

Submit original with signatures + 1 copy + electronic copy to UAF Governance.  
 See <http://www.uaf.edu/uafgov/faculty/cd> for a complete description of the rules governing curriculum & course changes.

**TRIAL COURSE OR NEW COURSE PROPOSAL**

**SUBMITTED BY:**

<b>Department</b>	Fisheries Division	<b>College/School</b>	SFOS
<b>Prepared by</b>	Keith Criddle	<b>Phone</b>	796-5449
<b>Email Contact</b>	<a href="mailto:kcriddle@sfos.uaf.edu">kcriddle@sfos.uaf.edu</a>	<b>Faculty Contact</b>	Keith Criddle

1. ACTION DESIRED (CHECK ONE):  
 Trial Course       New Course

2. COURSE IDENTIFICATION:      Dept       Course #       No. of Credits

Justify upper/lower division status & number of credits:

3. PROPOSED COURSE TITLE:

4. To be CROSS LISTED? YES/NO       If yes, Dept:       Course #

5. To be STACKED? YES/NO       If yes, Dept:       Course #

6. FREQUENCY OF OFFERING:   
 Fall, Spring, Summer (Every, or Even-numbered Years, or Odd-numbered Years) - or As Demand Warrants

7. SEMESTER & YEAR OF FIRST OFFERING (if approved)

8. COURSE FORMAT:  
 COURSE FORMAT: (check all that apply)       1       2       3       4       5       6 weeks to full semester  
 OTHER FORMAT:   
 Mode of delivery:

9. CONTACT HOURS PER WEEK:       LECTURE hours/weeks       LAB hours /week       PRACTICUM hours /week

OTHER HOURS (specify type)

10. COMPLETE CATALOG DESCRIPTION including dept., number, title and credits (50 words or less, if possible):

**FISH 670 Quantitative Analysis for Marine Policy Decisions**  
 3 credits      Offered Spring Odd-numbered Years  
 An introduction to the practical application of mathematical programming, operations research, simulation, cost-benefit analysis, cost effectiveness analysis, regional impact assessment, economic valuation, risk analysis, adaptive management, and other decision theoretic tools in preparation of regulatory documents required for the management of living marine resources and for assessment of environmental damages. *Prerequisites: STAT F401 and MATH F200, MATH F262, or MATH F272; graduate standing or permission of instructor. (3+0)*

to FS 4/25/11

11. COURSE CLASSIFICATIONS:

H = Humanities

S = Social Sciences

Will this course be used to fulfill a requirement for the baccalaureate core? YES  NO

IF YES, check which core requirements it could be used to fulfill:

O = Oral Intensive, Format 6

W = Writing Intensive, Format 7

Natural Science, Format 8

12. COURSE REPEATABILITY:

Is this course repeatable for credit? YES  NO

Justification

How many times may the course be repeated for credit?  TIMES

If the course can be repeated with variable credit, what is the maximum number of credit hours that may be earned for this course?  CREDITS

13. GRADING SYSTEM: Specify only one.

LETTER:

PASS/FAIL:

RESTRICTIONS ON ENROLLMENT (if any)

14. PREREQUISITES STAT 401 and MATH 200, 262, or 272

These will be required before the student is allowed to enroll in the course.

15. SPECIAL RESTRICTIONS, CONDITIONS

Graduate standing or permission of instructor

16. PROPOSED COURSE FEES \$0

Has a memo been submitted through your dean to the Provost & VCAS for fee approval? Yes/No

17. PREVIOUS HISTORY

Has the course been offered as special topics or trial course previously? Yes/No

If yes, give semester, year, course #, etc.: Fall 2008, FISH 694

18. ESTIMATED IMPACT

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

Costs to the university include the use of classrooms at Lena Point in Juneau and costs associated with videoconference delivery of this course to Fairbanks and other sites as demand warrants. These costs will be offset, in part, by tuition. The instructor is a tenured faculty member and will teach this class as a component of his workload; the course will not require unusual classroom features or other facilities.

19. LIBRARY COLLECTIONS

Have you contacted the library collection development officer (kljensen@alaska.edu, 474-6695) with regard to the adequacy of library/media collections, equipment, and services available for the proposed course? If so, give date of contact and resolution. If not, explain why not.

No  X Yes

The library collection development officer was contacted on 03-16-11. On Anne Christie responded on behalf of the library on 04-05-11 (see attached). With a few minor exceptions, the library has the reference materials listed as required readings for this class. I have copies of the materials that the library does not have and can place them in electronic reserve.

**20. 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)

FISH will bear the bulk of costs and reap the bulk of benefits associated with offering this class. Joshua Greenberg (Dept. Head, Resource Management) and Joe Little (Director of MS in Resource & Applied Economics) were contacted were contacted on 3/16/11. Dr. Greenberg expresses support for this course and notes that it will be a valuable option for students in the NRS PhD program (see attached). Dr. Little concludes that this course will positively impact the MS Resource and Applied Economics program by serving as an elective for interested students (see attached).

**21. POSITIVE AND NEGATIVE IMPACTS**

Please specify positive and negative impacts on other courses, programs and departments resulting from the proposed action.

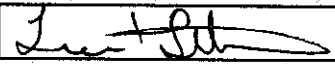
Fisheries graduate students preparing for employment in federal; fisheries management agencies or with resource based firms and resource focused NGOs need an introduction to practical and proper use of quantitative methods to evaluate the impact of policy alternatives. This course provides that introduction. This course does not duplicate any existing UAF courses and does not have any other negative impacts but instead offers potential positive impacts for the NRS PhD and the RAE MS programs.

**JUSTIFICATION FOR ACTION REQUESTED**

The purpose of the department and campus-wide curriculum committees is to scrutinize course change and new course 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. Use as much space as needed to fully justify the proposed course.

Although this topic is touched on in various courses offered by ECON and NRM, none of the current courses provide an in-depth treatment of the topic in the context of fisheries management. Preparation of Regulatory Impact Reviews and Initial Regulatory Flexibility Analyses required in regulation governing management of federal fisheries off Alaska is not well done primarily because current analysts lack training in cost-benefit analysis, and other quantitative methods of rigorously evaluating the likely consequences of contemplated actions. This course will provide training that will enable graduates to meet this gap in agency capacity. In addition, this course will provide a helpful overview for biometricians and population modelers who sit on advisory committees that evaluate whether draft RIR/IRFA documents are suitable for public review. This course was successfully offered as a trial course in Fall 2008.

**APPROVALS:**

 Date 04/07/2011


Signature, Chair,  
Program/Department of:

Fisheries Division

 Date 04/07/2011

Signature, Chair, College/School  
Curriculum Council for:

SFOS Curricula Committee

 Date 4/22/11

Signature, Dean, College/School  
of:

SFOS

Signature of Provost (if applicable) Date

Offerings above the level of approved programs must be approved in advance by the Provost.

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

Signature, Chair, UAF Faculty Senate Curriculum Review Committee Date

Signature, Chair, UAF Faculty Senate Curriculum Review Committee

**ADDITIONAL SIGNATURES: (As needed for cross-listing and/or stacking)**

	Date	
Signature, Chair, Program/Department of:		
	Date	
Signature, Chair, College/School Curriculum Council for:		
	Date	
Signature, Dean, College/School of:		

**ATTACH COMPLETE SYLLABUS (as part of this application).**

Note: The guidelines are online: <http://www.uaf.edu/uafgov/faculty/cd/syllabus.html>

The department and campus wide curriculum committees will review the syllabus to ensure that each of the items listed below are included. If items are missing or unclear, the proposed course change will be denied.

**SYLLABUS CHECKLIST FOR ALL UAF COURSES**

During the first week of class, instructors will distribute a course syllabus. Although modifications may be made throughout the semester, this document will contain the following information (as applicable to the discipline):

**1. Course information:**

Title,  number,  credits,  prerequisites,  location,  meeting time (make sure that contact hours are in line with credits).

**2. Instructor (and if applicable, Teaching Assistant) information:**

Name,  office location,  office hours,  telephone,  email address.

**3. Course readings/materials:**

Course textbook title,  author,  edition/publisher.  
 Supplementary readings (indicate whether  required or  recommended) and  
 any supplies required.

**4. Course description:**

Content of the course and how it fits into the broader curriculum;  
 Expected proficiencies required to undertake the course, if applicable.  
 Inclusion of catalog description is *strongly* recommended, and  
 Description in syllabus must be consistent with catalog course description.

**5.  Course Goals (general), and (see #6)**

**6.  Student Learning Outcomes (more specific)**

**7. Instructional methods:**

Describe the teaching techniques (eg: lecture, case study, small group discussion, private instruction, studio instruction, values clarification, games, journal writing, use of Blackboard, audio/video conferencing, etc.).

**8. Course calendar:**

A schedule of class topics and assignments must be included. Be specific so that it is clear that the instructor has thought this through and will not be making it up on the fly (e.g. it is not adequate to say "lab". Instead, give each lab a title that describes its content). You may call the outline Tentative or Work in Progress to allow for modifications during the semester.

**9. Course policies:**

Specify course rules, including your policies on attendance, tardiness, class participation, make-up exams, and plagiarism/academic integrity.

**10. Evaluation:**

Specify how students will be evaluated,  what factors will be included,  their relative value, and  
 how they will be tabulated into grades (on a curve, absolute scores, etc.)

**11. Support Services:**

Describe the student support services such as tutoring (local and/or regional) appropriate for the course.

**12. Disabilities Services:**

The Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials.

State that you will work with the Office of Disabilities Services (208 WHIT, 474-5655) to provide reasonable accommodation to students with disabilities."

# FISH 670: Quantitative Analysis for Marine Policy Decisions (3 credits)

**Instructor:** Dr. Keith R. Criddle  
**Contact Information:** [kcriddle@sfos.uaf.edu](mailto:kcriddle@sfos.uaf.edu) 796-5449 LP 203  
**Office hours:** TR 10-12 or by appointment  
**Time/Location:** TR 3:40-5:10 Juneau (LP 103) and by video conference as demand warrants.

**Course Description:** An introduction to the practical application of mathematical programming, operations research, simulation, cost-benefit analysis, cost effectiveness analysis, regional impact assessment, economic valuation, risk analysis, adaptive management, and other decision theoretic tools in preparation of regulatory documents required for the management of living marine resources and for assessment of environmental damages. *Prerequisites: STAT F401 and MATH F200, MATH F262, or MATH F272; graduate standing or permission of instructor.* (3+0)

**Course Goals and Learning Objectives:** Upon completion of this course, students will have a working background and an understanding of pitfalls associated with the use and abuse of quantitative methods as they are applied to the evaluation of alternatives and options for the management of living marine resources. Armed with this working background, students will be prepared to participate on analytic teams that are engaged in preparing economic analyses for inclusion in regulatory documents such as Environmental Assessments and Regulatory Impact Reviews, or to review and comment on draft regulatory documents on behalf of their employer. Students who successfully complete this course will:

- Be familiar with the federal laws and regulations that must be addressed when actions that could affect marine resources are being contemplated.
- Be able to structure and solve decision trees for unitary and multiple criteria.
- Understand how Benefit-Cost analyses are structured and potential misuses of Benefit-Cost analysis.
- Understand how present value is determined and how the choice of discount rate affects estimated benefits and costs.
- Be familiar with methods used to estimate the value of environmental goods and services the strengths and shortcomings of alternative estimation methodologies.
- Be familiar with methods used to estimate regional impacts aware of common abuses of regional impact analysis.
- Understand how mathematical programming models are structured and how they can be used to solve optimization problems.
- Be familiar with the principles of risk analysis, risk assessment, and risk management.

**Course Readings:** J. Loomis and G. Helfand. (2001) Environmental Policy Analysis for Decision Making. Kluwer Academic Publishers. Selected readings from academic articles and federal and state agency reports

**Instructional Method:** A combination of lectures, facilitated discussions, and work sessions. UAF's Electronic Blackboard will be used to post readings, data sets, examples, and exercises.

**Evaluation:** Evaluation will be based on 8 homework assignments (10% each) designed to reinforce topics covered in lectures and to allow you to demonstrate your ability to work with the analytic methods introduced in class. In addition, there will be a final exam (20%) designed to assess your ability to retain and integrate material covered in the lectures and homework assignments. Each homework assignment is worth 100 points and will require several hours of effort. The final is worth 100 points. Course grades will be assigned based on a weighted sum of scores on the exercises and exam:  $\geq 90 = A$ ;  $\geq 80$  but  $< 90 = B$ ;  $\geq 70$  but  $< 80 = C$ ;  $\geq 60$  but  $< 70 = D$ ; and  $< 60 = F$ .

**Course policies:** Plagiarism or cheating on the exam is automatic grounds for failing course grade. Students may work discuss the homework assignments with one another but are expected to do their own work.

**Registration:** Registration can be completed at: [uaonline.alaska.edu](http://uaonline.alaska.edu).

**Disabilities Services:** The office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials. I will work with the Office of Disabilities Services (208 WHIT 474-5665) to provide reasonable accommodation to students with disabilities.

**Other Support Service:** For a listing of other support services that may be useful, see: [www.uaf.edu/sssp/index.html](http://www.uaf.edu/sssp/index.html).

## COURSE OUTLINE & READING ASSIGNMENTS:

### Course Outline and Tentative Schedule

- 1. Introduction:** **weeks 1& 2**  
National Environmental Protection Act (NEPA), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Endangered Species Act (ESA), Magnuson-Stevens Fisheries Conservation and Management Act (MSFCMA), Resource Conservation and Recovery Act (RCRA), Marine Mammal Protection Act (MMPA), Clean Water Act (CWA), Coastal Zone Management Act (CZMA), Executive Order 12866 (Regulatory Impact Review—RIR), Regulatory Flexibility Act (RFA), Administrative Procedures Act (APA), etc.  
Homework 1 is due at end of this module.
- 2. Decision Criteria and Decision Methods for Policy Analysis:** **weeks 3 & 4**  
Decision Criteria: efficiency, equity, political/social acceptability, legality/operational feasibility. Decision Methods: dominance (payoff tables, decision trees, Minimax, Maximax, Minimum Regret, Expected Value, Value of Information, game theory), criteria ranking, benefit-cost analysis, multiattribute analysis.  
Homework 2 is due at end of this module.
- 3. Principles of Benefit-Cost Analysis:** **weeks 5 & 6**  
Effect of alternate specifications of the status quo. Effect of accounting stance. Gross benefits, net benefits, marginal net benefits. Consumer surplus, producer surplus, social welfare, willingness-to-pay vs. willingness-to-accept.  
Homework 3 is due at end of this module.
- 4. Discounting Benefits and Costs Over Time:** **weeks 7 & 8**  
Time preferences for benefits and costs. Net present value. Benefit-cost ratio. Internal rate of return.  
Homework 4 is due at end of this module.
- 5. Valuation of Environmental Resources and Quality:** **weeks 9 & 10**  
Stated preferences vs. revealed preferences. Hedonic pricing. Travel cost method. Contingent valuation. Contingent behavior. Conjoint analysis. Benefit transfer.  
Homework 5 is due at end of this module.
- 6. Regional Economic Analysis, Input-Output Models and Multipliers:** **weeks 11 & 12**  
Economic linkages and leakages, multiplier effects. Effect of accounting stance. Input-output models. Social accounting matrix. Economic base models. General equilibrium models. RIMS. IMPLAN.  
Homework 6 is due at end of this module.
- 7. Optimization and Linear Programming:** **weeks 13 & 14**  
Specification of objectives and constraints. Sensitivity analysis. Duality. Shadow values.  
Homework 7 is due at end of this module.
- 8. Risk Analysis:** **week 15**  
Risk assessment. Risk management.  
Homework 8 is due at end of this module.

Final Exam.



## Supplementary Readings:

### Regulatory Framework

- Criddle KR. 2008. The legal context of US fisheries management and the evolution of rights-based management in Alaska. Pages 369-382 in R Townsend, R Shotton, & H Uchida (editors). *Case Studies in Fisheries Self-Governance*. FAO Fisheries Technical Paper. No. 504. Rome, FAO.
- EO 12866-Regulatory Planning and Review.
- MSFCMA 2007 as amended.
- NMFS 2000 Guidelines for economic analysis of fishery management actions.

### Decision Criteria/ Decision Methods

#### Analytic Hierarchy Process

- DiNardo G, D Levy, B Golden. 1989. Using decision analysis to manage Maryland's river herring fishery: an application of AHP. *Journal of Environmental Management* 29:193-213.
- McDaniel TL. 1995. Using judgment in resource management: a multiple objective analysis of a fisheries management decision. *Operations Research* 43:415-426.
- Merritt MA, KR Criddle. 1993. Multiple criterion decision theory for judging management strategies and resolving conflict: a case study of the Kenai River recreational fisheries. Pages 683-704 in G Kruse, DM Eggers, RJ Marasco, C Pautzke, TJ Quinn II (Editors). *Proceedings of the International Symposium on Management Strategies for Exploited Fish Populations*, Alaska Sea Grant, Fairbanks, AK.

#### Bayesian Decision Analysis

- Charles AT. 1988. In-season fishery management: a Bayesian model. *Natural Resource Modeling* 2:599-629.
- Fried SM, R Hilborn. 1988. Inseason Forecasting of Bristol Bay, Alaska, sockeye salmon (*Onchorhynchus nerka*) abundance using Bayesian probability theory. *Canadian Journal of Fisheries and Aquatic Science* 45:850-855.
- Robb CA, RM Peterman. 1998. Application of Bayesian decision analysis to management of a sockeye salmon fishery. *Canadian Journal of Fisheries and Aquatic Science* 55: 86-98.
- Schnute JT, A Cass, LJ Richards. 2000. A Bayesian decision analysis to set escapement goals for Fraser River sockeye salmon. *Canadian Journal of Fisheries and Aquatic Science* 57: 962-979.

#### Game Theory

- Dockner E, G Feichtinger, A Mehlmann. 1989. Noncooperative solutions for a differential game model of fishery. *Journal of Economic Dynamics and Control* 13:1-20.
- Kaitala V, M Pohjola (1988) Optimal recovery of a shared resource stock-a differential game with efficient memory equilibria. *Natural Resource Modeling* 3: 91-119.
- Lee DJ, SL Larkin, CM Adams. 2000. Bioeconomic analysis of alternative swordfish management policies. *Marine Resource Economics* 15: 77-96.
- Levhari D, LJ Mirman. 1980. The great fish war: an example using a dynamic Cournot-Nash solution. *Bell Journal of Economics* 11:322-334.
- Russell, CS. 1990. Game models for structuring monitoring and enforcement systems. *Natural Resource Modeling* 4:143-173.

#### Multiple Criterion Decision Analysis

- Boutilier J, D Noakes, D Heritage, J Fulton. 1988. Use of multiattribute utility theory for designing invertebrate fisheries sampling programs. *North American Journal of Fisheries Management* 8:84-90
- Healey M. 1984. Multiattribute analysis and the concept of optimum yield. *Canadian Journal of Fisheries and Aquatic Science* 41:1393-1406.
- Hilborn R, CJ Walters. 1977. Differing goals of salmon management on the Skeena River. *Journal of the Fisheries Research Board of Canada* 34:64-72.
- Mardle S, S Pascoe. 1999. A review of applications of multiple-criteria decision-making techniques to fisheries. *Marine Resource Economics* 14: 41-63.

- Pan M, P-S Leung, SG Pooley. 2001. A decision support model for fisheries management in Hawaii: a multilevel and multiobjective. Programming approach. *North American Journal of Fisheries Management* 21:293–309.
- Sylvia G. 1994. Market information and fisheries management—a multiple-objective analysis. *North American Journal of Fisheries Management* 14:278-290.
- Sylvia G, RR Enriquez. 1994. Multiobjective bioeconomic analysis: an application to the Pacific whiting fishery. *Marine Resource Economics* 9:311-318.
- Walker KD, RB Rettig, R Hilborn. 1983. Analysis of multiple objectives in Oregon coho salmon policy. *Canadian Journal of Fisheries and Aquatic Science* 40: 580-587.

#### Structured Decision Making

- Bain MB. 1987. Structured decision making in fisheries management: trout fishing regulations on the Au Sable River, Michigan. *North American Journal of Fisheries Management* 7:475-481.
- MacGregor, BW, RM Peterman, BJ Pyper. 2002. A decision analysis framework for comparing experimental designs of projects to enhance Pacific salmon. *North American Journal of Fisheries Management* 22:509–527
- Mendelsohn R. 1980. Using Markov decision models and related techniques for purposes other than simple optimization: analyzing the consequences of policy alternatives on the management of salmon runs. *Fishery Bulletin* 78: 35-50.
- Peters CN, DR Marmorek, RB Deriso. 2001. Application of decision analysis to evaluate recovery actions for threatened Snake River fall chinook salmon (*Oncorhynchus tshawytscha*). *Canadian Journal of Fisheries and Aquatic Science* 58: 2447–2458
- Peters CN, DR Marmorek. 2001. Application of decision analysis to evaluate recovery actions for threatened Snake River spring and summer chinook salmon (*Oncorhynchus tshawytscha*). *Canadian Journal of Fisheries and Aquatic Science* 58: 2431–2446
- Tomlinson JWC, PS Brown. 1979. Decision analysis in fish hatchery management. *Transactions of the American Fisheries Society* 108: 121-129.

#### *Cost-Benefit Analysis*

- Herrick Jr. SF, I Strand, D Squires, M Miller, D Lipton, J Walden, and S Freese. 1994. Application of cost-benefit analysis to fisheries allocation decisions: the case of Alaska walleye pollock and Pacific cod. *North American Journal of Fisheries Management* 14:726-741.
- Huppert DD, D Squires. 1987. Potential economic benefits and optimum fleet size in the Pacific coast trawl fleet. *Marine Resource Economics* 3:297-319.
- Johnson DM, RJ Behnke, DA Harpman, RG Walsh. 1995. Economic benefits and costs of stocking catchable rainbow trout: a synthesis of economic analysis in Colorado. *North American Journal of Fisheries Management* 15: 26-32
- NOAA 1991. BSAI 18 GOA 23 Inshore-Offshore I SEIS-EA.
- NOAA BSAI 38 GOA 40 Inshore-Offshore II EA-RIR-IRFA
- NOAA BSAI 51 GOA 51 Inshore-Offshore III
- OMB. 2000. Guidelines to standardize measures of costs and benefits and the format of accounting statements.
- OMB. 2003. Circular A-4—Guidance to Federal agencies on the development of regulatory analysis as required under Section 6(a)(3)(c) of Executive Order 12866
- Smith VK. 1987. Nonuse values in benefit cost analysis. *Southern Economic Journal* 54:19-26
- Somerton DA, J June. 1984. Cost-benefit method for determining optimum closed fishing areas to reduce trawl catch of prohibited species. *Canadian Journal of Fisheries and Aquatic Science* 41: 93-98.

#### *Discounting Benefits and Costs*

- Mendelsohn R. 1982. Discount factors and risk aversion in managing random fish populations. *Canadian Journal of Fisheries and Aquatic Science* 39:1252-1257.
- NOAA. 1999. Discounting and the treatment of uncertainty in natural resource damage assessment.

#### *Valuation of Environmental Resources*

- Arrow K, R Solow, PR Portney, EE Leamer, R Radner, H Schuman. 1993. Report of the NOAA Panel on Contingent Valuation

- Henderson MM, KR Criddle and ST Lee. 2000. The economic value of Alaska's Copper River personal-use and subsistence fisheries. *Alaska Fishery Research Bulletin* 6: 63-69.
- Layman CS, JR Boyce, KR Criddle. 1996. The economic value of the recreational king salmon fisheries on the Gulkana and Klutina Rivers, Alaska. *Land Economics* 72: 113-128.
- Lipton DW, K Wellman, IC Sheifer, RF Weiher. 1995. Economic valuation of natural resources—a handbook for coastal resource policymakers, NOAA Coastal Ocean Program Decision Analysis Series No. 5, NOAA Coastal Ocean Office, Silver Spring, MD.

#### *Regional Economic Impacts*

- Hamel C, M Herrmann, ST Lee, KR Criddle, HT Geier. 2002. Linking sportfishing trip attributes, participation decisions, and regional economic impacts in Lower and Central Cook Inlet, Alaska. *Annals of Regional Science* 36: 247-264.
- Huppert DD. 1995. Fisheries and the economy: measuring economic contribution and economic impact. School of Marine Affairs, University of Washington.
- Seung CK, EC Waters. 2005. A review of economic models for Alaska fisheries. AFSC processed report. 2005-01
- Steinback SR. 1999. Regional economic impact assessments of recreational fisheries: an application of the IMPLAN modeling system to marine party and charter boat fishing in Maine. *North American Journal of Fisheries Management* 19: 724-736,

#### *Optimization and Linear Programming*

- Rothschild BJ, JW Balsiger. 1971. Linear-programming solution to salmon management. *Fishery Bulletin* 69: 117-139.

#### *Risk Analysis*

- Brown BE, GP Patil 1986. Risk analysis in the Georges Bank haddock fishery—a pragmatic example of dealing with uncertainty. *North American Journal of Fisheries Management* 6: 183-191.
- Criddle KR and AY Streletski. 2000. Multiple criterion management of a sequential fishery. *Annals of Operations Research* 94: 259-273.
- Criddle KR. 1996. Predicting the consequences of alternative harvest regulations in a sequential fishery. *North American Journal of Fisheries Management* 16:30-40.
- Criddle KR, M Herrmann, JA Greenberg, and EM Feller. 1998. Climate fluctuations and revenue maximization in the eastern Bering Sea fishery for walleye pollock. *North American Journal of Fisheries Management* 18: 1-10.
- Ferson S, L Ginzburg and A Silvers. 1989. Extreme event risk analysis for age-structured populations. *Ecological Modelling* 47:175-187.
- Jones DD and C J Walters. 1976 Catastrophe theory and fisheries regulation. *Journal of the Fisheries Research Board of Canada* 33:2829-2833.
- Mendelsohn R. 1979 Determining the best trade-off between expected economic return and the risk of undesirable events when managing a randomly varying population. *Journal of the Fisheries Research Board of Canada* 36:939-947.
- Mendelsohn R. 1980. Using Markov decision models and related techniques for purposes other than simple optimization: analyzing the consequences of policy alternatives on the management of salmon runs. *Fishery Bulletin* 78:35-50.
- NRC. 1983. *Risk Assessment in the Federal Government: Managing The Process*. National Academy Press, Washington, D.C., 191p.
- NRC. 1993. *Issues in Risk Assessment*. National Academy Press, Washington, D.C., 356p.
- NRC. 1996. *Understanding Risk: Informing Decisions in a Democratic Society*. National Academy Press, Washington, D.C., 249p.
- NRC. 2004. *Non-native Oysters in the Chesapeake Bay*. National Research Council, National Academy Press. Washington DC 325p.
- Silvert W. 1978. The price of knowledge: fisheries management as a research tool. *Journal of the Fisheries Research Board of Canada* 35(1978):208-212.
- Walters CJ, D Ludwig. 1987. Adaptive management of harvest rates in the presence of a risk averse utility function. *Natural Resource Modeling* 1: 321-337.
- Walters CJ, R Hilborn. 1978. Ecological optimization and adaptive management. *Annual Review of Ecological Systems* 9: 157-188.





**DEPARTMENT OF RESOURCES MANAGEMENT**

SCHOOL OF NATURAL RESOURCES AND AGRICULTURAL SCIENCES  
P.O. Box 757200  
Fairbanks, AK 99775-7200

907 474-7188  
FAX 907 474-6184  
[www.uaf.edu/salrm/rm/index.html](http://www.uaf.edu/salrm/rm/index.html)

**FROM:** Joshua Greenberg, Chair,  
NRS PhD Program

**DATE:** March 24, 2011

**SUBJECT:** Course contribution

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As Chair of the NRS PhD program, I would like to express our support for the three courses being offered by Dr. Keith Criddle: FISH 670 Quantitative Analysis and Marine Policy, FISH 645 Bioeconomic Modeling and Fisheries Management, and Fish 672 Law and Fisheries. These courses have great relevance and application to the NRS PhD program thematic areas of resource economics, and resource policy and sustainability science. We appreciate the broadening of the UAF course offerings to include human interaction with marine resources. Students in our program have taken advantages of these courses in the past and based upon student feedback will continue to participate in these courses in the future. Dr. Criddle is valued affiliate faculty with our program and we appreciate the contribution he has made to our program through these courses.



## Keith Criddle

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**From:** Joseph Little <jmlittle2@alaska.edu>  
**Sent:** Tuesday, March 29, 2011 9:21 AM  
**To:** kcriddle@sfos.uaf.edu  
**Subject:** Re: course impacts

Hi Keith,

I have reviewed the course syllabi you have sent but got delayed on the write up while finishing up some paper revisions. My apologies.

The proposed courses, Fish 670 (Quantitative Analysis for Marine Policy Decisions), Fish 645 (Bioeconomic Modeling and Fisheries Management, and Fish 672 (Law and Fisheries), would positively impact the MSRAE. The quantitative analysis courses (Fish 670 and Fish 645) provide additional elective opportunities which students could use to further hone their applied analysis skill sets. Fish 672 would also be useful to MSRAE students who are seeking to expand their knowledge of the laws and regulations which guide Fisheries management. The only limitation that I can see, is that Fish 672 is a two credit course. While this is a minor point, MSRAE students who opt to take the course may need to register for additional credits (e.g., project or thesis) to satisfy program requirements. Again, this is a small matter. Overall, each of the courses display a level of analytical rigor which is consistent with the MSRAE coursework. Expanded course opportunities would particularly benefit students who are conducting research in the area of Fisheries economics.

Again I apologize for the delayed response. I hope you are enjoying your spring semester. Take care. -Joe

On Tue, Mar 29, 2011 at 6:44 AM, Keith Criddle <kcriddle@sfos.uaf.edu> wrote:

> Hi Joe,

>

> Have you had a chance to review these syllabi for possible impacts?

>

> Keith

>

> -----Original Message-----

> From: Joseph Little [mailto:jmlittle2@alaska.edu]

> Sent: Wednesday, March 16, 2011 2:25 PM

> To: kcriddle@sfos.uaf.edu

> Subject: Re: course impacts

>

> Hi Keith,

>

> I'd be glad to help. Do you need the impact summaries prepared in a particular format? I hope you are enjoying some nice weather. Take care.

> -Joe

>

> On Wed, Mar 16, 2011 at 12:36 PM, Keith Criddle

> <kcriddle@sfos.uaf.edu>

> wrote:

>> Hi Joe,

>>

>> I am preparing paperwork for approval of three courses that have  
>> hitherto been offered as trial courses. "Bioeconomic Modeling and  
>> Fisheries Management" has been offered in Spring 2007, Spring 2009,  
>> and

> Spring 2011.

>> "Quantitative Analysis for Marine Policy Decisions" was offered in

>> Fall 2008. "Law and Fisheries" was offered in Fall 2010. Would you

>> please review the attached syllabi and comment on how these classes

>> might affect the MS Resource & Applied Economics program? Regards,

>>

>> Keith Criddle

>>

>>

>>

>



## Keith Criddle

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**From:** Anne Christie <anne.christie@alaska.edu>  
**Sent:** Tuesday, April 05, 2011 12:57 PM  
**To:** kcriddle@sfos.uaf.edu  
**Subject:** Re: FW: library impact of proposed course offerings

Hello Keith,

Thank you for providing the syllabi for your classes. This is very helpful for the library in providing one way to assess whether our collection is meeting faculty and student needs.

I've looked through the reading lists for the 3 courses and am glad to find that the library is able to provide a good number of the sources. Some of this is due to our JSTOR subscription as well as to complete backfiles for the Canadian Journal of Fisheries and Aquatic Sciences and the AFS journals. We recently purchased backfiles for some Elsevier journals which added a couple of titles that are on your list. Of course, as you point out, a number of the sources are freely available on the web. Based on the reading lists, I think students should be able to locate many of the sources they might need for their papers through the library collection.

I did uncover a couple of gaps which I will work on trying to fill. The most prominent is Marine Resource Economics. The library dropped its subscription at the end of 1989. It has been picked up again with 2011 but there is a big gap. Unfortunately, as far as I can tell, there is no online institutional access available. Also, we do not have the first four volumes of Natural Resource Modeling. Do you have your own access to complete runs of these two journals?

Also, the library does not subscribe to Research in Economic History.

I also found a few books that we are missing.

Sustainable Management of North American Fisheries 2004.

Kalo -- Coastal and Ocean Law

Endangered Species Act: Law, Policy and Perspectives

Loomis and Helfand -- Environmental Policy Analysis for Decision Making.

I will follow up on these.

The library's Electronic Reserves (E-Res) service can be used to provide scans of articles and book chapters (not the entire book) so that students have 24/7 access. This could be an alternative to posting in Blackboard which might save you some time. Please let me know if you have questions about this.

I noted edits for a couple of listings.

1. FISH 645

Page 3 in d.

Spatial Processes and the Management of Fish Populations -- is Marine Populations

2. FISH 670

Page 2

Pub year for McDaniels TL is 1995 rather than 1994.

Page 5.

Sueng CK. 2005, A review of regional economic models for Alaska fisheries. AFSC processed report. 2005-01. (There is a link to a pdf of this report from the library catalog.)

Again, thank you for providing your syllabi. It is really appreciated.

Best regards,

Anne

On Mon, Apr 4, 2011 at 3:51 PM, Keith Criddle <[kcriddle@sfos.uaf.edu](mailto:kcriddle@sfos.uaf.edu)> wrote:

Thanks Anne. Tomorrow will be fine.

**From:** Anne Christie [<mailto:anne.christie@alaska.edu>]  
**Sent:** Monday, April 04, 2011 3:49 PM

**To:** [kcriddle@sfos.uaf.edu](mailto:kcriddle@sfos.uaf.edu)  
**Subject:** Re: FW: library impact of proposed course offerings

Hello Keith,

Apologies for getting wires somewhat crossed on and I am just back after being out of town. I have the syllabi and will get back to you by the end of tomorrow. Hope that's OK.

Best regards,

Anne

On Tue, Mar 29, 2011 at 6:42 AM, Keith Criddle <[kcriddle@sfos.uaf.edu](mailto:kcriddle@sfos.uaf.edu)> wrote:

Hi Anne,

Have you had a chance to look at these syllabi for possible library impacts?

Keith

**From:** Karen Jensen [<mailto:kljensen@alaska.edu>]  
**Sent:** Tuesday, March 22, 2011 9:24 AM

**To:** [kcriddle@sfos.uaf.edu](mailto:kcriddle@sfos.uaf.edu)  
**Subject:** Re: library impact of proposed course offerings

Okay!

Karen Jensen  
Collection Development Officer  
Rasmuson Library  
University of Alaska Fairbanks  
907-474-6695  
[kljensen@alaska.edu](mailto:kljensen@alaska.edu)

On Tue, Mar 22, 2011 at 9:19 AM, <[kcriddle@sfos.uaf.edu](mailto:kcriddle@sfos.uaf.edu)> wrote:

Hi Karen. Thank you for getting back to me. At this point, all I need is an okay to include with my request for course approval. Regards, Keith

Sent via BlackBerry by AT&T

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**From:** Karen Jensen <[kljensen@alaska.edu](mailto:kljensen@alaska.edu)>

**Date:** Tue, 22 Mar 2011 09:12:21 -0800

**To:** <[kcriddle@sfos.uaf.edu](mailto:kcriddle@sfos.uaf.edu)>

**Subject:** Re: library impact of proposed course offerings

Hi Keith

Sorry I'm delayed getting back to you; I was out on vacation last week. Do you need a full report of library materials for these course proposals? That can take a while but I'm certainly willing to do it. Otherwise if you only need an "ok" from us, I'll forward the syllabi to Anne Christie, our BioSciences Librarian and she can contact you with any concerns or questions.

Thanks,

Karen Jensen  
Collection Development Officer  
Rasmuson Library  
University of Alaska Fairbanks  
907-474-6695  
[kljensen@alaska.edu](mailto:kljensen@alaska.edu)

On Wed, Mar 16, 2011 at 11:58 AM, Keith Criddle <[kcriddle@sfos.uaf.edu](mailto:kcriddle@sfos.uaf.edu)> wrote:

Hi,

I have attached syllabi for three proposed courses. All three have been previously offered as trial or special topic courses. Please comment on the adequacy of library/media collections, equipment, and services available for the proposed courses. Thank you,

Keith R. Criddle

Interim Administrative Director  
University of Alaska Fairbanks Fisheries Division  
[kcriddle@sfos.uaf.edu](mailto:kcriddle@sfos.uaf.edu)

## **Curriculum Committee SFOS**

Members: Trent Sutton (Chair)  
Katrín Iken  
Jeremy Mathis  
Andre Lopez

22 February 2011

### **New Course**

**Course Number:** FISH 670

**Course Title:** Quantitative Analysis for Marine Policy Decisions

**Instructor:** Criddle

**First Time of Offering:** No

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### **General Recommendations:**

No general comments.

### **Faculty Senate Form:**

#### **Clarify and Address the following:**

- FISH 670 (this course) and FISH 645 are listed to be offered in alternate years starting in spring 2012. Are those two courses really to be offered during the same semester or are they to alternate (one in spring of odd years, one in spring of even years). This has been resolved. FISH 645 will be offered in even years and FISH 670 will be offered in odd years.
- For section 8, please select the box for 6 weeks to a full semester. Done
- The catalog description (section 10) must appear as it will in the actual catalog; you must include the title, credits, prerequisites, and course format (e.g., 3+0); you only had the course description. Your course description is not very descriptive; please provide additional detail (note that this is a requirement of the UAF Curriculum Committee that is requiring more descriptive course descriptions). The line "...decision theoretic tools to regulatory decision-making..." should read "...decision theoretic tools for regulating decision-making...". Also, no need to note the last line "The course will be lecture-based...". Done. The description includes as much detail as can be included in 50 words or less as specified on the form.
- Section 19. Even though this course has been offered previously, you still must contact the library to ensure that sufficient resources are available. Contacting the library also ensures that they maintain current subscriptions and book purchase relative to the material covered in this course. Done. See attached email from Anne Christie.
- Section 20. Were other programs contacted that might have interest or overlap with this course? Political Science? NRM? If not, those programs need to be contacted. Done. Political Science does not engage in quantitative analyses and thus there is little purpose to asking PoliSci to review the course. It is, however, a

subject that is often addressed in Econ and Resource Management programs. The directors of those graduate programs were contacted. See attached emails from Joshua Greenberg and Joe Little.

- Section 21. You list the positive impacts but state nothing potential negative impacts. Are there any? If not, then need to state something to this effect. Addressed.

**Syllabus:**

- FISH 645 lists a meeting time of TR from 3:40 to 5:10. If this course (FISH 670) and FISH 670 are to be offered in the same semester (starting spring 2012), then the days/time that the courses are offered cannot be the same. Addressed.
- Office hours have to be provided and posted, cannot be just by appointment. Addressed.
- Course goals and learning objectives need to be moved up to just below the first paragraph. Also, you only provide course goals and skills to be completed and do not provide any learning objectives. Please provide these as the UAF Curriculum Committee will look specifically for course learning objectives for outcomes assessment purposes. Addressed.
- For course evaluation, the various grading criteria are very vague; please provide additional detail on each type of assignment. In addition, please note on the course outline when the various assignments will be due. You need to provide grading criteria – how many points each assignment is worth, total points in the course, how many points needed for each grade (A, B, C, etc.), and whether you are using a plus-minus system. If this is the case, need to provide specific criteria for each grade (e.g., number of points or percentile for an A, A-, etc.). Addressed.