MEMORANDUM

Date: March 13, 2017

To: Mark Archambault, Chair, Undergraduate Curriculum Committee

Through: Hamid K. Rassoul, Dean, College of Science

From: Richard B. Aronson, Head, Department of Biological Sciences

Subject: An Option in Marine Conservation for Biological Sciences

The attached paperwork describes a 'new' option proposed for the Department of Biological Sciences. Marine Conservation updates the curriculum and the name of the Conservation Biology and Ecology option (major code 7029) and will replace it. The accompanying paperwork includes the rationale for the option and changes in the course requirements, a modified flow-chart, and rubrics to assess the academic progress of our students. No new courses are proposed.

The schedule for teach-out will be as follows. The replacement option will be effective in August 2017. All incoming students who sign up for Conservation Biology and Ecology (7029) through July 2017 will be encouraged to switch to Marine Conservation. Option 7029 will, therefore, be terminated at the end of the 2020-2021 academic year at the latest, but possibly earlier.

Thank you.
Florida Institute of Technology

ADDING A NEW MAJOR OR MINOR TO THE CURRICULUM

Please provide the following information when requesting a new major or minor (program or option) to be added to the curriculum. Only new majors, minors and options are assigned a new code and print on the diploma. The code will be assigned by the Office of the Registrar and information emailed to all appropriate personnel.

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<td>Classroom (classroom, online)</td>
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PROGRAM TO BE ADDED: Major ☑  Minor ☐  Option for Biological Sciences (existing degree program)

NOTE: Only Majors, Minors and Options receive new codes and print on the diploma; use Option for new program name to appear with existing degree name.

☐ Associate of Arts (A.A.)  ☐ Master of Business Administration (M.B.A.)  ☐ Educational Specialist (Ed.S.)
☐ Associate of Science (A.S.)  ☐ Master of Education (M.Ed.)  ☐ Doctor of Business Administration (DBA)
☐ Bachelor of Arts (B.A.)  ☐ Master of Public Administration (M.P.A.)  ☐ Doctor of Philosophy (Ph.D.)
☐ Bachelor of Science (B.S.)  ☐ Master of Science (M.S.)  ☐ Doctor of Psychology (Psy.D.)
☐ Master of Arts (M.A.)  ☐ Master of Science in Aviation (M.S.A.)  ☐ Graduate Certificate
☐ Master of Arts in Teaching (M.A.T.)

OTHER ADDITION TO THE CURRICULUM NOTE: Only Majors, Minors and Options receive new codes and print on the diploma; use the Adding a New Concentration or Specialization form if the new program represents less than a full degree curriculum.

PROGRAM TITLE Restricted to 30 characters, including spaces

Marine Conservation

ACADEMIC YEAR TO BE INITIATED: FALL 2017  ADVISOR FOR NEW PROGRAM: Bush

New programs are available beginning with the fall term in which they appear in the University Catalog

ROUTING APPROVALS: 1) Department head/program chair and college dean approve and sign form. 2) The chief academic officer reviews and approves business plan of the program in terms of financial viability and impact on the university mission and signs form. 3) Graduate Council or Undergraduate Curriculum Committee approves academics and signs form. 4) The chief academic officer reviews and signs form, and forwards to the Catalog & Curriculum Manager.

1) Richard B. Aragon 3/14/17  Dean or Associate Dean  3/14/17  Hamed K. Rezaei
2) Monzeach Balogha 3/16/17  Chief Academic Officer  3/16/17
3) Chair, Graduate Council  Date  OR
   Chair, Undergraduate Curriculum Committee  Date
4) Chief Academic Officer  Date

REGISTRAR'S USE ONLY

FSA ATLAS  SOAXREF  SMAPRLE
STVMAJR  SOACURR  Major Code Assigned
GWVSDAX  CIPC Code  Operator Initials/Date

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150 West University Boulevard, Melbourne, FL 32901-6975  (321) 674-7399  Fax (321) 674-7827
Department of Biological Sciences
Marine Conservation (major code 70XX)
Programmatic Modifications and Change-of-Name
To Update Conservation Biology & Ecology Option (major code 7029)

I. Introduction
The Department of Biological Sciences proposes a ‘new’ option, Marine Conservation, to update the content and name of the existing option in Conservation Biology and Ecology (major code 7029). The proposed changes will modernize the curriculum and better utilize the existing strengths of FIT in marine biology and sustainability. Specifically, the program will exploit the growing connection between FIT and efforts to restore and manage coastal areas as well as the Indian River Lagoon to give students more hands-on training. The addition of courses in media communications and resource economics will better prepare graduates to communicate science to both the public and policy makers. These changes reflect both the technical skills (GIS, conservation genetics, etc.) and the communication skills necessary to make our students competitive in the workforce as well as graduate schools. While these changes will reinvigorate this program, it remains, fundamentally, an ecology degree and therefore does not require a new business plan.

II. Programmatic Modifications
Some re-ordering of electives was required, but the net changes to the curriculum consist of classes being dropped and replaced listed below (not necessarily in the same semester, but in the resulting flowchart no semester would exceed 17 credits,
Replacements
1. COM 2223 (Writing about Science) is replaced with COM 2225 (Writing for the Media)
2. BIO 4010 (Biochemistry 1) is replaced with a 4-credit restricted elective
3. BIO 4210 (Plant Physiology) is replaced with BIO 4710 (Marine Biology)
4. BIO 3701 (Evolution) was swapped in the schedule with the HUMCORE course
5. ISC 1500 Introduction to Sustainability, Marine Ecology (BIO 4720) and Environmental Resource Economics (BUS 4426) were added
6. Senior Semester free and liberal arts electives are eliminated

III. Name of the Program
The name of the program will be Marine Conservation (major code 7xxx). There are two strategic rationales for the change of name. The first is to improve marketing and increase enrollment. The new name is expected to improve marketability, and ultimately enrollment numbers, of this program. Our program needed to be updated to communicate to students and their families that we will prepare them for real-world careers in this exciting field. Graduate programs in Marine Conservation have surged in popularity over the last decade, with programs at Duke, the University of Miami, and Stony Brook. Florida Tech would become one of the only undergraduate institutions in the nation to offer an undergraduate degree in marine conservation. Second, the emphasis on marine conservation is consistent with the university’s focus on ocean systems, and it capitalizes on our geographic location.
IV. Teach-Out of 7029

Marine Conservation will be effective 1 August 2017. All incoming students who sign up for Conservation Biology and Ecology (7029) through July 2017 will be encouraged to switch to the replacement option. Option 7029 will, therefore, be taught out and terminated at the end of the 2020–21 academic year at the latest, but possibly earlier.

V. Assessment

A revised rubric for assessment accompanies this proposal.
Assessment Rubric for Marine Conservation Option
Revised from Conservation Biology and Ecology Option

Outcomes/Objectives

1. Understand principles of biology (DSK)
   - Graduates will explain fundamental principles of biology
   - Measure: Students will answer embedded questions in exams of General Genetics (BIO 2110) that address principles of inheritance a topic that all biology students should understand. (O: 1)
     - Target: 75% of students will attain a grade of 80% or better on embedded questions in exams of General Genetics (BIO 2110).
   - Measure: Students will answer embedded questions in exams of Ecology (BIO 3410) that address principles of competition and predation a topic that all conservation biologists should understand. (O: 1)
     - Target: 75% of students will attain an 80% on embedded questions in exams of Ecology (BIO 3410).

2. Prepared to Enter Graduate School in Ecology or Marine Biology (DSK)
   - Graduates will answer embedded questions in exams of core courses in Community Ecology (BIO 4410) and Marine Ecology (BIO 4720; hereafter capstone classes) that address fundamental principles that all Ecology and Marine Biology students should understand.
   - Measure: Students will answer embedded questions in exams of capstone classes that address hypothesis testing, and plant/animal interactions with their environment fundamental principles that all Ecology and Marine Biology should understand.
     - Target: 75% of students will attain an 80% or better on embedded questions in exams capstone classes.
   - Measure: Students will answer embedded questions in exams of core Marine Conservation courses. These questions will address fundamental principles that all Ecology and Marine Biology students should understand such as the concept of limiting resources, genetics at small population sizes, climate and community change (O: 2)
     - Target: 75% of students will attain a grade of 80% or better on embedded questions in Conservation Genetics (BIO 4411) and capstone classes.

3. Give effective oral presentation (COM)
   - Graduates will give an effective oral presentation about an aspect of biology learned from the literature or laboratory research.
   - Measure: Students will give an oral presentation in capstone courses in capstone classes that will include an introduction to pertinent literature and oral presentations. Presentations will be evaluated using a rubric.
     - Target: 75% of students will attain an 80% or better on the introductory section of their oral presentations for capstone classes.
   - Measure: Students will give oral presentations in the capstone courses that will include a discussion of the students' own thoughts or findings in relation to the presentation topic. Presentations will be evaluated using a rubric.
     - Target: 75% of students will attain an 80% or better on the discussion section of their oral presentations in the capstone courses.
   - Measure: Students will give a podcast presentation in Conservation Biology (BIO 4030) that will include clear articulation of a complex argument. Presentations will be evaluated using a rubric.
     - Target: 75% of students will attain an 80% or better on the their podcast in Conservation Biology (BIO 4030).

4. Compose effective written presentation (COM)
   - Graduates will compose an effective research paper based on an aspect of biology learned from laboratory or field research.
   - Measure: Students will write laboratory reports for Biometry (BIO 2801) that will include a discussion of their laboratory findings. Reports will be evaluated using a rubric. (O: 4)
     - Target: 75% of students will attain an 80% or better on the discussion section of the laboratory report in Biometry (BIO 2801).
- Measure: Students will write in Marine Ecology that will include a discussion of their research findings. Papers will be evaluated using a rubric.
  - Target: 75% of students will attain an 80% or better on the discussion section of their research paper for Marine Ecology (BIO 4720)

5. Demonstrate problem solving skills (CT)
   - Graduates will demonstrate an ability to solve problems in biology.
     - Measure: Students will answer embedded problem solving questions in exams of Conservation Genetics (BIO 4411)
     - Target: 75% of students will attain an 80% or better on embedded problem solving questions in exams of Conservation Genetics (BIO 4411)
     - Measure: Students will develop mathematical models to address an ecological issue in Ecological Modeling (BIO 4517).
     - Target: 75% of students will attain an 80% or better on evaluation of the mathematical model presented in Ecological Modeling (BIO 4517).

6. Ability to integrate biological principles in problem solving (CT)
   - Graduates will demonstrate the ability to effectively integrate biological principles into solving research related problems.
     - Measure: Students will conduct research and present a poster in their capstone classes. Posters will be evaluated using a rubric.
     - Target: 75% of students will attain an 80% or better on the evaluation of their posters in their capstone classes.
MARINE CONSERVATION

Major Code: 7029
Delivery Mode(s): Classroom
Admission Status: Undergraduate

Degree Awarded: Bachelor of Science
Age Restriction: No
Location(s): Main Campus–Melbourne

The Bachelor of Science in Biological Sciences–Marine Conservation provides students with the skills and knowledge for immediate employment in ocean and estuarine conservation or for graduate studies in ecology and conservation biology. Graduates are prepared to face the challenges associated with global climate change, pollution, and habitat loss, as well as the growing threat of invasive species. Coursework emphasizes ecological principles, experimental design, implementation, and analysis. Access and training to in-demand technologies such as Geographic Information Systems (GIS), R statistical software, and other tools are a priority. Courses in environmental law, natural resource economics, and media communications gives graduates the skills necessary to serve as ocean diplomats to the public or aiding in policy debate and implementation. Undergraduate research opportunities range from work on marine microbes and molecular marine ecology to dolphins, tarpon, invasive lionfish, reef-corals and the rich fauna of Antarctica. Fieldwork is required and is available locally in the Indian River Lagoon—one of North America’s most diverse estuaries—and via summer field courses in the Galapagos Islands, the Florida Keys, the Bahamas, Puerto Rico, Cuba and other locations. This degree is eligible for the Fast Track program, allowing students to complete a Bachelor’s degree (B.S.) in Biological Sciences and a professional Master’s degree (M.S.) in Conservation Technology in 5 years.

Admission Requirements

Students intending to apply for admission to study in the Department of Biological Sciences are strongly encouraged to complete at least one year each of high-school biology, chemistry and physics. Prospective students should also have at least three years of high-school mathematics, including second-year algebra and trigonometry.

Florida Tech has articulation agreements with many of the community colleges in Florida. Students contemplating transfer to Florida Tech should consult with the department to determine transferability of credits. If there is a question regarding specific courses needed, students should contact the Associate Department Head for Undergraduate Studies.
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TOTAL CREDITS REQUIRED: 129

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Student: ____________________________
Advisor: ____________________________
Department Head: ____________________________

*AP, advanced placement by testing, equivalency exam, etc.;
†Free Elective for exempted transfer students TC, transfer credit
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REMARKS/EXTRA COURSES:
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*AP, advanced placement by testing, equivalency exam, etc.;
†Free Elective for exempted transfer students  TC, transfer credit
§BIO/CHM/ENS/ISC-4000/ISC-5016/OCN

SIGNATURES:
Student: ____________________________
Advisor: ____________________________
Department Head: ____________________

REMARKS/EXTRA COURSES:

______________________________________________
______________________________________________
MEMORANDUM

Date: March 13, 2017

To: Mark Archambault, Chair, Undergraduate Curriculum Committee

Through: Hamid K. Rassoul, Dean, College of Science

From: Richard B. Aronson, Head, Department of Biological Sciences

Subject: An Option in Fisheries and Aquaculture for Biological Sciences

The attached paperwork describes a ‘new’ option proposed for the Department of Biological Sciences. Fisheries and Aquaculture updates the curriculum and the name of the Aquaculture option (major code 7026) and will replace it. The accompanying paperwork includes the rationale for the option and changes in the course requirements, a modified flow-chart, and rubrics to assess the academic progress of our students. Also included are new course descriptions that will enable existing aquaculture courses to be replaced by courses that enhance the educational value and career-development potential of the Fisheries and Aquaculture option.

The schedule for teach-out will be as follows. The replacement option will be effective in August 2017. All incoming students who sign up for Aquaculture (7026) through July 2017 will be encouraged to switch to Fisheries and Aquaculture. Option 7026 will, therefore, be terminated at the end of the 2020–2021 academic year at the latest, but possibly earlier.

Thank you.
Florida Institute of Technology

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Please provide the following information when requesting a new major or minor (program or option) to be added to the curriculum. Only new majors, minors and options are assigned a new code and print on the diploma. The code will be assigned by the Office of the Registrar and information emailed to all appropriate personnel.

COLLEGE: College of Science
DELIVERY MODE(S): Classroom (classroom, online)

DEPARTMENT: Biological Sciences
CAMPUS/SITE(S): Melbourne

PROGRAM TO BE ADDED: □ Major □ Minor □ Option for Biological Sciences (existing degree program)

NOTE: Only Majors, Minors and Options receive new codes and print on the diploma; use Option for new program name to appear with existing degree name.

☐ Associate of Arts (A.A.) ☐ Master of Business Administration (M.B.A.) ☐ Educational Specialist (Ed.S.)
☐ Associate of Science (A.S.) ☐ Master of Education (M.Ed.) ☐ Doctor of Business Administration (DBA)
☐ Bachelor of Arts (B.A.) ☐ Master of Public Administration (M.P.A.) ☐ Doctor of Philosophy (Ph.D.)
☐ Bachelor of Science (B.S.) ☐ Master of Science (M.S.) ☐ Doctor of Psychology (Psy.D.)
☐ Master of Arts (M.A.) ☐ Master of Science in Aviation (M.S.A.) ☐ Graduate Certificate
☐ Master of Arts in Teaching (M.A.T.)

OTHER ADDITION TO THE CURRICULUM: NOTE: Only Majors, Minors and Options receive new codes and print on the diploma; use Option for a new Concentration or Specialization form if the new program represents less than a full degree curriculum.

PROGRAM TITLE: Restricted to 30 characters, including spaces
Fisheries and Aquaculture

ACADEMIC YEAR TO BE INITIATED: FALL 2017
ADVISOR FOR NEW PROGRAM: Shenker & Tiringan

New programs are available beginning with the fall term in which they appear in the University Catalog

ROUTING APPROVALS: 1) Department head/program chair and college dean approve and sign form. 2) The chief academic officer reviews and approves business plan of the program in terms of financial viability and impact on the university mission and signs form. 3) Graduate Council or Undergraduate Curriculum Committee approves academics and signs form. 4) The chief academic officer reviews and signs form, and forwards to the Catalog & Curriculum Manager.

1) Richard B. Grammon 3/15/17
Department Head/Program Chair

2) Monica H Bologa 3/16/17
Dean or Associate Dean

3) Chair, Graduate Council Date
4) Chair, Undergraduate Curriculum Committee Date
5) Chief Academic Officer Date

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REP-282-T16
Florida Institute of Technology

ADDING A NEW COURSE TO THE CURRICULUM

This is a request for reactivation of a course in the system. □ Yes □ No

New courses are available beginning with the fall term in which they appear in the University Catalog.

SUBJECT BIO (e.g., CSE) COURSE NO. 4520 ACADEMIC YEAR TO BE ADDED TO THE FILE Fall 2017
*Credible level if 1000-level and no co- or prerequisites

CLASS HOURS 90/semester LECTURE HOURS 45/semester LAB HOURS 45/semester CONTACT HOURS (CEU ONLY) N/A

DEPARTMENT BIOLOGICAL SCIENCES (e.g., Biological Sciences) SCHEDULE TYPE Lecture / Lab (C)

□ COLLEGE OF AERONAUTICS – 23 □ COLLEGE OF SCIENCE – 26
□ NATHAN M. BISK COLLEGE OF BUSINESS – 24 □ EXTEDNED STUDIES/NMM COLLEGE OF BUSINESS – 90
□ COLLEGE OF ENGINEERING – 1 □ SCHOOL OF COMPUTING – 29
□ COLLEGE OF PSYCHOLOGY AND LIBERAL ARTS – 25 □ SCHOOL OF HUMAN-CENTERED DESIGN, INNOVATION & ART – 28

COMPUTER TITLE Invertebrate Aquaculture Restricted to 25 characters, including spaces

This course will be entered into the system as: □ B-Level □ Cross-Listed □ Dual-Numbered □ Full-Load □ None of these/Standard Listing □

CATALOG TITLE Invertebrate Aquaculture

CATALOG DESCRIPTION OF COURSE Restricted to 35 characters, including spaces

Covers a diverse array of invertebrate species and their culture in laboratory or field settings. Includes the aquaculture technology and techniques for animals such as corals, mollusks and crustaceans cultured for human consumption, ornamental display or restoration of wild populations.

This description has been approved by the catalog office

3/14/2017

In addition, please attach a course syllabus and/or more detailed description.

RESTRICTIONS □ Prerequisite BIO 2801 □ Corequisite Course Number □ and □ or

□ Prerequisite Course Number □ Corequisite Course Number □ and □ or

□ Prerequisite Course Number □ Corequisite Course Number □ and □ or

□ Other

GRADES TO BE ISSUED

□ A, □ B, □ C, □ D, □ F, □ CEU/Audit

□ S, □ U

□ P, □ F

□ Other

ADDITIONAL RESTRICTION □ and □ or (e.g., Major, Class Level, Department Head Approval)

If this course replaces a course currently offered in BANNER, please indicate old course information and the date/term the course may be removed from the system.

SUBJECT Alpha Prefix (e.g., CSE) B I O COURSE NO. (e.g., 1301) 3625 TERM TO INACTIVATE Fall 2017

□ Yes □ No Will this course be used to measure program-level student learning outcomes? If yes, review and signature required.

□ Yes □ No Will this course be used to satisfy the scholarly inquiry requirement? If yes, attach "Q" materials for review.

□ Yes □ No Will this course impact any existing programs? If yes, attach "Changing Graduation Requirements" form for each program impacted.

APPROVALS: On completion of description and course number verification, affix appropriate signatures as indicated, and submit to the Office of Graduate Programs, or Undergraduate Curriculum Committee Chair for placement on agenda.

3/17/17

Date

Chair, Graduate Council

Date

OR

Date

Chair, Undergraduate Curriculum Committee

Date

Catalyst & Curriculum Manager

These changes/additions have been made for the University Catalog and entered into the BANNER term named above.

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RGR-267-816
ADDING A NEW COURSE TO THE CURRICULUM

This course is to be added to the permanent file, "Master Course Index", in the Associate Registrar's Office. I understand it will not be made available to the student body until proper approvals have been affixed.

COURSE NUMBER: BIO-4520 CREDIT HOUR: 4 CLASS HOURS: 3 LAB HOURS: 3
CATALOG TITLE: Invertebrate Aquaculture
COMPUTER TITLE (restricted to 21 spaces including blanks): Invert Aquaculture

CATALOG DESCRIPTION OF COURSE: A study of the basic biology, ecology, life history, and culturing techniques of the major crustacean and molluscan species of commercial value. Major diseases and parasites of crustacean and molluscan aquaculture are discussed. Laboratory work includes spawning, hatchery, and rearing of selected species.

PRE-REQUISITE and/or CO-REQUISITE: BIO-3510, BIO-3620

SEMESTER TO BE ADDED TO THE FILE: Fall, 1993

APPROVALS:
Originator
Feb. 6, 1992
Date

TUITION REMISSION CREDIT: 4

Department Head
Feb. 5, 1992
Date

Chairman, Council on Engineering Curricula
Date

Dean of Assoc. Dean (Appropriate School)
Date

Upon completion of above approvals submit to Dean, Graduate Studies and Research (Graduate Courses); or Chairman, Curriculum Committee (Undergraduate Courses).

Approved (Graduate Courses Only):

Dean, Graduate Studies and Research
Date

Chairman, Curriculum Committee
Date

Distribution:
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Proposed Course: BIO 4520
Invertebrate Aquaculture

Instructor: Dr. J. Shenker
Email: shenker@fit.edu
Teaching Assistant: TBA

Office: Harris Building Room 112
Phone: 674-8145
Office Hours: TBA

Rationale: Aquaculture is rapidly expanding throughout the world, and has recently exceeded commercial fisheries in terms of annual levels of productivity of food resources. It is a significant component of population and habitat restoration programs, and also is a mainstay of the ornamental aquarium industry. This course combines two previous 3 credit courses (BIO 3625 Molluscan Aquaculture and BIO 4625 Crustacean Aquaculture) with a higher-intensity 4 credit course. The laboratory for the earlier courses essentially set up cultures of different species, and monitored growth and development over the semester. This course will include overlapping culture systems for mollusks and crustaceans, and include aquaculture of corals as well. This course will provide students with the experience to develop their careers and join the large group of Florida Tech Aquaculture alumni who are highly regarded in commercial and research aquaculture programs.

Prerequisites: BIO 2801 or equivalent

Primary research literature

Class format:
Three 50 minute lectures/week + 1 laboratory session per week, with extended daily duties for monitoring and maintaining culture systems. Students will conduct individual or group aquaculture research projects. Field trips to regional aquaculture facilities will be provided outside of the regular class hours (e.g. Harbor Branch Oceanographic Institution, Ocean and Reef Aquaculture).

Lecture and Laboratory Syllabus: Laboratory and field exercises will be closely integrated with this sequence of topics.
Week 1: Introduction to Invertebrate Aquaculture. Species discussions, status and trends.
Laboratory: Aquaculture laboratory set-up

Weeks 2-6: Coral aquaculture — coral biology and culture technology and methods. Student-led Case Study Discussion (CSD).
Laboratory: Establish coral, molluscan and crustacean culture systems.

Weeks 7-10: Molluscan aquaculture — biology and culture technology and methods. CSD.
Laboratory: Maintain culture systems, work on relevant life stages of cultured organisms

Weeks 10-14: Crustacean aquaculture — biology and culture technology and methods. CSD.
Laboratory: Maintain culture systems, work on relevant life stages of cultured organisms

Week 15: Additional case studies; research project presentations
Laboratory: Clean-up

Grading: A-F letter grades, to be awarded based on the following:
Midterm Exam 25%
Final Exam 25%
Case Study Discussion 10%
Research Paper 30%
Research Paper Presentation 10%
REQUEST TO CHANGE THE REQUIREMENTS FOR A COURSE

Any change, addition or removal of any restriction, or change in credit hours or availability for a course requires this form, accompanied by any supporting documentation, be completed and approved as indicated below.

COLLEGE: Science

DEPARTMENT: Biological Sciences

REQUEST IS FOR CHANGE IN COURSE: Bio 4620

Finfish Aquaculture and Fisheries Management

PREFIX: Bio

NUMBER: 4620

Catalog Changes effective beginning with the fall term in which they appear in the University Catalog.

IS REQUEST FOR A CHANGE IN THE NAME LISTED ABOVE? Yes No If yes, requested name: Fisheries Management

IS REQUEST FOR A CHANGE IN CREDITS FOR COURSE LISTED ABOVE? Yes No If yes, current credits requested credits

IS REQUEST TO CHANGE RESTRICTIONS FOR COURSE LISTED ABOVE? Yes No If yes, please check all that apply:

Add Remove Prerequisite Corequisite

Add Remove Prerequisite Corequisite

Add Remove Other Restrictions* Yes No If yes, please use box below:

*Other restrictions may include changing the grade mode (P, S, U, A-E, CU), deactivating a course already in the system, majors or class levels restricted from registration, or other restrictions.

Please enter the complete prerequisite/restriction list as it should appear if this change is approved:

No changes

Yes No Is this request for the course to be used to measure program-level student learning outcomes?

Yes No Is this request for the course to satisfy the scholarly inquiry requirement? If yes, attach "Q" materials for review.

Yes No Will this change impact any existing programs? If yes, attach "Changing Graduation Requirements" form for each program that is impacted.

APPROVALS: Once appropriate department approvals are completed, submit to the Office of Graduate Programs, or Undergraduate Curriculum Committee Chair for placement on agenda.

1) Jon Shenker

2) Richard B. Graverson

3) Hamid K. Rasoul

4) Chair, Graduate Council Date

Chair, Undergraduate Curriculum Committee Date

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RGR 264-1016
REQUEST TO CHANGE THE REQUIREMENTS FOR A COURSE

Any change, addition or removal of any restriction, or change in credit hours or availability for a course requires this form, accompanied by any supporting documentation, be completed and approved as indicated below.

COLLEGE: Science
DEPARTMENT: Biological Sciences

REQUEST IS FOR CHANGE IN COURSE: B10 4530 Biology of Fishes

Prefix: 
Number: 
Course Title: 

TO BE INCLUDED IN 2017/2018 CATALOG
Course changes are effective beginning with the fall term in which they appear in the University Catalog.

IS REQUEST FOR A CHANGE IN THE NAME LISTED ABOVE?  Yes ☐ No ☐ If yes, requested name: Finfish Aquaculture

IS REQUEST FOR A CHANGE IN CREDITS FOR COURSE LISTED ABOVE?  Yes ☐ No ☐ If yes, current credits requested credits

IS REQUEST TO CHANGE RESTRICTIONS FOR COURSE LISTED ABOVE?  Yes ☐ No ☐ If yes, please check all that apply:
☐ Add ☐ Remove ☐ Prerequisite ☐ Corequisite
☐ Add ☐ Remove ☐ Prerequisite ☐ Corequisite
☐ Add ☐ Remove ☐ Other Restrictions* ☐ Yes ☐ No ☐ If yes, please use box below:

*Other restrictions may include changing the grade mode (P/E, S/U, A-F, C/UL), deactivating a course already in the system, majors or class levels restricted from registration, or other restrictions.
Please enter the complete prerequisite/restriction list as it should appear if this change is approved:

No change

☐ Yes ☐ No  is this request for the course to be used to measure program-level student learning outcomes?
☐ Yes ☐ No  is this request for the course to satisfy the scholarly inquiry requirement? If yes, attach "Q" materials for review.
☐ Yes ☐ No  Will this change impact any existing programs? If yes, attach "Changing Graduation Requirements" form for each program that is impacted.

APPROVALS: Once appropriate department approvals are completed, submit to the Office of Graduate Programs,
or Undergraduate Curriculum Committee Chair for placement on agenda.

1) Originator: RALPH LOCKING 3/5/17
Date: 

2) Chair, Graduate Council: Date: 

3) Dean or Associate Dean: Date: 

4) Chair, Undergraduate Curriculum Committee: Date: 

OR

CATALOG & CURRICULUM MANAGER’S USE ONLY

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Department of Biological Sciences
Fisheries and Aquaculture (major code 70XX)
Programmatic Modifications and Change-of-Name
To Update Aquaculture Option (major code 7026)

I. Introduction
The Department of Biological Sciences proposes a ‘new’ option, Fisheries and Aquaculture, to update the content and name of the existing option in Aquaculture (major code 7026). The proposed changes will increase the breadth of the existing option, incorporating modern research techniques and resource management strategies, ensuring that students are well prepared to enter graduate programs and careers in fisheries and aquaculture in commercial and governmental organizations. The proposed changes to the option will qualify graduating students for an Associate Fisheries Professional certification from the American Fisheries Society upon receipt of their B.S. These changes modify the existing aquaculture option but do not reflect a substantial change from the original focus of the program.

II. Programmatic Modifications
The courses required in the existing Aquaculture program will be modified or replaced to provide an updated and comprehensive view of the discipline. These changes reflect requirements for the Associate Fisheries Professional certification and advances in aquaculture, and they reflect changes in the expertise of faculty within the department. The changes are outlined on the accompanying flow charts.

The required biology and sustainability courses specific to this major will be:
   BIO 1500 Introduction Aquaculture, 1 credit-hour
   ISC 1500 Introduction to Sustainability, 3 credit-hours
   BIO 4411 Conservation Genetics, 4 credit-hours
   BIO 4520 Invertebrate Aquaculture, 4 credit-hours
   BIO 4530 Finfish Aquaculture, 4 credit-hours
   BIO 4620 Fisheries Management, 4 credit-hours

Changes to the existing Aquaculture option are as follows:

1) Add ISC 1500 Introduction to Sustainability (3 cr), to replace BIO 4010 Biochemistry (4 cr) in fall of Junior year,

2) Add BIO 4411 Conservation Genetics (4 cr), to replace OCN 3201/3211 (4 cr) in fall of Junior year.

3) Add BIO 4XXX Invertebrate Aquaculture (4 cr), to replace BIO 3625 Molluscan Aquaculture (3 cr) and BIO 4625 Crustacean Aquaculture (3 cr) in spring of Junior year. BIO 3625 and 4625 will be deactivated.

4) Split the current BIO 4620 Finfish Aquaculture and Fisheries Management (4 cr) into two courses: BIO 4YYY Finfish Aquaculture (4 cr) and BIO 4ZZZ Fisheries Management (4 cr, to include both finfish and invertebrate fisheries), in fall and spring of Senior year. BIO 4620 will be deactivated.

5) Replace BIO 4530 Biology of Fishes (4 cr) with BIO 4550 Comparative Vertebrate Anatomy (4 cr), in fall of Senior Year

6) Remove one Liberal Arts Elective, reducing total credits required from 129 to 127.
These changes ensure that the university core and computer literacy (BIO 2801) requirements will be met. As in the current option, students will take as their Q-course any course so designated in the Department of Biological Sciences and selected through consultation with their faculty advisor. This will provide students with flexibility to focus their studies on their primary areas for career development. The approved Q-courses at present include BIO 4410 Community Ecology, BIO 4720 Marine Ecology and BIO 4991/2/3 Undergraduate Research. Future Q-course designations for BIO 4530 Fish Aquaculture and/or BIO 4620 Fisheries Management will be evaluated at a later date.

There will be no hidden prerequisites. The total credits required will be 127 credit hours.

III. Name of the Program

The name of the program will be Fisheries and Aquaculture (major code 7xxx). The new name will have broader appeal and should improve student recruitment, a conclusion based on:

- Our discussions with current FIT students and visiting high school/transfer students
- Participation of our undergraduates as research volunteers and their enrollment in formal Undergraduate Research (BIO 4991/4992/4993)
- Tracking the careers of our graduates
- Availability of research funding, graduate programs, and career opportunities.

The curriculum of the Fisheries and Aquaculture option will provide our students with a stronger background and more diverse preparation, making them highly competitive for immediate employment or entry into graduate studies. The benefit of earning an Associate Fisheries Professional certification from the American Fisheries Society upon completion of the B.S. underscores the job-ready approach to the revised program.

IV. Teach-Out of 7026

All freshman and sophomore students in Aquaculture (7026) will be encouraged to switch to the replacement option of Fisheries and Aquaculture (7XXX). Juniors and seniors will enroll in the new courses, which will be substituted into the requirements for the existing program. Although no serious disruptions in course offerings are expected, Undergraduate Research in the appropriate topic(s) will be provided as independent study to students to help them complete their degrees in a timely fashion.

V. Assessment

A revised rubric for assessment accompanies this proposal.
Assessment Rubric for Fisheries and Aquaculture Option
Revised from Aquaculture Option

Outcomes/Objectives

1. Understand principles of biology (DSK)
   - Graduates will explain fundamental principles of biology.
   - Measure: Students will answer embedded questions in exams of General Genetics (BIO 2110) that address principles of inheritance, a topic that all biology students should understand.
     - Target: 75% of students will attain a grade of 80% or better on embedded questions in exams of General Genetics (BIO 2110).
   - Measure: Students will answer embedded questions in exams of General Ecology (BIO 3410) that address principles of natural selection, a topic that all organismal biologists should understand.
     - Target: 75% of students will attain an 80% on embedded questions in exams of General Ecology (BIO 3410).

2. Prepared for Career or Entering Graduate School in Fisheries and Aquaculture (DSK)
   - Graduates will answer embedded questions in exams of core courses that address fundamental principles that all Fisheries and Aquaculture students should understand.
     -- Measure: Students will answer embedded questions in exams of Comparative Vertebrate Anatomy (BIO 4550) that address fundamental principles of vertebrate morphology, and physiology that all Fisheries and Aquaculture students should understand.
     - Target: 75% of students will attain an 80% or better on embedded questions in exams of Comparative Vertebrate Biology (BIO 4550)

     - Measure: Students will answer embedded questions in exams of core Fisheries and Aquaculture courses. These questions will address fundamental principles that all fisheries and aquaculture students should understand, such as physiology, reproduction, growth, and management of marine and freshwater species.
     - Target: 75% of students will attain a grade of 80% or better on embedded questions in Invertebrate Aquaculture (BIO 4520) and Finfish Aquaculture (BIO 4530) and Fisheries Management (BIO 4620).

Examples of the types of embedded questions that will be included in these courses are the following, which can be used in the BIO 4620 Fisheries Management course:

- Provide a series of graphs, one each year, for a 3 year period, that show the length-frequency structure of a fish population that typically reaches 4 years of age. Show on the graph how you could determine the growth rate of each cohort. How could you estimate annual mortality of each cohort over the 3 year period?
• Pick a species of fish that is typically caught by purse seine. Why is a purse seine used for that species? How would you characterize the selectivity and efficiency of that fishing technique? How could you manage the total catch of the purse seine fishery to ensure that the fishery doesn't cause major biological damage to the fish population?

• Marine Protected Areas are a vital and relatively new tool used to manage fisheries. What are they, and how are they supposed to work? Provide the names and short descriptions of 2 MPAs. What were they designed to do? Describe data that you could collect to determine if they're succeeding or not.

• You need to develop a fishery management strategy for the newly-discovered “Marathon grouper,” Epinephelus turinganensis. How can you determine: whether it a gonochoristic or hermaphroditic species? What its spawning season is? How fast it grows? How fast it reaches reproductive maturity?

• Pick what you think is one of the most overfished species – from anywhere in the world. How is that species caught? What is the market? Why is it in such danger? What do you think can be done to more effectively manage the fishery that will help stabilize the fish population? If your strategy was adopted, define 2 population-level parameters you could measure to determine the success or failure of the strategy, and how success/failure would affect those parameters.

3. Give effective oral presentation (COM)
   - Graduates will give an effective oral presentation about an aspect of biology learned from the literature or laboratory research.
     - Measure: Students will give an oral presentation in the capstone course Finfish Aquaculture (BIO 4530) that will include an introduction to pertinent literature. Presentations will be evaluated using a rubric.
       - Target: 75% of students will attain an 80% or better on the introductory section of their oral presentations for Finfish Aquaculture (BIO 4530).
       - Measure: Students will give an oral presentation in the capstone Fisheries Management (BIO 4620) that will include an introduction to pertinent literature. Presentations will be evaluated using a rubric.
       - Target: 75% of students will attain an 80% or better on the introductory section of their oral presentation for Fisheries Management (BIO 4620)

4. Compose effective written presentation (COM)
   - Graduates will compose an effective research paper based on an aspect of biology learned from laboratory or field research.
     - Measure: Students will write a laboratory report for General Genetics (BIO2110) that will include a discussion of their laboratory findings. Reports will be evaluated using a rubric.
       - Target: 75% of students will attain an 80% or better on the discussion section of the laboratory report for General Genetics (BIO2110).
     - Measure: Students will write a research paper in the core courses in Finfish Aquaculture (BIO 4530) and Fisheries Management (BIO 4620). Papers will be evaluated using a rubric.
       - Target: 75% of students will attain an 80% or better on the discussion section of their research papers for Finfish Aquaculture (BIO 4530) and Fisheries Management (BIO 4620).
5. Demonstrate problem solving skills (CT)
- Graduates will demonstrate an ability to solve problems in biology.
  - **Measure**: Students will answer embedded problem solving questions in exams of General Genetics (BIO 2110). (O: 5)
    - **Target**: 75% of students will attain an 80% or better on embedded problem solving questions in exams of General Genetics (BIO 2110).
- Graduates will demonstrate the ability to effectively integrate biological principles into solving research related problems.
  - **Measure**: Students will develop a research project and write a paper based on their findings in Finfish Aquaculture (BIO 4530) and Fisheries Management (BIO 4620). Papers will be evaluated using a rubric.
    - **Target**: 75% of students will attain an 80% or better on the project development section of their research paper Finfish Aquaculture (BIO 4530) and Fisheries Management (BIO 4620).
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**FRESHMAN YEAR: FALL SEMESTER**

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**JUNIOR YEAR: FALL SEMESTER**

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**FRESHMAN YEAR: SPRING SEMESTER**

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**JUNIOR YEAR: SPRING SEMESTER**

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**SOPHOMORE YEAR: FALL SEMESTER**

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**SOPHOMORE YEAR: SPRING SEMESTER**

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<td>PHY-2002</td>
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**TOTAL CREDITS REQUIRED: 129**

†Free Elective for exempted transfer students

TC, transfer credit

Restricted electives must contain 1 Q course

SIGNATURES:

Student: ____________________________

Advisor: ____________________________

Department Head: ____________________________

REMARKS/EXTRA COURSES:

______________________________________________________________
INSTRUCTIONS AND GUIDELINES FOR COMPLETING FLOWCHART FOR BIOLOGICAL SCIENCES/AQUACULTURE OPTION (7026)

Complete all parts in ink except for advisor's temporary notes in pencil, erased before submission.

Use the flowchart for the year that represents the student’s academic peer group based on majority of curriculum (mainly biology and chemistry courses) satisfied upon entry to FIT.

Enter full name and full student number.

The only entries under “GRADE” column are earned grades: A–F; TC (official transfer credit); AP (official advanced placement); EE (FIT equivalency exam). If student re-took course, entry might appear as “FIC”.

The only entries under “SUBSTITUTION” are alphanumeric FIT course numbers either from transfer credit evaluation or for courses taken at FIT; no substitutions allowed for named required courses (except as noted below under “TRANSFER STUDENTS”).

TRANSFER STUDENTS: students formerly matriculated at other colleges and universities (not high-school students with college credit) exempt from FYE-1000; enter “EX”, indicating exemption, under “SUBSTITUTION” column and enter a 1-credit-hour free elective; entry might appear as “EX/FREE: BIO-4991 (1 of 3 cr)”; if awarded AA degree (NOT AS degree) on transfer evaluation sheet, HU electives may substitute for HUM-2051 and HUM-2052 if no transfer credit for them; entry might appear as “AA EX/HU: LNC-1301”; only use of SCI transfer credits is for free elective; all actions require submission of a substitution form.

FREE ELEC: any course taken at FIT or by transfer credit at 1000-level or above.

HUM CORE: HUM-2052, 2142, 2212, 2223, 2331, 2332, or 3333.

HUM ELEC: any FIT course (taken at FIT or by transfer credit) with “HU” at end of course description in FIT catalog; also, MSC-4002; or any transfer course designated “HUM XXXX Humanities Elective” (or similar) on Registrar’s transfer credit evaluation sheet.

LIB ARTS ELEC: any course covered here under “HUM ELEC” and “SOC SCI ELEC”; all non-required courses with prefixes COM, HUM, LNG, MUS, PSY; BUS-1801, BUS-2601, BUS-3404, BUS-3501, BUS-3801, BUS-4503, BUS-4520; EDS-1005, EDS-1502, EDS-1503, EDS-2502, EDS-2503, EDS-3131, EDS-4081; up to 6 credits of MSC-XXXX.

REST ELEC: approved subjects: BIO, CHM, ENS, ISC-4000, ISC-5016, OCN; PSY-4521; courses designated as non-majors not allowed; 1000-level courses not allowed except the few allowable 1-credit courses, usable only twice as restricted electives unless taken as the laboratory component with its lecture component: BIO-1200, BIO-2332 (if MTH-2332 not used), BIO-4990, CHM-1091, CHM-4901, COM-2012, ENS-3105, ENS-4901, ENS-4911, OCN-3111, OCN-3211, OCN-3311, OCN-3411, OCN-3433, OCN-4901, OCN-4911. At least one course must be a Q course: BIO-3210, BIO-4120, BIO-4130, BIO-4720, BIO-4991, BIO-4992, BIO-4993.

Q-COURSE: At least one restricted elective, technical elective, or free elective must be a course designated “Q” in the university catalog.

SOC SCI ELEC: any FIT course (taken at FIT or by transfer credit) with “SS” at end of course description in FIT catalog; also, MSC-4002; or any transfer course designated “S XXXX Social Science Elective” (or similar) on Registrar’s transfer credit evaluation sheet.

TECH ELEC: approved subjects: AHF, AVS, BCM, BIO, BME, CHE, CHM, CIS, CON, CSE, CVE, ECE, ENS, ISC, MAE, MET, MTH, OCE, OCN, ORP, PHY, SPC, SPS, SWE, SYS; PSY-3423, PSY-4521; courses designated as non-majors (e.g., BIO-3010) not allowed; approved levels include 3000 and 4000 as well as graduate courses; levels 1000 and 2000 allowed except: AVS-1101, AVS-1102, AVS-1202, BIO-1162, BIO-1XXX transfer credit, BIO-2332 if MTH-2332 used for graduation credit, CHM-1100, CSE-1101, CSE-2234, CSE-2400 (or any other statistics course), MTH-1000, MTH-1003, MTH-1701, MTH-1702, MTH-1801, MTH-2332 if BIO-2332 used for graduation credit, MTH-2401.

Be certain to submit substitution forms immediately for elective courses, any substitutions, and special situations.
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†Free Elective for exempted transfer students

**Required electives must contain 1 Q course**

TC, transfer credit

SIGNATURES:

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Advisor: ____________________________
Department Head: ____________________________

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Be certain to submit substitution forms immediately for elective courses, any substitutions, and special situations.