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PROGRAM/DEGREE REQUIREMENT CHANGE (MAJOR/MINOR)

SUBMITTED BY:

Department	Fisheries	College/School	SFOS
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See <http://www.uaf.edu/uafgov/faculty/cd> for a complete description of the rules governing curriculum & course changes.

PROGRAM IDENTIFICATION:

DEGREE PROGRAM	M.S. in Fisheries	
Degree Level: (i.e., Certificate, A.A., A.A.S., B.A., B.S., M.A., M.S., Ph.D.)		M.S.

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

Recognizing the current strengths of our graduate program in fisheries, its well-deserved reputation as a strong quantitative program, and the desire to broaden the degree requirements to include training in the bio/ecological and human dimensions of fisheries, we propose that MS graduate students in Fisheries should have expertise in three core areas. The goal of the program's core is to ensure that graduates of our program master fundamental concepts in three key domains of fishery research and practice:

- Biology and ecology of fish and shellfish
- Quantitative population dynamics of fish and shellfish
- Management and human dimensions of fishery systems

This proposal expands upon the current requirement of one elective course (all currently quantitative fishery science courses) to include three core courses, one from each of the areas listed above.

B. CURRENT REQUIREMENTS AS IT APPEARS IN THE CATALOG:

Graduate Program — M.S. Degree

1. Complete the following admission requirements:

- a. Prerequisites: calculus, elementary statistics, ichthyology or invertebrate zoology and computer competency.
- b. Submit GRE scores.

2. Complete the general university requirements (page 201).

3. Complete the master's degree requirements (page 205).

4. Complete the following:

FISH F699—Thesis.....6 – 12
STAT F401—Regression and Analysis of Variance.....4

Electives including at least one:

FISH F421—Fisheries Population Dynamics.....4
FISH F601—Quantitative Fishery Science.....3
FISH F621—Advanced Fish Population Dynamics.....4
FISH F622—Advanced Fish Population Dynamics II.....4

Graduate seminars.....2

5. Minimum credits required.....30

Note: Students working in subject areas involving significant non-English literature may be expected to read the appropriate foreign language.

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

Graduate Program — M.S. Degree

1. Complete the following admission requirements:

- a. Prerequisites: calculus, elementary statistics, ichthyology or invertebrate zoology and computer competency.
- b. Submit GRE scores.

2. Complete the general university requirements (page 201).

3. Complete the master's degree requirements (page 205).

4. Complete the following:

to GOV. COUN. 10.15.10

FISH F699—Thesis.....	6 – 12
STAT F401—Regression and Analysis of Variance.....	4
Electives including at least one:	
FISH F421—Fisheries Population Dynamics.....	4
FISH F601—Quantitative Fishery Science.....	3
FISH F621—Advanced Fish Population Dynamics.....	4
FISH F622—Advanced Fish Population Dynamics II.....	4
Graduate seminars.....	2

Students must complete one of the following courses under each area.
Biology and ecology of fish and shellfish

BIOL 415/MSL 615: Physiology of Marine Organisms	
FISH 425: Fish Ecology	
FISH 426/626: Behavioral Ecology of Fishes	
FISH 428/628: Physiological Ecology of Fishes	
FISH 633: Pacific Salmon Life Histories	
FISH 650: Fish Ecology	
FISH 651: Fishery Genetics	
MSL 640: Fisheries Oceanography	
MSL 652: Marine Ecosystems	

Quantitative population dynamics of fish and shellfish

FISH 421: Fisheries Population Dynamics	
FISH 601: Quantitative Fishery Science	
FISH 621: Estimation of Fish Abundance	
FISH 622: Quantitative Fish Population Dynamics II	

Management and human dimensions of fisheries

FISH 411: Human Dimensions of Environmental Systems	
FISH 487: Fisheries Management	
FISH 640: Management of Renewable Marine Resources	
FISH 675: Political Ecology of the Oceans	

5. Minimum credits required.....30

Note: Students working in subject areas involving significant non-English literature may be expected to read the appropriate foreign language

Note: Only 9 credits of the required 30 M.S. degree credits can be at the 400-level.

D. ESTIMATED IMPACT

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

The increased number of required courses (3 core courses now required, 1 core course previously required) may increase the number of students in core courses and may necessitate faculty teaching core courses on a regular schedule; however, given the selection of courses available, we do not anticipate a significant increase in demand for any particular course.

E. IMPACTS ON PROGRAMS/DEPTS:

*What programs/departments will be affected by this proposed action?
 Include information on the Programs/Departments contacted (e.g., email, memo)*

The majority of the core courses are Fisheries courses. Several are cross-listed with Biology and Marine Biology. There may be a slight increase in student demand for these courses. Given the breadth of courses in each core area, we do not expect any specific courses to see significant increases in enrollment.

F. IF MAJOR CHANGE - ASSESSMENT OF THE PROGRAM:

Description of the student learning outcomes assessment process.)

This degree requirement change will better prepare students to achieve the goals we set out in our outcomes assessments document. The addition of required coursework in biological/ecological and human dimensions of fisheries better prepares students under each of four objectives (see attached). Particularly objective two (professional career in resource management) and four (certification by the American Fisheries Society) require broad training in the fisheries discipline for successful achievement of these outcomes. The requirement of two new core areas of study will ensure that all M.S. fisheries students will graduate with the credentials to achieve these goals of our program.

In light of the current accreditation process and this proposed change, the Fisheries Division is undertaking a evaluation and development of our outcomes assessment process. We expect to have this to have this outcomes assessment process finalized by December 2010. The new process will take into account the proposed revisions to the M.S. Degree requirements described here. We expect the revised assessment protocol will include: thesis defense quality, comprehensive exam, exit interview, post-graduation follow-up assessment. Students will be required to complete exit interviews. The Academic Programs Office will administer post-graduate surveys.

JUSTIFICATION FOR ACTION REQUESTED

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

This proposed action broadens the M.S. fisheries degree core from one area of focus (quantitative fishery science) to three core areas of focus (biology and ecology of fish and shellfish, quantitative population dynamics of fish and shellfish populations, and human dimensions of fisheries). The addition of a biology/ecology and a human dimensions core course expands the breadth of fisheries courses that each M.S. student will be required to take. This breadth will provide for a more holistic training in fisheries, responsive to the strengths of our expanding faculty and the growth of the field of fisheries science and practice. The selection of courses available in each core area of study will enable students to retain flexibility in designing their courses of study.

Please see attached document for a description of each course currently included in each core area. Also included is description of the core areas and criteria that will be used to determine the addition of future courses to these lists.

APPROVALS:

Signature, Chair, Program/Department of: *[Signature]* Date: 10/05/10
 Fisheries Division

Signature, Chair, College/School Curriculum Council for: *[Signature]* Date: 10/05/10
 SFOS

Signature, Dean, College/School of: *[Signature]* Date: 10/7/10
 SFOS

ALL SIGNATURES MUST BE OBTAINED PRIOR TO SUBMISSION TO THE GOVERNANCE OFFICE

Signature, Chair, UAF Faculty Senate Curriculum Review Committee: _____ Date: _____

Proposed changes to MS Fisheries degree requirements

Recognizing the current strengths of our graduate program in fisheries, its well-deserved reputation as a strong quantitative program, and the desire to broaden the degree requirements to include training in the bio/ecological and human dimensions of fisheries, we propose that MS graduate students in Fisheries should have expertise in three core areas. The goal of the program's core is to ensure that graduates of our program master fundamental concepts in three key domains of fishery research and practice:

- Biology and ecology of fish and shellfish
- Quantitative population dynamics of fish and shellfish populations
- Management and human dimensions of fishery systems

The current MS degree requirements include: 1) Prerequisites: calculus, elementary statistics, ichthyology or invertebrate zoology and computer competency; 2) Completion of STAT 401, thesis credits, and graduate seminar; 3) Electives including at least one:

- FISH F421—Fisheries Population Dynamics—4 credits
- FISH F601—Quantitative Fishery Science—3 credits
- FISH F621—Advanced Fish Population Dynamics—4 credits
- FISH F622—Advanced Fish Population Dynamics II—4 credits

We propose to broaden these electives to include one class from each of the above core areas.

Students must complete one of the following courses under each area.

Note: Only 9 credits of the required 30 M.S. degree credits can be at the 400-level.

Biology and ecology of fish and shellfish

BIOL 415/MSL 615: Physiology of Marine Organisms

- FISH 425: Fish Ecology
- FISH 426/626: Behavioral Ecology of Fishes
- FISH 428/628: Physiological Ecology of Fishes
- FISH 633: Pacific Salmon Life Histories
- FISH 650: Fish Ecology
- FISH 651: Fishery Genetics
- MSL 640: Fisheries Oceanography
- MSL 652: Marine Ecosystems

Quantitative population dynamics of fish and shellfish

- FISH 421: Fisheries Population Dynamics
- FISH 601: Quantitative Fishery Science
- FISH 621: Estimation of Fish Abundance
- FISH 622: Quantitative Fish Population Dynamics II

Management and human dimension of fisheries

- FISH 411: Human Dimensions of Environmental Systems
- FISH 487: Fisheries Management
- FISH 640: Management of Renewable Marine Resources

FISH 675: Political Ecology of the Oceans

These lists of courses reflect only permanent courses. We expect to review these lists every three years and add/delete courses to reflect current offerings.

Courses that are offered as options under each of the core areas should provide an in-depth exploration of current knowledge and theoretical foundations in a relevant topic. Proposed courses shall meet these minimum requirements: 3 credits, 400-level, content should be at a level suitably challenging for graduate students. The following criteria may be used to evaluate proposed inclusions or deletions in each of the core areas:

Biology and ecology of fish and shellfish. Courses in this core may focus on any aspect of fish or shellfish biology; however, course content should be closely linked to fishery science. Example topics that meet the requirements of this core area are: Behavior, Ecology, Genetics, Life history, Physiology.

Quantitative population dynamics of fish and shellfish populations. Courses in this core may focus on any or all of the following topics:

- Theoretical foundations in the estimation of population characteristics
- Analytical frameworks and methods employed in quantitative analysis of fish and shellfish populations
- Modeling single- or multi-species dynamics of fish and shellfish populations

Management and human dimensions of fisheries. Courses in this core area may focus on any or all of the following topics:

- Theory and practice in natural resource management and conservation
- Policy development and implementation
- Economic, social and cultural aspects of fishing, management and policy

Course descriptions:

BIOL 415/MSL 615: Physiology of Marine Organisms

3 credits. A study of the physiological systems of and adaptation to the marine environment, intertidal, pelagic, and deep benthos environment and energy flows will be discussed. Prerequisites: Graduate standing or permission of instructor. (3+0)

FISH 421: Fisheries Population Dynamics

4 credits. Review and analysis of the major quantitative techniques available for assessing and predicting the status of fish populations. Demonstration and use of field and laboratory techniques and model verification; examples and case histories. Prerequisites: STAT F200X [STAT S273-J]. Recommended: FISH F418. (4+0)

FISH 425: Fish Ecology

3 credits. Focus on the relationship of fishes to the physical, chemical, and biological features of their environment and the processes responsible for patterns of fish distribution and abundance. Concepts introduced in lectures will follow a logical progression, starting with the study of individual fish moving towards investigations of populations, metapopulations, and assemblages. Prerequisites: BIOL F115X; BIOL F271; FISH F101; or permission of instructor. Recommended: FISH F288. (3+0)

FISH 411: Human Dimensions of Environmental Systems

3 credits. Study of human-environment relationships and applications to resource management. Draws on a range of social scientific approaches to the study of environmental systems, including: environmental anthropology, environmental history, historical ecology, cultural ecology, political ecology, ethnoecology, property theory, and environmental justice. Prerequisites: Upper division standing; COMM F131X or F141X, ENGL F211X or F213X; 200-level course in cultural anthropology, human geography, sociology, or political science, or permission of instructor. (3+0)

FISH 487: Fisheries Management

3 credits. Theory and practice of fisheries management, with an emphasis on strategies utilized for the management of freshwater and marine fisheries. Application of quantitative methodologies for the assessment and manipulation of aquatic habitats, sport and commercial fish populations, and stock assessment are considered, as is the setting of appropriate goals and objectives for effective, science-based management. Prerequisites: COMM 131X or 141X; ENGL 414W; FISH 425; FISH 405 or 410; or permission of instructor. (3+0)

FISH 426/626: Behavioral and Physiological Ecology of Fishes

3 credits. This course will provide upper-level undergraduate and graduate students with an advanced understanding of behavioral and physiological responses and adaptations of fishes to natural and anthropogenic environmental variables. It should provide students another option to fulfill upper-level undergraduate and graduate level elective coursework. Before enrolling, students should have a sound understanding of both ecological and biological concepts relating to fish. Prerequisites: BIOL 115, BIOL 116, FISH 288, or permission of instructor. (3+0)

FISH 601: Quantitative Fishery Science

3 credits. Quantitative analysis and modeling of exploited fish populations. Emphasis is placed on estimates of abundance, recruitment, growth, mortality and yield. Method and theory are presented in relation to management needs. Prerequisites: STAT 301 and FISH 401. (2+3)

FISH 621: Estimation of Fish Abundance

3 credits. Estimation of abundance of fish and other aquatic populations, using mark-recapture, line-transect, catch-effort and change-in-ratio techniques. Computer lab work and homework from actual and simulated populations. Prerequisites: MATH F201X; STAT F401; familiarity with PC's including word processing and spreadsheets. Recommended: FISH F421; MATH F302; MATH F314. (2+2.5)

FISH 622: Quantitative Fish Population Dynamics II

3 credits. Modeling fish population mortality, recruitment individual growth and fecundity. Models and assessment techniques for age- and length-structured populations. Biological reference points and management strategies derived from population and harvesting parameters. Computer lab work and homework with data from actual and simulated populations. Prerequisites: FISH F621. (2+2.5)

FISH 633: Pacific Salmon Life Histories

3 credits. Life history patterns of species and stocks of Pacific salmon compared. Evolutionary models to explain the variety of patterns. Effects of human activities on species and stock; conservatin of salmon resources. Discussion and analysis of readings from the literature. Prerequisites: FISH 427. (3+0)

FISH 640: Management of Renewable Marine Resources

3 credits. Principles of fisheries management, along with case studies of successes and failures. Topics include management objectives, relationships of fished species to their environment, fishing methods, human dimensions, fishery data acquisition, harvest strategies, ecosystem effects of fishing, aquaculture and alternative management strategies, including ecosystem-based fishery management.
Prerequisites: FISH F427 Recommended: FISH F487 (3+0)

FISH/BIOL 650: Fish Ecology

3 credits. The ecology of fish is examined from the community aspect. Current literature on inter- and intraspecific relationships, influence of the environment on community structure, behavior and production is emphasized. Prerequisites: Permission of instructor. (2+3)

FISH 651: Fishery Genetics

4 credits. Application of genetics to fisheries. Focus on Alaskan fisheries including introduction to the theory of electrophoresis, stock separation, population genetics and quantitative genetics. (4+0)

FISH/ANTH 675: Political Ecology of the Oceans

3 credits. Introduction to the field of political ecology in the marine sphere. Topics include the sociology of scientific knowledge, traditional and local ecological knowledge, politics of resource management, processes of marine enclosure, environmental values, marine conservation, environmental justice, and colonialism and economic development. Prerequisites: Graduate standing; or permission of instructor. (3+0)

MSL 640: Fisheries Oceanography

4 credits. Oceanography of marine processes affecting commercially important fisheries (finfish and shellfish). Interactions between fisheries resources and physical, biological, geological and chemical oceanography, as well as climatological, and meteorological conditions. Topics include recruitment, transport, natural mortality, predator-prey relationships, competition, distribution and abundance. Emphasis is on early life history of fishes. Applications to world's commercial fisheries are cited.
Prerequisites: MSL 620 and 650 or permission of instructor; recommended FISH 400. (4+0)

MSL 652: Marine Ecosystems

3 credits. Understanding ecosystems of the sea in the context of evaluating the impact of human activities. The course focuses on current concepts, trends and perspectives rather than being a survey.
Prerequisites: BIOL 472W, MSL 650, and MSL 620 or permission of instructor. (3+0)

Certificate or Degree Program: Master of Science in Fisheries

Mission: The SFOS Fisheries Division will provide quality graduate education responsive to the needs of the individual students and the diverse population of Alaska.

Goal: The goal of the Master of Science in Fisheries degree program is to assure that our graduates are adequately prepared to succeed in the job market in their chosen fisheries field or a closely related field.

INTENDED OUTCOMES/ OBJECTIVES	ASSESSMENT CRITERIA	IMPLEMENTATION PROCEDURES (what, when, who)
<ol style="list-style-type: none"> 1. Be prepared to compete successfully for admission to Ph.D. programs in Fisheries or related aquatic science disciplines. 	<ol style="list-style-type: none"> 1. Students must pass an oral Comprehensive Examination which assesses their knowledge of Fisheries Science (for outcomes 1-3). 	<ol style="list-style-type: none"> 1. The OAC will assess graduate's research competence and written communications skills by reviewing the written reports from student Program Committee.
<ol style="list-style-type: none"> 2. Be prepared to compete successfully for mid-level professional career positions in research and management at resource management agencies in Alaska and elsewhere. 	<ol style="list-style-type: none"> 2. Students are required to write a M.S. Thesis that reports the results of independent research in some aspect of Fisheries Science, they are required to orally defend the Thesis, and they must present a public presentation of the Thesis (all outcomes). 	<ol style="list-style-type: none"> 2. A representative of the OAC will prepare a written evaluation of each student's outcome assessment.
<ol style="list-style-type: none"> 3. Be prepared to teach Fisheries Science courses at the community college or lower-division undergraduate level. 	<ol style="list-style-type: none"> 3. 80% of graduates seeking employment in Fisheries or Aquatic Sciences, or admission to another graduate program will succeed within one year of graduation (outcomes 1-3). 	<ol style="list-style-type: none"> 3. Three years after graduation, the Fisheries Division will request that each M.S. graduate complete a short questionnaire, addressing their experiences seeking employment or continuing graduate studies, and if they have successfully applied for certification as a professional with the American Fisheries Society. Completed questionnaires will be reviewed by the OAC annually.

<p>4. Be certifiable as an Associate Fisheries Professional with the American Fisheries Society.</p>	<p>4. All graduates applying for certification as an Associate Fisheries Professional with the American Fisheries Society will achieve that certification.</p>	
	<p>5. 80% of graduates will be "satisfied" or "very satisfied" overall, with the education they received in the Fisheries Program at UAF.</p>	
	<p>6. At the Thesis defense, each faculty member on the Committee will rate the student, pass/no pass on whether he/she has achieved professional level performance on the following items:</p> <ul style="list-style-type: none"> *writing ability *organizational skill *ability to synthesize literature *quantitative abilities *logical thinking *ability to think fast *clarity of verbal presentation *knowledge of subject 	

Curriculum Committee SFOS

Members: Trent Sutton (Chair)
Katrin Iken
Jeremy Mathis

20 August 2010

Degree Program Change

Degree Program: M.S. in Fisheries

Preparer: Courtney Carothers

First Time of Offering: Yes

General Recommendations:

None

Faculty Senate Form:

Clarify and Address the following:

- Please add Christina Neumann's email address (cneumann@alaska.edu) to the email contact line in addition to your email address.
- The committee thought that it was redundant to include both FISH 425 Fish Ecology and FISH 650 Fish Ecology. Since the degree program is for a graduate degree, it was recommended that only FISH 650 be retained in the biology/ecology core area.
- Program Assessment. The outcomes assessment rubric was the same one that exists for the current M.S. degree program in fisheries. The question that was raised during the committee discussion was "Why change the program if you are still meeting the same outcomes?". In its current form, the outcomes assessment rubric is incomplete and does not really assess the M.S. program. Given the current emphasis on outcomes assessment at UAF and strong linkage to university accreditation, the committee recommends developing a comprehensive outcomes assessment document/rubric for this degree program that truly assesses it.

EMJLED 8/20/10