL A498 Individual Research (1-6)~~
~~BIOL A499 Senior Thesis (3)~~

~~4.~~3. It is recommended that students complete 8 credits from the following: 8

GEOL A111 Physical Geology (4)
GEOL A221 Historical Geology (4)
or
PHYS A123 Basic Physics I (3)
and
PHYS A123L Basic Physics I Laboratory (1)
PHYS A124 Basic Physics II (3)

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and

PHYS A124L Basic Physics II Laboratory (1)

or

PHYS A211 General Physics I (3)

and

PHYS A211L General Physics I Laboratory (1)

PHYS A212 General Physics II (3)

and

PHYS A212L General Physics II Laboratory (1)

~~5.~~4. A total of 124 credits is required for the degree, 42 credits of which must be upper division.

Bachelor of Science, Biological Sciences

The Bachelor of Science degree includes a single core program of coursework with electives selected from 4 sub-disciplines within the biological sciences.~~with two areas of study. Completing courses from the cellular and molecular biology area prepares students for professional careers in areas such as medicine, dentistry and veterinary science. Completing courses from the organismal, ecology, and evolutionary area prepares students for careers in environmental, organismal, and evolutionary biology.~~ A wide selection of electives is available to all students, including courses offered under BIOL A490, which is a selected topics course. It is imperative that students consult their academic advisors within the Department of Biological Sciences to determine which electives are most appropriate to their career interests. Some of these elective courses are offered periodically, depending on demand. Refer to course descriptions to identify these courses.

Admission Requirements

Complete the Admission to Baccalaureate Programs Requirements in Chapter 7.

Academic Progress

To graduate with a BS in Biological Sciences, the student must complete all courses covered under Major Requirements for a BS in Biological Sciences with a grade of C or better. All prerequisites for Biology courses must be completed with a grade of C or better. Students who audit, or are unable to earn a grade of C or better in, a lower-division (100 or 200 level) course in the Department of Biological Sciences (BIOL) may repeat the course two additional times on a space available basis. Students who audit, or are unable to earn a grade of C or better in, an upper-division (300 or 400 level) course in the Department of Biological Sciences may repeat the course one additional time on a space available basis. Students repeating a course in the Department of Biological Sciences are required to complete all components of that course during the semester in which the course is retaken. When repeating a course with a linked lecture and laboratory component, both components must be repeated. Students enrolled in a laboratory or Experiential Learning course in the Department of Biological Sciences must attend the lab or course the first week of class or they may be administratively dropped.

Graduation Requirements

Students must complete the following graduation requirements:

A. General University Requirements

Complete the General University Requirements for All Baccalaureate Degrees located at the beginning of this chapter.

B. General Education Requirements

Complete the General Education Requirements for Baccalaureate Degrees listed at the beginning of this chapter.

C. College of Arts and Sciences Requirements

Complete the College of Arts and Sciences Requirements listed at the beginning of the CAS section.

D. Major Requirements

1. Some major requirements may also be used to satisfy the College of Arts and Sciences BS requirements.
2. Complete these required support courses (~~39~~ 36 credits):

CHEM A105	General Chemistry I	3
CHEM A105L	General Chemistry I Laboratory	1
CHEM A106	General Chemistry II	3
CHEM A106L	General Chemistry II Laboratory	1
CHEM A321	Organic Chemistry I	3
CHEM A322	Organic Chemistry II	3
CHEM A323L	Organic Chemistry Laboratory	2
MATH A200	Calculus I	4
MATH A201	Calculus II	4
PHYS A123	Basic Physics I (3)	8
PHYS A123L	Basic Physics I Laboratory (1)	
	and	
PHYS A124	Basic Physics II (3)	
PHYS A124L	Basic Physics II Laboratory (1)	
	or	
PHYS A211	General Physics I (3)	
PHYS A211L	General Physics I Laboratory (1)	
	and	
PHYS A212	General Physics II (3)	
PHYS A212L	General Physics II Laboratory (1)	
STAT A253	Applied Statistics for the Sciences (4)	4
	or	
STAT A307	Probability and Statistics (4)	
~~STAT A308~~	~~Intermediate Statistics for the Sciences*~~	~~3~~
	~~or~~	
	~~3 upper division biological sciences credits~~	

~~*It is recommended that STAT A308 be taken. Students may substitute STAT A308 with 3 upper division Biological Sciences credits.~~

3. Complete Biological Sciences core courses (~~32 33~~22 credits):

~~BIOL A115~~	~~Fundamentals of Biology I with~~	~~4~~
~~BIOL A116~~	~~Fundamentals of Biology II~~	~~4~~BIOL A108 Principles and Methods in Biology 6
BIOL A242	Fundamentals of Cell Biology	~~4~~3
BIOL A252	Principles of Genetics	~~4~~3
BIOL A271	Principles of Ecology	~~4~~3
BIOL ~~A308~~ A288	Principles of Evolution	3
BIOL A243	Experiential Learning: Genetics and Cell Biology	4
	or	
BIOL A273	Experiential Learning: Ecology and Evolution	4
~~BIOL A310~~	~~Principles of Physiology (4)~~	~~3~~ 4
	~~or~~	
~~BIOL A316~~	~~Introduction to Plant Physiology (3)~~	
~~BIOL A340~~	~~General Microbiology~~	~~5~~
BIOL A492	Undergraduate Seminar	1

4. Complete at least ~~11-12~~24 ~~-~~credits of upper division program electives from the following areas.

a. A minimum of 3 credits must come from each of 4 of the five 5 areas*.

~~4.~~b. A minimum of 6 credits must be Experiential Learning from 2 areas**. ~~from the following list:~~

~~11-12~~24

~~a. Recommended electives in cellular and molecular biology:~~

Genetics, Cellular and Molecular Biology

BIOL A340 Microbial Biology (3)
BIOL A451 Microbial Biotechnology (3)
BIOL A452 Human Genome (3)
BIOL A461 Molecular Biology (3)
BIOL A462 Virology (3)
BIOL A463 Molecular Biology of Cancer (3)
BIOL A464 Metals in Biology (3)
BIOL A471 Immunology (3)

BIOL A342 Experiential Learning: Microbial Biology (4)
BIOL A403 Experiential Learning: Microscopical Tissue Techniques (6)
BIOL A454 Experiential Learning: Microbial Biotechnology (4)
BIOL A455 Experiential Learning: Bioinformatics (4)
BIOL A465 Experiential Learning: Molecular Biology (4)
BIOL A488 Experiential Learning: Developmental Biology (4)

Ecology and Evolution

BIOL A365 Astrobiology (3)
BIOL A430 Marine Mammals and Seabirds (3)
BIOL A441 Animal Behavior (3)
BIOL A445 Plant-Herbivore Ecology (4)
BIOL A450 Microbial Ecology (3)
BIOL A472 Biogeography (3)
BIOL A473 Conservation Biology (3)
BIOL A474 Ecotoxicology (3)
BIOL A475 Fish Ecology (3)
BIOL A476 Wildlife Population Dynamics and Management (3)
BIOL A477 Tundra and Taiga Ecosystems (3)
BIOL A478 Biological Oceanography (3)
BIOL A479 Physiological Plant Ecology (3)
BIOL A480 Ecological and Conservation Genetics (3)
BIOL A481 Marine Biology (3)
BIOL A482 Spatial Ecology (3)
BIOL A483 Exploration Ecology (2)
BIOL A486 Evolutionary Ecology (3)
BIOL A489 Population Genetics and Evolutionary Processes (3)

BIOL A442 Experiential Learning: Animal Behavior (3)
BIOL A453 Experiential Learning: Microbial Ecology (4)
BIOL A484 Experiential Learning: Exploration Ecology Field Study (4)

Diversity and Organismal Biology

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BIOL A320 Vertebrate Biology (3)
BIOL A330 Plant Biology (3)
BIOL A340 Microbial Biology (3)
BIOL A423 Ichthyology (3)
BIOL A427 Marine Invertebrate Biology (3)
BIOL A430 Marine Mammals and Seabirds (3)
BIOL A431 Plant Diversity and Evolution (3)
BIOL A487 Comparative Anatomy of Vertebrates (3)

BIOL A321 Experiential Learning: Vertebrate Biology (2)
BIOL A332 Experiential Learning: Plant Biology (2)
BIOL A342 Experiential Learning: Microbial Biology (4)

Physiology

BIOL A310 Principles of Animal Physiology (3)
BIOL A316 Principles of Plant Physiology (3)
BIOL A412 Behavioral Endocrinology (3)
BIOL A413 Neurophysiology (3)
BIOL A414 Chronobiology (3)
BIOL A415 Comparative Animal Physiology (3)
BIOL A416 Exercise Physiology (3)
BIOL A418 Fish Physiology (3)
BIOL A479 Physiological Plant Ecology (3)
BIOL A487 Comparative Anatomy of Vertebrates (3)

Additional Upper Division Electives

BIOL A456 Nonlinear Dynamics and Chaos (3)
BIOL A490 Selected Lecture Topics in Biology (1-3)
BIOL A495 Instructional Practicum: Laboratory (1)
BIOL A497 Independent Study in Biology (1-12)
BIOL A498 Individual Research (1-6)
BIOL A499 Senior Thesis (3)
BIOL A490L Selected Laboratory Topics in Biology (1-3)
CHEM A441 Principles of Biochemistry I (3)
CHEM A442 Principles of Biochemistry II (3)
CHEM A443 Biochemistry Laboratory (2)

BIOL A406 Experiential Learning: Biostatistics (4)
BIOL A408 Experiential Learning: Scanning Electron Microscopy (SEM) (6)

**Several courses are listed under more than one area. Each course can only count toward the credit requirement in one area.*

***BIOL A498 credits may not be counted toward the Experiential Learning minimum requirement*

***BIOL A490L credits may be counted toward the Experiential Learning minimum requirement*

~~CHEM A441 Principles of Biochemistry I (3)~~

~~CHEM A442 Principles of Biochemistry II (3)~~

~~CHEM A443 Biochemistry Laboratory (2)~~

~~**Cellular Molecular**~~

~~BIOL A451 Applied Microbiology (3)~~

~~BIOL A452 Human Genome (3)~~

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~~BIOL A461 Molecular Biology (3)~~

~~BIOL A461L Molecular Biology Laboratory (3)~~

~~BIOL A462 Virology (3)~~

~~BIOL/~~

~~CHEM A471 Immunochemistry (4)~~

~~BIOL A488 Developmental Biology (4)~~

~~**Zoology**~~

~~BIOL A415 Comparative Animal Physiology (3)~~

~~BIOL A487 Comparative Anatomy of Vertebrates (4)~~

~~**Techniques**~~

~~BIOL A403 Microtechnique (4)~~

~~BIOL A495 Instructional Practicum: Laboratory (1)~~

~~b. Recommended elective courses in organismal, ecology and evolutionary biology:~~

~~**Botany**~~

~~BIOL A316 Introduction to Plant Physiology (3)~~

~~BIOL A331 Systematic Botany (4)~~

~~BIOL A333 Biology of Non-Vascular Plants (4)~~

~~BIOL A334 Biology of Vascular Plants (4)~~

~~BIOL A479 Physiological Plant Ecology (3)~~

~~**Zoology**~~

~~BIOL A415 Comparative Animal Physiology (3)~~

~~BIOL A423 Ichthyology (4)~~

~~BIOL A425 Mammalogy (3)~~

~~BIOL A426 Ornithology (4)~~

~~BIOL A427 Invertebrate Zoology (4)~~

~~BIOL A487 Comparative Anatomy of Vertebrates (4)~~

~~**Ecology Systems**~~

~~BIOL A309 Biogeography (3)~~

~~BIOL A373 Conservation Biology (3)~~

~~BIOL A378 Marine Biology (3)~~

~~BIOL A430 Marine Mammal Biology (4)~~

~~BIOL A441 Animal Behavior (4)~~

~~BIOL A445 Plant Herbivore Ecology (4)~~

~~BIOL A450 Microbial Ecology (3)~~

~~BIOL A477 Tundra and Taiga Ecosystems (3)~~

~~BIOL A478 Biological Oceanography (4)~~

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~~BIOL A479 Physiological Plant Ecology (3)~~

~~BIOL A489 Population Genetics and Evolutionary Processes (3)~~

~~**Marine Biology**~~

~~BIOL A378 Marine Biology (3)~~

~~BIOL A423 Ichthyology (4)~~

~~BIOL A427 Invertebrate Zoology (4)~~

~~BIOL A430 Marine Mammal Biology (4)~~

~~BIOL A478 Biological Oceanography (4)~~

~~**Techniques**~~

~~BIOL A403 Microtechnique (4)~~

~~BIOL A495 Instructional Practicum: Laboratory (1)~~

~~c. Special topics, independent study, individual research, other (credits vary):~~

~~ASTR/~~

~~BIOL A365 Astrobiology (3)~~

~~BIOL/CHEM/~~

~~PHYS A456 Nonlinear Dynamics and Chaos (3)~~

~~BIOL A490 Selected Lecture Topics in Biology (1-3)~~

~~BIOL A490L Selected Laboratory Topics in Biology (1-3)~~

~~BIOL A497 Independent Study in Biology (1-12)~~

~~BIOL A498 Individual Research (1-6)~~

~~BIOL A499 Senior Thesis (3)~~

~~CHEM A441 Principles of Biochemistry I (3)~~

~~CHEM A442 Principles of Biochemistry II (3)~~

~~CHEM A443 Biochemistry Laboratory (2)~~

5. A total of 122-125 credits is required for the degree, 42 credits of which must be upper division.

Bachelor of Science, Natural Sciences

The Department of Biological Sciences also oversees the Bachelor of Science in Natural Sciences. This curriculum emphasizes the interrelationships among the sciences. A program of study in the Natural Sciences requires that students select an option within the degree, and complete all courses required within the option, as well as sufficient science elective courses to meet minimum unit requirements for graduation. Students accepted into this flexible degree program select one of three options: the General Sciences Option is designed for students who are interested in understanding the interrelationships among various scientific fields, or in teaching science at the secondary level. The Pre-Health Professions Option is designed to meet the admission requirements of specific professional schools in medicine, dentistry, and veterinary medicine. The Environmental Sciences Option is designed to prepare students for graduate school or for employment in the private or public sector.

For a complete program description see the Natural Sciences section of this chapter.

Minor, Biological Sciences

Students majoring in another subject who wish to minor in Biological Sciences must complete the following requirements. A total of 28 credits is required for the minor, 12 of which must be upper division.

~~BIOL A115~~	~~Fundamentals of Biology I~~	~~4~~			
~~BIOL A116~~	~~Fundamentals of Biology II~~	~~4~~	BIOL A108	Principles and Methods in Biology	6
BIOL A242	Fundamentals of Cell Biology	~~4~~3			
BIOL A252	Principles of Genetics	~~4~~3			
BIOL A288	Principles of Evolution	3			
Upper division Biological Sciences electives		12			

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8Jan14

To: CAS Course and Curriculum Committee
Undergraduate Academic Board

From: Khrys Duddleston, Chair
Department of Biological Sciences Curriculum Committee

RE: Changes to the B.S. in Natural Sciences Degree

The Department of Biological Sciences proposes the following changes to the B.S. in Natural Sciences Degree:

1. Changes to the core course requirements
2. Updating upper division course offerings

These changes are being made to update the course requirements and course lists in light of changes the Dept. is making to the B.S. in Biological Sciences curriculum.

Please contact me if you have any additional questions.

Program/Prefix Action Request
University of Alaska Anchorage
Proposal to Initiate, Add, Change, or Delete a Program of Study or Prefix

1a. School or College	1b. Department
AS CAS	Biological Sciences

2. Complete Program Title/Prefix
Bachelor of Science, Natural Sciences

3. Type of Program

Choose one from the appropriate drop down menu: Undergraduate: Bachelor of Science or Graduate: CHOOSE ONE

This program is a Gainful Employment Program: ☐ Yes or ☒ No

4. Type of Action:

PROGRAM	PREFIX
☐ Add	☐ Add
☒ Change	☐ Change
☐ Delete	☐ Inactivate

5. Implementation Date (semester/year)
From: Fall/2015 To: Fall/9999

6a. Coordination with Affected Units Department, School, or College: CAS

Initiator Name (typed): Khrys Duddleston Initiator Signed Initials: _____
Date:_____

6b. Coordination Email submitted to Faculty Listserv (uaa-faculty@lists.uaa.alaska.edu) Date: 6Jan14

6c. Coordination with Library Liaison Date: 6Jan14

7. Title and Program Description - Please attach the following:

☒ Cover Memo ☒ Catalog Copy in Word using the track changes function

8. Justification for Action

The purpose for making these changes is to improve the time to completion of the degree and align our curriculum with the core concepts and competencies outlined in Vision and Change in Undergraduate Biology Education: A Call to Action (2013), a report of a national conference organized by the American Association for the Advancement of Science with support from the National Science Foundation.

Initiator (faculty only) Date Khrys Duddleston Initiator (TYPE NAME)	☐ Approved ☐ Disapproved Dean/Director of School/College Date
☐ Approved ☐ Disapproved Department Chair Date	☐ Approved ☐ Disapproved Undergraduate/Graduate Academic Board Chair Date
☐ Approved ☐ Disapproved College/School Curriculum Committee Chair Date	☐ Approved ☐ Disapproved Provost or Designee Date

NATURAL SCIENCES

ConocoPhillips Integrated Sciences Building (CPSB), Room 101P, (907) 786-4770
www.uaa.alaska.edu/biology

The undergraduate program in Natural Sciences is founded on a curriculum that emphasizes the interrelationships among the sciences. A program of study in the Natural Sciences requires that students select an option within the degree and complete all courses required within the option, as well as sufficient science elective courses to meet minimum unit requirements for graduation.

Students accepted into this flexible degree program select one of three options: the General Sciences Option is designed for students who are interested in understanding the interrelationships among various scientific fields, or in teaching science at the secondary level. The Pre-Health Professions Option is designed to meet the admission requirements of specific professional schools in medicine, dentistry, and veterinary medicine. The Environmental Sciences Option is designed to prepare students for graduate school or for employment in the private or public sector.

The Natural Sciences program is administered by the Department of Biological Sciences. Upon acceptance to the major the student will be assigned an academic advisor from the Department of Biological Sciences in accordance with the student's declared option, and students are strongly encouraged to consult with their academic advisors to determine which electives best suit their career requirements.

Bachelor of Science, Natural Sciences

Admission Requirements

Complete the Admission to Baccalaureate Programs Requirements in Chapter 7. Declare the major (see Major Requirements) and select one of three options: General Sciences, Pre-Health Professions or Environmental Sciences.

Program Student Learning Outcomes

It is expected that graduates of the Natural Sciences program will:

1. Demonstrate their knowledge of central conceptual models used in the major thematic areas of natural sciences.
2. Identify problems, devise solutions and communicate solutions effectively.

Academic Progress

To graduate with a BS in Natural Sciences, the student must complete all courses covered under Major Requirements for a BS in Natural Sciences with a grade of C or better. All prerequisites for courses used to meet the Natural Sciences degree requirements must be completed with a grade of C or better. Students who audit a course intended to meet the Natural Sciences degree requirements or who are unable to earn a grade of C or better in the course may repeat the course. Students who audit, or are unable to earn a grade of C or better in, a lower-division (100 or 200 level) course in the Department of Biological Sciences (BIOL) may repeat the course two additional times on a space available basis. Students who audit, or are unable to earn a grade of C or better in, an upper-division (300 or 400 level) course in the Department of Biological Sciences may repeat the course one additional time on a space available basis. Students repeating a course in the Department of Biological Sciences are required to complete all components of that course during the semester in which the course is retaken. When repeating a course with a lecture and laboratory component, both components must be repeated. Students enrolled in a laboratory or Experiential Learning course in the Department of Biological Sciences must attend the lab or course the first week of class or they may be administratively dropped.

Graduation Requirements

Students must complete the following graduation requirements:

A. General University Requirements

Complete the General University Requirements for All Baccalaureate Degrees located at the beginning of this chapter.

B. General Education Requirements

Complete the General Education Requirements for Baccalaureate Degrees (GERs) listed at the beginning of this chapter.

C. College of Arts and Sciences Requirements

Complete the College of Arts and Sciences (CAS) Requirements listed at the beginning of the CAS section. It is recommended that MATH A200 or MATH A272, STAT A253 or STAT A307, and the computer programming requirements be completed in the first two years of study.

D. Major Requirements

1. To declare the Bachelor of Science in Natural Sciences as their major, students must meet with an advisor and then apply to be accepted into the major. To schedule your advising session, contact the Department of Biological Sciences. At the advising session students are required to:
   a. choose one of the three options and
   b. file a preliminary program of study with the Department of Biological Sciences.
2. It is strongly recommended that any changes to the preliminary program be reviewed by an advisor to ensure that the final program of study will meet all requirements for graduation.
3. Students must submit a final Program of Study-Natural Sciences Degree form signed by their advisor to both the Office of the Registrar and the Department of Biological Sciences during the semester prior to the semester in which they plan to graduate. All courses listed in the Program of Study-Natural Sciences Degree form must be approved by the formal advisor before submitting the form to the Office of the Registrar and the Department of Biological Sciences.
4. No more than 6 credits may come from courses designated as A495, A498 and A499 combined, with no more than 2 credits from A495.
5. No more than 4 credits may be A492, with no more than 2 from the same discipline.
6. Courses not listed as approved for the Natural Sciences degree may be considered by petition, which should be signed by an advisor.
7. A total of 120-124 credits is required for the degree, of which 42 credits must be upper division.

Note 1: It is suggested that the required science sequences for any option be completed in the first two years of study.

Note 2: Students are encouraged to pay careful attention to prerequisite requirements when designing their program of study.

Note 3: Some courses meet more than one of the requirements (GER, CAS, Major). Consult the beginning of this chapter for information about GERs and the beginning of the CAS section for information about CAS requirements.

Environmental Sciences Option (80 credits)

1. Complete the following required courses (28 credits):

BIOL A108	Principles and Methods in Biology	6
CHEM A105	General Chemistry I	3
CHEM A105L	General Chemistry I Laboratory	1
CHEM A106	General Chemistry II	3
CHEM A106L	General Chemistry II Laboratory	1
GEOL A111	Physical Geology	4
GEOL A221	Historical Geology	4
ENVI A211	Environmental Science: Systems and Processes	3
ENVI A212	Living on Earth: People and the Environment	3

2. Complete an additional 52 credits of degree electives from the approved course lists for the Environmental Sciences Option.
   a. A minimum of 32 credits must be upper division.

b. A minimum of 20 credits must come from the following Natural and Physical Sciences Course List for the Environmental Sciences Option: 20

ASTR/ BIOL A365	Astrobiology (3)
BIOL/ GEOL A178	Fundamentals of Oceanography (3)
BIOL/ GEOL A179	Fundamentals of Oceanography Laboratory (1)
BIOL/ CPLX A200	Introduction to Complexity (3)
BIOL A242	Fundamentals of Cell Biology (3)
BIOL A243	Experiential Learning: Genetics and Cell Biology (4)
BIOL A252	Principles of Genetics (3)
BIOL A271	Principles of Ecology (3)
BIOL A273	Experiential Learning: Ecology and Evolution (4)
BIOL A288	Principles of Evolution (3)
BIOL A310	Principles of Animal Physiology (3)
BIOL A316	Principles of Plant Physiology (3)
BIOL A340	Microbial Biology (3)
BIOL A342	Experiential Learning: Microbial Biology (4)
BIOL A403	Experiential Learning: Microscopical Tissue Techniques (6)
BIOL A406	Experiential Learning: Biostatistics (4)
BIOL A408	Experiential Learning: Scanning Electron Microscopy (SEM) (6)
BIOL A415	Comparative Animal Physiology (3)
BIOL A418	Fish Physiology (3)
BIOL A423	Ichthyology (3)
BIOL A427	Marine Invertebrate Biology (3)
BIOL A430	Marine Mammals and Seabirds (3)
BIOL A431	Plant Diversity and Evolution (3)
BIOL A441	Animal Behavior (3)
BIOL A442	Experiential Learning: Animal Behavior (3)
BIOL A445	Plant-Herbivore Ecology (4)
BIOL A450	Microbial Ecology (3)
BIOL A451	Microbial Biotechnology (3)
BIOL A453	Experiential Learning: Microbial Ecology (4)
BIOL A454	Experiential Learning: Microbial Biotechnology (4)
BIOL/CHEM/ PHYS A456	Nonlinear Dynamics and Chaos (3)
BIOL A472	Biogeography (3)
BIOL A473	Conservation Biology (3)
BIOL A474	Ecotoxicology (3)
BIOL A475	Fish Ecology
BIOL A476	Wildlife Population Dynamics and Management (3)
BIOL A477	Tundra and Taiga Ecosystems (3)

BIOL A478	Biological Oceanography (3)
BIOL A479	Physiological Plant Ecology (3)
BIOL A480	Ecological and Conservation Genetics (3)
BIOL A481	Marine Biology (3)
BIOL A482	Spatial Ecology (3)
BIOL A483	Exploration Ecology (2)
BIOL A484	Experiential Learning: Exploration Ecology Field Study (4)
BIOL A486	Evolutionay Ecology (3)
BIOL A487	Comparative Anatomy of Vertebrates (4)
BIOL A489	Population Genetics and Evolutionary Processes (3)
BIOL A490	Selected Lecture Topics in Biology (1-3)
BIOL A490L	Selected Laboratory Topics in Biology (1-3)
BIOL A492	Undergraduate Seminar (1)
BIOL A495A	Internship in the Biological Sciences (3)
BIOL A498	Individual Research (1-6)
BIOL A499	Senior Thesis (3)
CHEM A253	Principles of Inorganic Chemistry (3)
CHEM A311	Physical Chemistry: A Biological Orientation (3)
CHEM A312	Quantitative Analysis (5)
CHEM A321	Organic Chemistry I (3)
CHEM A322	Organic Chemistry II (3)
CHEM A323L	Organic Chemistry Laboratory (2)
CHEM A331	Physical Chemistry I (3)
CHEM A332	Physical Chemistry II (3)
CHEM A333L	Physical Chemistry Lab (2)
CHEM A434	Instrumental Methods (5)
CHEM A441	Principles of Biochemistry I (3)
CHEM A442	Principles of Biochemistry II (3)
CHEM A443	Biochemistry Laboratory (2)
CHEM A450	Environmental Chemistry (3)
CHEM A453	Advanced Inorganic Chemistry (5)
CHEM A460	Chemical Ecotoxicology (3)
CHEM A492	Undergraduate Seminar (1)
CHEM A498	Individual Research (3)
GEOL A115	Environmental Geology (3)
GEOL A115L	Environmental Geology Laboratory (1)
GEOL A190	Introductory Topics in Geology (1-3)
GEOL A320	Volcanology (3)
GEOL A321	Mineralogy (4)
GEOL A322	Igneous and Metamorphic Petrology (4)
GEOL A325	Geology of Ore Deposits (3)
GEOL A335	Structural Geology (4)
GEOL A340	Hydrogeology (3)
GEOL A350	Geomorphology (4)
GEOL A360	Geochemistry (3)

GEOL A380	Anchorage Field Studies (3)
GEOL A381	Kenai Peninsula Field Studies (3)
GEOL A382	Geological Field Studies (3)
GEOL A450	Paleoclimatology and Global Change (3)
GEOL A452	Sedimentology and Stratigraphy (4)
GEOL A454	Glacial and Quaternary Geology (3)
GEOL A455	Permafrost (3)
GEOL A456	Geoarchaeology (3)
GEOL A460	Environmental Geochemistry (3)
GEOL A475	Environmental Geophysics (3)
GEOL A480	Geological Field Methods (3)
GEOL A481	Alaskan Field Investigations (3)
GEOL A482	Geological Field Investigations (3)
GEOL A490	Advanced Topics in Geology (1-4)
GEOL A492	Geology Seminar (1)
GEOL A495	Geology Internship (1-3)
GEOL A498	Student Research (1-3)
GEOL A499	Senior Thesis (3)
LSIS A201	Life on Earth (5)
LSIS A202	Concepts and Processes: Natural Sciences (5)
PHYS A123	Basic Physics I* (3)
PHYS A123L	Basic Physics I Laboratory* (1)
PHYS A124	Basic Physics II* (3)
PHYS A124L	Basic Physics II Laboratory* (1)
PHYS A211	General Physics I* (3)
PHYS A211L	General Physics I Laboratory* (1)
PHYS A212	General Physics II* (3)
PHYS A212L	General Physics II Laboratory* (1)
PHYS A303	Modern Physics (3)

**Students cannot get credit for both PHYS 123/L and PHYS 211/L or PHYS 124/L and PHYS 212/L.*

c. A minimum of 15 credits must come from the following Math and Computational Skills Course List for the Environmental Sciences Option: 15

CS A109	Computer Programming (Languages Vary) (3)c
	or
CS A110	Java Programming (3)
	or
CS A111	Visual Basic .NET Programming (3)
	or
CSCE A201	Computer Programming I (4)
CSCE A202	Object-Oriented Programming (3)
CSCE A302	Object-Oriented Design Patterns (3)
CSCE A311	Data Structures and Algorithms (3)
CSCE A351	Automata, Algorithms and Complexity (3)
CSCE A360	Database Systems (3)

CSCE A385	Computer Graphics (3)
CSCE A411	Artificial Intelligence (3)
CSCE A412	Evolutionary Computing (3)
GEO A157	Analytical and Digital Cartography (3)
GEO A167	Remote Sensing and Image Analysis (4)
GEO A248	Digital Terrain Cartography (3)
GEO A257	Elements of Photogrammetry (3)
GEO A359	Geodesy and Map Projections (3)
GEO A459	Geodetic Geomatics (3)
GEO A467	Analytical and Digital Photogrammetry (3)
GIS A268	Elements of Geographic Information Systems (GIS) (4)
GIS A295	Internship in Geographic Information Systems I (3)
GIS A366	Spatial Information Analysis and Modeling (3)
GIS A367	GIS and Remote Sensing (3)
GIS A370	GIS and Remote Sensing for Natural Resources (3)
GIS A433	Coastal Mapping (3)
GIS A458	Design and Management of Spatial Information (3)
GIS A468	Integration of Geomatics Technologies (3)
GIS A495	Internship in Geographic Information Systems II (3)
MATH A200	Calculus I (4)
	or
MATH A272	Applied Calculus (3)
MATH A201	Calculus II (4)
MATH A202	Calculus III (4)
MATH A215	Introduction to Mathematical Proofs (3)
MATH A231	Introduction to Discrete Mathematics (3)
MATH A302	Ordinary Differential Equations (3)
MATH A303	Introduction to Modern Algebra (3)
MATH A305	Introduction to Geometries (3)
MATH A306	Discrete Methods (3)
MATH A314	Linear Algebra (3)
MATH A321	Analysis of Several Variables (3)
MATH A324	Advanced Calculus (3)
MATH A371	Stochastic Processes (3)
MATH A407	Mathematical Statistics I (3)
MATH A408	Mathematical Statistics II (3)
MATH A410	Introduction to Complex Analysis (3)
MATH A422	Partial Differential Equations (3)
STAT A253	Applied Statistics for the Sciences (4)
	or
STAT A307	Probability and Statistics (4)

STAT A308	Intermediate Statistics for the Sciences (3)
STAT A402	Scientific Sampling (3)
STAT A403	Regression Analysis (3)
STAT A404	Analysis of Variance (3)
STAT A405	Nonparametric Statistics (3)
STAT A407	Time Series Analysis (3)
STAT A408	Multivariate Statistics (3)
STAT A490	Selected Topics in Statistics (1-3)

d. A minimum of 9 credits must come from the following Social Sciences Course List for the Environmental Sciences Option: 9

ANTH A101	Introduction to Anthropology (3)
ANTH A202	Cultural Anthropology (3)
ANTH A205	Biological Anthropology (3)
ANTH A335	Native North Americans (3)
ANTH A354	Culture and Ecology (3)
ANTH A415	Applied Anthropology (3)
ANTH A445	Evolution of Humans and Disease (3)
CEL A292	Introduction to Civic Engagement (3)
CEL A390	Selected Topics in Civic Engagement (1-3)
ECON A201	Principles of Macroeconomics (3)
ECON A202	Principles of Microeconomics (3)
ECON A210	Environmental Economics and Policy (3)
ECON A300	The Economy of Alaska (3)
ECON A321	Intermediate Microeconomics (3)
ECON A324	Intermediate Macroeconomics (3)
ECON A435	Natural Resource Economics (3)
ENVI/ PHIL A303	Environmental Ethics (3)
ENVI A470	Environmental Planning and Problem Solving (4)
ENVI A490	Topics in Environment and Society (3)
GEOG A101	Local Places/Global Regions: An Introduction to Geography (3)
LSSS A311	People, Places and Ecosystems (3)
SOC A101	Introduction to Sociology (3)
SOC A404	Environmental Sociology (3)

Pre-Health Professions Option (80 credits)

1. Complete the following required courses (22 credits):

BIOL A108	Principles and Methods in Biology	6
CHEM A105	General Chemistry I	3
CHEM A105L	General Chemistry I Laboratory	1
CHEM A106	General Chemistry II	3
CHEM A106L	General Chemistry II Laboratory	1
PHYS A123	Basic Physics I	3
PHYS A123L	Basic Physics I Laboratory	1

PHYS A124	Basic Physics II	3
PHYS A124L	Basic Physics II Laboratory	1

2. Complete an additional 58 credits of degree electives from the approved course lists for the Pre-Health Professions Option.
   a. A minimum of 32 credits must be upper division.
   b. A minimum of 24 credits must come from the following Natural Sciences Course List for the Pre-Health Professions Option: 24

BIOL A111	Human Anatomy and Physiology I (4)
BIOL A112	Human Anatomy and Physiology II (4)
BIOL/ CPLX A200	Introduction to Complexity (3)
BIOL A240	Introductory Microbiology for Health Sciences (4)
	or
BIOL A340	Microbial Biology (3)
	and
BIOL A342	Experiential Learning: Microbial Biology (4)
BIOL A242	Fundamentals of Cell Biology (3)
BIOL A252	Principles of Genetics (3)
BIOL A243	Experiential Learning: Genetics and Cell Biology (4)
BIOL A310	Principles of Animal Physiology (3)
BIOL A320	Vertebrate Biology (3)
BIOL A321	Experiential Learning: Vertebrate Biology (2)
BIOL A403	Experiential Learning: Microscopical Tissue Techniques (6)
BIOL A408	Experiential Learning: Scanning Electron Microscopy (SEM) (6)
BIOL A412	Behavioral Endocrinology (3)
BIOL A413	Neurophysiology (3)
BIOL A414	Chronobiology (3)
BIOL A415	Comparative Animal Physiology (3)
BIOL A416	Exercise Physiology (3)
BIOL A451	Microbial Biotechnology (3)
BIOL A452	Human Genome (3)
BIOL A454	Experiential Learning: Microbial Biotechnology (4)
BIOL A455	Experiential Learning: Bioinformatics (4)
BIOL/CHEM/ PHYS A456	Nonlinear Dynamics and Chaos (3)
BIOL A461	Molecular Biology (3)
BIOL A462	Virology (3)
BIOL A463	Molecular Biology of Cancer (3)
BIOL A464	Metals in Biology (3)
BIOL A465	Experiential Learning: Molecular Biology (4)
BIOL/ CHEM A471	Immunology (3)
BIOL A487	Comparative Anatomy of Vertebrates (4)
BIOL A488	Experiential Learning: Developmental Biology (4)

BIOL A489	Population Genetics and Evolutionary Processes (3)
BIOL A490	Selected Lecture Topics in Biology (1-3)
BIOL A490L	Selected Laboratory Topics in Biology (1-3)
BIOL A492	Undergraduate Seminar (1)
BIOL A495A	Internship in the Biological Sciences (3)
BIOL A498	Individual Research (1-6)
CHEM A311	Physical Chemistry: A Biological Orientation (3)
CHEM A312	Quantitative Analysis (5)
CHEM A321	Organic Chemistry I (3)
CHEM A322	Organic Chemistry II (3)
CHEM A323L	Organic Chemistry Laboratory (2)
CHEM A434	Instrumental Methods (5)
CHEM A441	Principles of Biochemistry I (3)
CHEM A442	Principles of Biochemistry II (3)
CHEM A443	Biochemistry Laboratory (2)
CHEM A460	Chemical Ecotoxicology (3)
CHEM A492	Undergraduate Seminar (1)
CHEM A498	Individual Research (3)

c. A minimum of (15) credits must come from the following Social Sciences Course List for the Pre-Health Professions Option: 15

ANTH A101	Introduction to Anthropology (3)
ANTH A205	Biological Anthropology (3)
ANTH A324	Psychological Anthropology (3)
ANTH A365	Modern Human Biological Diversity (3)
ANTH A445	Evolution of Humans and Disease (3)
ANTH A455	Medical Anthropology (3)
ANTH A457	Food and Nutrition: An Anthropological Perspective (3)
ANTH A485	Human Osteology (4)
ANTH A486	Applied Human Osteology (3)
ANTH A490	Selected Topics in Anthropology (1-3)
ECON A201	Principles of Macroeconomics (3)
ECON A202	Principles of Microeconomics (3)
HS A210	Introduction to Environmental Health (3)
HS A220	Core Concepts in the Health Sciences (3)
HS A230	Introduction to Global Health (3)
HS A326	Introduction to Epidemiology (3)
HS A492	Senior Seminar: Contemporary Health Policy (3)
PHIL A302	Biomedical Ethics (3)
PSY A111	General Psychology (3)
PSY A143	Death and Dying (3)

PSY A150	Lifespan Development (3)
PSY A260	Statistics for Psychology (3)
PSY A260L	Statistics for Psychology Lab (1)
PSY A261	Research Methods in Psychology (4)
PSY A345	Abnormal Psychology (3)
PSY A355	Learning and Cognition (4)
PSY A366	Perception (3)
PSY A368	Personality (3)
PSY A370	Behavioral Neuroscience (3)
PSY A412	Foundations of Modern Psychology (3)
PSY A420	Conducting Research in Psychology (3)
PSY A425	Clinical Psychology (3)
PSY A428	Evolutionary Psychology (3)
PSY A450	Adult Development and Aging (3)
PSY A455	Mental Health Services in Alaska (3)
PSY A485	Health Psychology (3)
PSY A498	Individual Research (3)

d. A minimum of 9 credits must come from the following Math and Computational Skills Course List for the Pre-Health Professions Option: 9

MATH A200	Calculus I (4)
	or
MATH A272	Applied Calculus (3)
MATH A201	Calculus II (4)
MATH A202	Calculus III (4)
MATH A215	Introduction to Mathematical Proofs (3)
MATH A231	Introduction to Discrete Mathematics (3)
MATH A302	Ordinary Differential Equations (3)
MATH A303	Introduction to Modern Algebra (3)
MATH A305	Introduction to Geometries (3)
MATH A306	Discrete Methods (3)
MATH A314	Linear Algebra (3)
MATH A321	Analysis of Several Variables (3)
MATH A324	Advanced Calculus (3)
MATH A371	Stochastic Processes (3)
MATH A407	Mathematical Statistics I (3)
MATH A408	Mathematical Statistics II (3)
MATH A410	Introduction to Complex Analysis (3)
MATH A422	Partial Differential Equations (3)
MATH A490A	Selected Topics in Pure Mathematics (1-3)
MATH A490B	Selected Topics in Applied Mathematics (1-3)
MATH A498	Individual Research (1-3)
STAT A253	Applied Statistics for the Sciences (4)
	or
STAT A307	Probability and Statistics (4)

STAT A308	Intermediate Statistics for the Sciences (3)
STAT A402	Scientific Sampling (3)
STAT A403	Regression Analysis (3)
STAT A404	Analysis of Variance (3)
STAT A405	Nonparametric Statistics (3)
STAT A407	Time Series Analysis (3)
STAT A408	Multivariate Statistics (3)
STAT A490	Selected Topics in Statistics (1-3)

General Sciences Option (80 credits)

1. Complete the following required courses (30 credits):

BIOL A108	Principles and Methods in Biology	6
CHEM A105	General Chemistry I	3
CHEM A105L	General Chemistry I Laboratory	1
CHEM A106	General Chemistry II	3
CHEM A106L	General Chemistry II Laboratory	1
GEOL A111	Physical Geology	4
GEOL A221	Historical Geology	4
PHYS A123	Basic Physics I (3)	8
PHYS A123L	Basic Physics I Laboratory (1)	
	and	
PHYS A124	Basic Physics II (3)	
PHYS A124L	Basic Physics II Laboratory (1)	
	or	
PHYS A211	General Physics I (3)	
PHYS A211L	General Physics I Laboratory (1)	
	and	
PHYS A212	General Physics II (3)	
PHYS A212L	General Physics II Laboratory (1)	

2. Complete an additional 50 credits of degree electives. 50
   a. The credits may come from the following course lists:
      i. Environmental Sciences Option Course Lists (above)
      ii. Pre-Health Professions Course Lists (above)
      iii. General Sciences Additional Course List

ASTR A103	Solar System Astronomy (3)
ASTR A103L	Solar System Astronomy Laboratory (1)
ASTR A104	Stars, Galaxies and Cosmology (3)
ASTR A104L	Stars, Galaxies and Cosmology Laboratory (1)
PHYS A311	Intermediate Classical Mechanics (3)
PHYS/EE A314	Electromagnetics (3)
PHYS A320	Simulation of Physical Systems (3)
PHYS/EE A324	Electromagnetics II (3)
PHYS A403	Quantum Mechanics (3)

PHYS A413	Statistical and Thermal Mechanics (3)
PHYS A498	Individual Research (1-6)

b. At least two of the following disciplines must be represented at the upper division level: Astronomy, Biology, Chemistry, Geology, Mathematics, Physics, Statistics.

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NATURAL SCIENCES

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www.uaa.alaska.edu/biology

The undergraduate program in Natural Sciences is founded on a curriculum that emphasizes the interrelationships among the sciences. A program of study in the Natural Sciences requires that students select an option within the degree and complete all courses required within the option, as well as sufficient science elective courses to meet minimum unit requirements for graduation.

Students accepted into this flexible degree program select one of three options: the General Sciences Option is designed for students who are interested in understanding the interrelationships among various scientific fields, or in teaching science at the secondary level. The Pre-Health Professions Option is designed to meet the admission requirements of specific professional schools in medicine, dentistry, and veterinary medicine. The Environmental Sciences Option is designed to prepare students for graduate school or for employment in the private or public sector.

The Natural Sciences program is administered by the Department of Biological Sciences. Upon acceptance to the major the student will be assigned an academic advisor from the Department of Biological Sciences in accordance with the student's declared option, and students are strongly encouraged to consult with their academic advisors to determine which electives best suit their career requirements.

Bachelor of Science, Natural Sciences

Admission Requirements

Complete the Admission to Baccalaureate Programs Requirements in Chapter 7. Declare the major (see Major Requirements) and select one of three options: General Sciences, Pre-Health Professions or Environmental Sciences.

Program Student Learning Outcomes

It is expected that graduates of the Natural Sciences program will:

1. Demonstrate their knowledge of central conceptual models used in the major thematic areas of natural sciences.
2. Identify problems, devise solutions and communicate solutions effectively.

Academic Progress

To graduate with a BS in Natural Sciences, the student must complete all courses covered under Major Requirements for a BS in Natural Sciences with a grade of C or better. All prerequisites for courses used to meet the Natural Sciences degree requirements must be completed with a grade of C or better. Students who audit a course intended to meet the Natural Sciences degree requirements or who are unable to earn a grade of C or better in the course may repeat the course. Students who audit, or are unable to earn a grade of C or better in, a lower-division (100 or 200 level) course in the Department of Biological Sciences (BIOL) may repeat the course two additional times on a space available basis. Students who audit, or are unable to earn a grade of C or better in, an upper-division (300 or 400 level) course in the Department of Biological Sciences may repeat the course one additional time on a space available basis. Students repeating a course in the Department of Biological Sciences are required to complete all components of that course during the semester in which the course is retaken. When repeating a course with a lecture and laboratory component, both components must be repeated. Students enrolled in a laboratory or Experiential Learning course in the Department of Biological Sciences must attend the lab or course the first week of class or they may be administratively dropped.

Graduation Requirements

Students must complete the following graduation requirements:

A. General University Requirements

Complete the General University Requirements for All Baccalaureate Degrees located at the beginning of this chapter.

B. General Education Requirements

Complete the General Education Requirements for Baccalaureate Degrees (GERs) listed at the beginning of this chapter.

C. College of Arts and Sciences Requirements

Complete the College of Arts and Sciences (CAS) Requirements listed at the beginning of the CAS section. It is recommended that MATH A200 or MATH A272, STAT A253 or STAT A307, and the computer programming requirements be completed in the first two years of study.

D. Major Requirements

1. To declare the Bachelor of Science in Natural Sciences as their major, students must meet with an advisor and then apply to be accepted into the major. To schedule your advising session, contact the Department of Biological Sciences. At the advising session students are required to:
   a. choose one of the three options and
   b. file a preliminary program of study with the Department of Biological Sciences.
2. It is strongly recommended that any changes to the preliminary program be reviewed by an advisor to ensure that the final program of study will meet all requirements for graduation.
3. Students must submit a final Program of Study-Natural Sciences Degree form signed by their advisor to both the Office of the Registrar and the Department of Biological Sciences during the semester prior to the semester in which they plan to graduate. All courses listed in the Program of Study-Natural Sciences Degree form must be approved by the formal advisor before submitting the form to the Office of the Registrar and the Department of Biological Sciences.
4. No more than 6 credits may come from courses designated as A495, A498 and A499 combined, with no more than 2 credits from A495.
5. No more than 4 credits may be A492, with no more than 2 from the same discipline.
6. Courses not listed as approved for the Natural Sciences degree may be considered by petition, which should be signed by an advisor.
7. A total of 120-124 credits is required for the degree, of which 42 credits must be upper division.

Note 1: It is suggested that the required science sequences for any option be completed in the first two years of study.

Note 2: Students are encouraged to pay careful attention to prerequisite requirements when designing their program of study.

Note 3: Some courses meet more than one of the requirements (GER, CAS, Major). Consult the beginning of this chapter for information about GERs and the beginning of the CAS section for information about CAS requirements.

Environmental Sciences Option (80 credits)

1. Complete the following required courses (2830 credits):

~~BIOL A115~~	~~Fundamentals of Biology I~~	~~4~~
~~BIOL A116~~	~~Fundamentals of Biology II~~	~~4~~BIOL A108 Principles and Methods in Biology 6
CHEM A105	General Chemistry I	3
CHEM A105L	General Chemistry I Laboratory	1
CHEM A106	General Chemistry II	3
CHEM A106L	General Chemistry II Laboratory	1
GEOL A111	Physical Geology	4
GEOL A221	Historical Geology	4
ENVI A211	Environmental Science: Systems and Processes	3
ENVI A212	Living on Earth: People and the Environment	3

2. Complete an additional ~~50~~ 52 credits of degree electives from the approved course lists for the Environmental Sciences Option.
   a. A minimum of 32 credits must be upper division.
   ~~a.~~

b. A minimum of 20 credits must come from the following Natural and Physical Sciences Course List for the Environmental Sciences Option: 20

ASTR/
BIOL A365 Astrobiology (3)
BIOL/
GEOL A178 Fundamentals of Oceanography (3)
BIOL/
GEOL A179 Fundamentals of Oceanography Laboratory (1)
BIOL/
CPLX A200 Introduction to Complexity (3)
BIOL A242 Fundamentals of Cell Biology (43)
~~BIOL A252 Principles of Genetics (4)~~
~~BIOL A271 Principles of Ecology (4)~~
~~BIOL A308 Principles of Evolution (3)~~BIOL A243 Experiential Learning: Genetics and Cell Biology (4)
BIOL A252 Principles of Genetics (3)
BIOL A271 Principles of Ecology (3)
BIOL A273 Experiential Learning: Ecology and Evolution (4)
BIOL A288 Principles of Evolution (3)

~~BIOL A309 Biogeography (3)~~
BIOL A310 Principles of Animal Physiology (34)
BIOL A316 ~~Introduction to~~Principles of Plant Physiology (3)
~~BIOL A331 Systematic Botany (4)~~
~~BIOL A333 Biology of Non-Vascular Plants (4)~~
~~BIOL A334 Biology of Vascular Plants (4)~~
BIOL A340 ~~General Microbiology~~Microbial Biology (53)
BIOL A342 Experiential Learning: Microbial Biology (4)
BIOL A403 Experiential Learning: Microscopical Tissue Techniques (6)
BIOL A406 Experiential Learning: Biostatistics (4)
BIOL A408 Experiential Learning: Scanning Electron Microscopy (SEM) (6)
~~BIOL A309 Biogeography (3)~~
~~BIOL A373 Conservation Biology (3)~~
~~BIOL A378 Marine Biology (3)~~
~~BIOL A403 Microtechnique (4)~~
BIOL A415 Comparative Animal Physiology (3)
BIOL A418 Fish Physiology (3)
BIOL A423 Ichthyology (43)
~~BIOL A425 Mammalogy (3)~~
~~BIOL A426 Ornithology (4)~~
BIOL A427 Marine Invertebrate ~~Zoology~~ Biology (43)
BIOL A430 Marine ~~Mammal Biology (4)~~Mammals and Seabirds (3)
BIOL A431 Plant Diversity and Evolution (3)
BIOL A441 Animal Behavior (43)
BIOL A442 Experiential Learning: Animal Behavior (3)

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BIOL A445 Plant-Herbivore Ecology (4)
BIOL A450 Microbial Ecology (3)
BIOL A451 ~~Applied Microbiology~~Microbial Biotechnology (3)
BIOL A453 Experiential Learning: Microbial Ecology (4)
BIOL A454 Experiential Learning: Microbial Biotechnology (4)
BIOL/CHEM/
PHYS A456 Nonlinear Dynamics and Chaos (3)
BIOL A472 Biogeography (3)
BIOL A473 Conservation Biology (3)
BIOL A474 Ecotoxicology (3)
BIOL A475 Fish Ecology
BIOL A476 Wildlife Population Dynamics and Management (3)
BIOL A477 Tundra and Taiga Ecosystems (3)
BIOL A478 Biological Oceanography (43)
BIOL A479 Physiological Plant Ecology (3)
BIOL A480 Ecological and Conservation Genetics (3)
BIOL A481 Marine Biology (3)
BIOL A482 Spatial Ecology (3)
BIOL A483 Exploration Ecology (2)
BIOL A484 Experiential Learning: Exploration Ecology Field Study (4)
BIOL A486 Evolutionay Ecology (3)
BIOL A487 Comparative Anatomy of Vertebrates (4)
BIOL A489 Population Genetics and Evolutionary Processes (3)
BIOL A490 Selected Lecture Topics in Biology (1-3)
BIOL A490L Selected Laboratory Topics in Biology (1-3)
BIOL A492 Undergraduate Seminar (1)
BIOL A495A Internship in the Biological Sciences (3)
BIOL A498 Individual Research (1-6)
BIOL A499 Senior Thesis (3)
CHEM A253 Principles of Inorganic Chemistry (3)
CHEM A311 Physical Chemistry: A Biological Orientation (3)
CHEM A312 Quantitative Analysis (5)
CHEM A321 Organic Chemistry I (3)
CHEM A322 Organic Chemistry II (3)
CHEM A323L Organic Chemistry Laboratory (2)
CHEM A331 Physical Chemistry I (3)
CHEM A332 Physical Chemistry II (3)
CHEM A333L Physical Chemistry Lab (2)
CHEM A434 Instrumental Methods (5)
CHEM A441 Principles of Biochemistry I (3)
CHEM A442 Principles of Biochemistry II (3)
CHEM A443 Biochemistry Laboratory (2)
CHEM A450 Environmental Chemistry (3)
CHEM A453 Advanced Inorganic Chemistry (5)
CHEM A460 Chemical Ecotoxicology (3)
CHEM A492 Undergraduate Seminar (1)

CHEM A498	Individual Research (3)
GEOL A115	Environmental Geology (3)
GEOL A115L	Environmental Geology Laboratory (1)
GEOL A190	Introductory Topics in Geology (1-3)
GEOL A320	Volcanology (3)
GEOL A321	Mineralogy (4)
GEOL A322	Igneous and Metamorphic Petrology (4)
GEOL A325	Geology of Ore Deposits (3)
GEOL A335	Structural Geology (4)
GEOL A340	Hydrogeology (3)
GEOL A350	Geomorphology (4)
GEOL A360	Geochemistry (3)
GEOL A380	Anchorage Field Studies (3)
GEOL A381	Kenai Peninsula Field Studies (3)
GEOL A382	Geological Field Studies (3)
GEOL A450	Paleoclimatology and Global Change (3)
GEOL A452	Sedimentology and Stratigraphy (4)
GEOL A454	Glacial and Quaternary Geology (3)
GEOL A455	Permafrost (3)
GEOL A456	Geoarchaeology (3)
GEOL A460	Environmental Geochemistry (3)
GEOL A475	Environmental Geophysics (3)
GEOL A480	Geological Field Methods (3)
GEOL A481	Alaskan Field Investigations (3)
GEOL A482	Geological Field Investigations (3)
GEOL A490	Advanced Topics in Geology (1-4)
GEOL A492	Geology Seminar (1)
GEOL A495	Geology Internship (1-3)
GEOL A498	Student Research (1-3)
GEOL A499	Senior Thesis (3)
LSIS A201	Life on Earth (5)
LSIS A202	Concepts and Processes: Natural Sciences (5)
PHYS A123	Basic Physics I* (3)
PHYS A123L	Basic Physics I Laboratory* (1)
PHYS A124	Basic Physics II* (3)
PHYS A124L	Basic Physics II Laboratory* (1)
PHYS A211	General Physics I* (3)
PHYS A211L	General Physics I Laboratory* (1)
PHYS A212	General Physics II* (3)
PHYS A212L	General Physics II Laboratory* (1)
PHYS A303	Modern Physics (3)

**Students cannot get credit for both PHYS 123/L and PHYS 211/L or PHYS 124/L and PHYS 212/L.*

c. A minimum of 15 credits must come from the following Math and Computational Skills Course List for the Environmental Sciences Option: 15

CS A109	Computer Programming (Languages Vary) (3)c

	or
CS A110	Java Programming (3)
	or
CS A111	Visual Basic .NET Programming (3)
	or
CSCE A201	Computer Programming I (4)
CSCE A202	Object-Oriented Programming (3)
CSCE A302	Object-Oriented Design Patterns (3)
CSCE A311	Data Structures and Algorithms (3)
CSCE A351	Automata, Algorithms and Complexity (3)
CSCE A360	Database Systems (3)
CSCE A385	Computer Graphics (3)
CSCE A411	Artificial Intelligence (3)
CSCE A412	Evolutionary Computing (3)
GEO A157	Analytical and Digital Cartography (3)
GEO A167	Remote Sensing and Image Analysis (4)
GEO A248	Digital Terrain Cartography (3)
GEO A257	Elements of Photogrammetry (3)
GEO A359	Geodesy and Map Projections (3)
GEO A459	Geodetic Geomatics (3)
GEO A467	Analytical and Digital Photogrammetry (3)
GIS A268	Elements of Geographic Information Systems (GIS) (4)
GIS A295	Internship in Geographic Information Systems I (3)
GIS A366	Spatial Information Analysis and Modeling (3)
GIS A367	GIS and Remote Sensing (3)
GIS A370	GIS and Remote Sensing for Natural Resources (3)
GIS A433	Coastal Mapping (3)
GIS A458	Design and Management of Spatial Information (3)
GIS A468	Integration of Geomatics Technologies (3)
GIS A495	Internship in Geographic Information Systems II (3)
MATH A200	Calculus I (4)
	or
MATH A272	Applied Calculus (3)
MATH A201	Calculus II (4)
MATH A202	Calculus III (4)
MATH A215	Introduction to Mathematical Proofs (3)
MATH A231	Introduction to Discrete Mathematics (3)
MATH A302	Ordinary Differential Equations (3)
MATH A303	Introduction to Modern Algebra (3)
MATH A305	Introduction to Geometries (3)

MATH A306 Discrete Methods (3)
MATH A314 Linear Algebra (3)
MATH A321 Analysis of Several Variables (3)
MATH A324 Advanced Calculus (3)
MATH A371 Stochastic Processes (3)
MATH A407 Mathematical Statistics I (3)
MATH A408 Mathematical Statistics II (3)
MATH A410 Introduction to Complex Analysis (3)
MATH A422 Partial Differential Equations (3)
STAT A253 Applied Statistics for the Sciences (4)
or
STAT A307 Probability and Statistics (4)
STAT A308 Intermediate Statistics for the Sciences (3)
STAT A402 Scientific Sampling (3)
STAT A403 Regression Analysis (3)
STAT A404 Analysis of Variance (3)
STAT A405 Nonparametric Statistics (3)
STAT A407 Time Series Analysis (3)
STAT A408 Multivariate Statistics (3)
STAT A490 Selected Topics in Statistics (1-3)

d. A minimum of 9 credits must come from the following Social Sciences Course List for the Environmental Sciences Option: 9

ANTH A101 Introduction to Anthropology (3)
ANTH A202 Cultural Anthropology (3)
ANTH A205 Biological Anthropology (3)
ANTH A335 Native North Americans (3)
ANTH A354 Culture and Ecology (3)
ANTH A415 Applied Anthropology (3)
ANTH A445 Evolution of Humans and Disease (3)
CEL A292 Introduction to Civic Engagement (3)
CEL A390 Selected Topics in Civic Engagement (1-3)
ECON A201 Principles of Macroeconomics (3)
ECON A202 Principles of Microeconomics (3)
ECON A210 Environmental Economics and Policy (3)
ECON A300 The Economy of Alaska (3)
ECON A321 Intermediate Microeconomics (3)
ECON A324 Intermediate Macroeconomics (3)
ECON A435 Natural Resource Economics (3)
ENVI/
PHIL A303 Environmental Ethics (3)
ENVI A470 Environmental Planning and Problem Solving (4)
ENVI A490 Topics in Environment and Society (3)
GEOG A101 Local Places/Global Regions: An Introduction to Geography (3)

LSSS A311	People, Places and Ecosystems (3)	
SOC A101	Introduction to Sociology (3)	
SOC A404	Environmental Sociology (3)	

Pre-Health Professions Option (80 credits)

1. Complete the following required courses (~~24~~ 22 credits):

~~BIOL A115~~	~~Fundamentals of Biology I~~	~~4~~
~~BIOL A116~~	~~Fundamentals of Biology II~~	~~4~~
BIOL A108	Principles and Methods in Biology	6
CHEM A105	General Chemistry I	3
CHEM A105L	General Chemistry I Laboratory	1
CHEM A106	General Chemistry II	3
CHEM A106L	General Chemistry II Laboratory	1
PHYS A123	Basic Physics I	3
PHYS A123L	Basic Physics I Laboratory	1
PHYS A124	Basic Physics II	3
PHYS A124L	Basic Physics II Laboratory	1

2. Complete an additional ~~56~~ 58 credits of degree electives from the approved course lists for the Pre-Health Professions Option.
   a. A minimum of 32 credits must be upper division.
   b. A minimum of 24 credits must come from the following Natural Sciences Course List for the Pre-Health Professions Option: 24

BIOL A111	Human Anatomy and Physiology I (4)
BIOL A112	Human Anatomy and Physiology II (4)
BIOL/ CPLX A200	Introduction to Complexity (3)
BIOL A240	Introductory Microbiology for Health Sciences (4)
	or
BIOL A340	~~General Microbiology~~Microbial Biology (~~5~~3)
	and
BIOL A342	Experiential Learning: Microbial Biology (4)
BIOL A242	Fundamentals of Cell Biology (3)
BIOL A252	Principles of Genetics (3)
BIOL A243	Experiential Learning: Genetics and Cell Biology (4)
~~BIOL A242~~	~~Fundamentals of Cell Biology (4)~~
~~BIOL A252~~	~~Principles of Genetics (4)~~
BIOL A310	Principles of Animal Physiology (~~4~~3)
BIOL A320	Vertebrate Biology (3)
BIOL A321	Experiential Learning: Vertebrate Biology (2)
BIOL A403	Experiential Learning: Microscopical Tissue Techniques ~~Microtechnique~~ (~~4~~6)
BIOL A408	Experiential Learning: Scanning Electron Microscopy (SEM) (6)
BIOL A412	Behavioral Endocrinology (3)
BIOL A413	Neurophysiology (3)
BIOL A414	Chronobiology (3)
BIOL A415	Comparative Animal Physiology (3)

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BIOL A416	Exercise Physiology (3)
~~BIOL A425~~	~~Mammalogy (3)~~
BIOL A451	~~Applied Microbiology~~Microbial Biotechnology (3)
BIOL A452	Human Genome (3)
BIOL A454	Experiential Learning: Microbial Biotechnology (4)
BIOL A455	Experiential Learning: Bioinformatics (4)
BIOL/CHEM/ PHYS A456	Nonlinear Dynamics and Chaos (3)
BIOL A461	Molecular Biology (3)
~~BIOL A461L~~	~~Molecular Biology Laboratory (3)~~
BIOL A462	Virology (3)
BIOL A463	Molecular Biology of Cancer (3)
BIOL A464	Metals in Biology (3)
BIOL A465	Experiential Learning: Molecular Biology (4)
BIOL/ CHEM A471	Immunology (3)~~chemistry (4)~~
BIOL A487	Comparative Anatomy of Vertebrates (4)
BIOL A488	Experiential Learning: Developmental Biology (4)
BIOL A489	Population Genetics and Evolutionary Processes (3)
BIOL A490	Selected Lecture Topics in Biology (1-3)
BIOL A490L	Selected Laboratory Topics in Biology (1-3)
BIOL A492	Undergraduate Seminar (1)
BIOL A495A	Internship in the Biological Sciences (3)
BIOL A498	Individual Research (1-6)
CHEM A311	Physical Chemistry: A Biological Orientation (3)
CHEM A312	Quantitative Analysis (5)
CHEM A321	Organic Chemistry I (3)
CHEM A322	Organic Chemistry II (3)
CHEM A323L	Organic Chemistry Laboratory (2)
CHEM A434	Instrumental Methods (5)
CHEM A441	Principles of Biochemistry I (3)
CHEM A442	Principles of Biochemistry II (3)
CHEM A443	Biochemistry Laboratory (2)
CHEM A460	Chemical Ecotoxicology (3)
CHEM A492	Undergraduate Seminar (1)
CHEM A498	Individual Research (3)

c. A minimum of (15) credits must come from the following Social Sciences Course List for the Pre-Health Professions Option: 15

ANTH A101	Introduction to Anthropology (3)
ANTH A205	Biological Anthropology (3)
ANTH A324	Psychological Anthropology (3)
ANTH A365	Modern Human Biological Diversity (3)
ANTH A445	Evolution of Humans and Disease (3)

ANTH A455	Medical Anthropology (3)
ANTH A457	Food and Nutrition: An Anthropological Perspective (3)
ANTH A485	Human Osteology (4)
ANTH A486	Applied Human Osteology (3)
ANTH A490	Selected Topics in Anthropology (1-3)
ECON A201	Principles of Macroeconomics (3)
ECON A202	Principles of Microeconomics (3)
HS A210	Introduction to Environmental Health (3)
HS A220	Core Concepts in the Health Sciences (3)
HS A230	Introduction to Global Health (3)
HS A326	Introduction to Epidemiology (3)
HS A492	Senior Seminar: Contemporary Health Policy (3)
PHIL A302	Biomedical Ethics (3)
PSY A111	General Psychology (3)
PSY A143	Death and Dying (3)
PSY A150	Lifespan Development (3)
PSY A260	Statistics for Psychology (3)
PSY A260L	Statistics for Psychology Lab (1)
PSY A261	Research Methods in Psychology (4)
PSY A345	Abnormal Psychology (3)
PSY A355	Learning and Cognition (4)
PSY A366	Perception (3)
PSY A368	Personality (3)
PSY A370	Behavioral Neuroscience (3)
PSY A412	Foundations of Modern Psychology (3)
PSY A420	Conducting Research in Psychology (3)
PSY A425	Clinical Psychology (3)
PSY A428	Evolutionary Psychology (3)
PSY A450	Adult Development and Aging (3)
PSY A455	Mental Health Services in Alaska (3)
PSY A485	Health Psychology (3)
PSY A498	Individual Research (3)

d. A minimum of 9 credits must come from the following Math and Computational Skills Course List for the Pre-Health Professions Option: 9

MATH A200	Calculus I (4)
	or
MATH A272	Applied Calculus (3)
MATH A201	Calculus II (4)
MATH A202	Calculus III (4)
MATH A215	Introduction to Mathematical Proofs (3)
MATH A231	Introduction to Discrete Mathematics (3)
MATH A302	Ordinary Differential Equations (3)
MATH A303	Introduction to Modern Algebra (3)
MATH A305	Introduction to Geometries (3)

MATH A306	Discrete Methods (3)
MATH A314	Linear Algebra (3)
MATH A321	Analysis of Several Variables (3)
MATH A324	Advanced Calculus (3)
MATH A371	Stochastic Processes (3)
MATH A407	Mathematical Statistics I (3)
MATH A408	Mathematical Statistics II (3)
MATH A410	Introduction to Complex Analysis (3)
MATH A422	Partial Differential Equations (3)
MATH A490A	Selected Topics in Pure Mathematics (1-3)
MATH A490B	Selected Topics in Applied Mathematics (1-3)
MATH A498	Individual Research (1-3)
STAT A253	Applied Statistics for the Sciences (4)
	or
STAT A307	Probability and Statistics (4)
STAT A308	Intermediate Statistics for the Sciences (3)
STAT A402	Scientific Sampling (3)
STAT A403	Regression Analysis (3)
STAT A404	Analysis of Variance (3)
STAT A405	Nonparametric Statistics (3)
STAT A407	Time Series Analysis (3)
STAT A408	Multivariate Statistics (3)
STAT A490	Selected Topics in Statistics (1-3)

General Sciences Option (80 credits)

1. Complete the following required courses (~~32~~ 30 credits):

~~BIOL A115~~	~~Fundamentals of Biology I~~	~~4~~
~~BIOL A116~~	~~Fundamentals of Biology II~~	~~4~~BIOL A108 Principles and Methods in Biology 6
CHEM A105	General Chemistry I	3
CHEM A105L	General Chemistry I Laboratory	1
CHEM A106	General Chemistry II	3
CHEM A106L	General Chemistry II Laboratory	1
GEOL A111	Physical Geology	4
GEOL A221	Historical Geology	4
PHYS A123	Basic Physics I (3)	8
PHYS A123L	Basic Physics I Laboratory (1)	
	and	
PHYS A124	Basic Physics II (3)	
PHYS A124L	Basic Physics II Laboratory (1)	
	or	
PHYS A211	General Physics I (3)	
PHYS A211L	General Physics I Laboratory (1)	
	and	
PHYS A212	General Physics II (3)	
PHYS A212L	General Physics II Laboratory (1)	

2. Complete an additional ~~48~~ 50 credits of degree electives.~~48~~50

a. The credits may come from the following course lists:
   i. Environmental Sciences Option Course Lists (above)
   ii. Pre-Health Professions Course Lists (above)
   iii. General Sciences Additional Course List

ASTR A103	Solar System Astronomy (3)
ASTR A103L	Solar System Astronomy Laboratory (1)
ASTR A104	Stars, Galaxies and Cosmology (3)
ASTR A104L	Stars, Galaxies and Cosmology Laboratory (1)
PHYS A311	Intermediate Classical Mechanics (3)
PHYS/EE A314	Electromagnetics (3)
PHYS A320	Simulation of Physical Systems (3)
PHYS/EE A324	Electromagnetics II (3)
PHYS A403	Quantum Mechanics (3)
PHYS A413	Statistical and Thermal Mechanics (3)
PHYS A498	Individual Research (1-6)

b. At least two of the following disciplines must be represented at the upper division level: Astronomy, Biology, Chemistry, Geology, Mathematics, Physics, Statistics.

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