Course Syllabus
Spring Semester 2011 University of Alaska Fairbanks

Course Title: Integrated Assessment & Adaptive Management
Spring 2011 **Course Number**: NRM 694/BIOL694/ECON 694/ANTH 694

Class time: Tu. & Th. 9:45 – 11:15 **Room:** Room 305 O'Neil Building #1 **Web page:** See Blackboard site

Instructor:

Name	*Position / Departmental Affiliation*	*Phone numbers*	*Office*	*e-mail*
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Prerequisites: Participation in the Resilience and Adaptation Program (RAP) in good standing; having previously taken "Global-Local Sustainability" or received approval of instructor based on background in resilience theory and potential to function effectively in a graduate-level interdisciplinary environment.

Course Description: This course examines the interdisciplinary practice of assessing social-ecological system (SES) conditions and the process of linking integrated SES assessments with adaptive governance. Students survey concepts important in understanding societal and professional-level decision-making on sustainability and learn about tools and approaches for interdisciplinary and transdisciplinary analysis of sustainability that integrate social and natural science. Students work as individuals and in small teams to undertake assignments.

Learning Goals of the Course:

- Develop an understanding in theory of integrated assessment and adaptive governance.
- Gain experience making operational the ideas of resilience thinking in research.
- Become familiar with case studies that illustrate the potential contributions and limitations of adaptive co-management and integrated assessment in practice.
- Receive hands-on experience through completion of a student-led integrated assessment.
- Develop the skills of working in transdisciplinary research teams.

Background: Today's conditions of rapid change challenge policy makers at all levels to think beyond issues of sustainability and actively consider how society can build its adaptive capacity, facilitate social learning, innovate, and where needed, achieve social transformation. Meeting these challenges is far from simple. Today the outcomes of contemporary issues related to sustainability are determined by complex political maneuvering of actors with differing societal goals and values. These interactions occur in an environment of contested legal mandates, changing resource production capabilities, uncertain social-ecological conditions, and differing perspectives on risk. To support decision making in these difficult

conditions, approaches are needed that build collaboration and integrate cultural, economic, and ecological perspectives using a diversity of knowledge. This course examines the tools, methods, and approaches for achieving these goals.

Definitions: *Integrated assessment* (IA) is the process of drawing on interdisciplinary perspectives to inform the policy process. IAs take many forms, but commonly use computer simulation models as decision-support tools. We will approach IAs from a broader perspective as the process of integrating social and ecological dimensions to understand the dynamics of social-ecological systems. *Adaptive management* (AM) is the iterative process of decision making that includes experimentation, implementation, and reflection for dealing with uncertainty and complexity in social-ecological systems. It has been called management based on the science of learning by doing. *Co-management* (CM) is the sharing of power and responsibility between resource users and management agencies in resource management. *Adaptive co-management* (ACM), a relatively new concept, integrates these ideas in order to achieve multi-scale processes of social learning, problem solving, and adaptation. *Adaptive Governance* is the process by which society collectively negotiates problems and effectively responds to change.

How then do we us IAs and realize the goals of ACM? In an ideal system, ACM is implemented through resource governance that works across scales to coordinate management goals and objectives. ACM may employ participatory scenario analyses, conceptual models, sustainability indicators, and integrated decision-support systems in planning that compare the outcomes of past decisions to previously predicted conditions. While the ideal notions of ACM and IA are commonly discussed in the literature, there is often a significant shortfall in their implementation. This situation gives our class a unique opportunity to be creative and critical, to make new discoveries, and to push the current thinking in this field forward.

This course as part of the RAP Curriculum. This course is the second of two core courses that are part of the Resilience and Adaptation Program core curriculum, with the first being the Local-to-Global Sustainability course offered each fall. Whereas the L-G Sustainability course explores the fundamental concepts of resilience, vulnerability, adaptation, and transformation in social-ecological systems, Integrated Assessment & Adaptive Management provides training in the methods, skills and techniques associated with putting those ideas into practice. Students who take the IA&AM course must therefore have a background in the concepts central to resilience theory. Ask the instructor for readings if you have not taken the L-G Sustainability course.

Note on demands of the course and its approach: Anticipate that the course will demand a tremendous amount of work, including reading, in-class activities, as well as non-class time for research. We expect students to delve deeply into the literatures of ACM and IA, while also working as members of interdisciplinary research teams in and outside of class.

Organization of the course: The course is organized around several complementary activities.

1) Key elements of IA and ACM are examined through readings, lectures, discussions, and class assignments and activities.
2) Students work in interdisciplinary teams to develop and complete an integrated assessment that applies one or more of the tools presented in class, and which potentially informs a policy and planning process.

The Use of Blackboard: Class syllabus, assignments, readings, and other class relevant

information are posted on Blackboard (Bb). Please check Bb regularly for updated information. Students should use View/Complete Assignment or Digital Dropbox interfaces on Bb to submit finished assignments.

Grading:

Percentage	Item
25%	Class assignments, such as readings and student led discussions
25%	The exam
25%	Final project deliverables (see "percentages for project grading" below)
25%	Class participation, reading assignments, and attendance

Reading assignments. Students are expected to complete all reading assignments before each class and come to class with an understanding of the material and or questions about the readings. Be prepared to describe the material presented in readings and present your own critique. In some cases students may be asked to lead class discussions about readings. Students are also encouraged to delve into recommended readings that are of interest to them. Readings are posted on Bb. Study questions for each assignment are posted on Bb at least two weeks prior to the day they are covered in class. Study questions are provided for your benefit. Students are expected to answer study questions before class. Written answers to questions are not turned in for grades but may be the subject of class discussions. In some cases, readings not included in this syllabus will be added as assignments to take advantage of new opportunities. Students receive a grade in this category at the end of the semester based on their comprehension and evaluation of reading assignments, as demonstrated through class discussions.

Hands-on assignments include group or individual exercises to be completed during class and may require preparation prior to class. In most cases assignments will be posted and submitted through the View/Complete Assignment Bb interface. In the case of group assignments, only one copy may be submitted to the Digital Dropbox. See course outline below for a list of reading-related and hands-on assignments. Anticipate that reading assignments and hands-on assignments will build your repertoire of skills, which will be helpful in the completion of the group project.

The Written Exam will test on material covered in class by the date the test is given, including readings, lectures, and discussions. Students are expected to work individually and not discuss any aspects of the test with others during the exam period.

The Project

Focus: The goal of the project is for students to apply one or more of the tools presented in class to a problem area, undertaken as a small group. One of several problem areas can serve as the focus of the project. For example:

- *Developing scenarios for Alaska after peak oil*
- *Indicators of resilience in rural Alaska*
- *The application of adaptive management for economic change in SE Alaska*
- *Modeling the challenges of urban, suburban, and rural growth in the North Star Borough*
- *Anticipating Rural-Urban interactions of Alaska with climate change*
- *Barriers to adaptive governance in the coastal zone of northern Alaska*

Students should plan to initiate work on the project just after the spring break.

Project Organization: Students undertake a group project as teams that include people with disciplinary homes in social or natural sciences. One student (in each team) is to be selected as the group leader/coordinator. Students choose a project topic from the options given above. Students are expected to do work that is new to them and not rely solely only on previous experiences. To the extent that it is possible, teams should conduct their work in partnership with an organization, agency, or entity that provides an opportunity to inform decision making. See project schedule and deadlines listed below. The final weeks of the semester will be devoted to finalizing the project. The team project culminates with a final paper and a public presentation. It is highly recommended that a limited set of variables be included in the analysis of the problem so as to make it doable in the allotted time period.

Project deliverables will include:

- *Project proposal*: A five page (single spaced plus bibliography) project proposal. The proposal should lay out the problem and study questions; the conceptual ideas to be explored, tested, or used; the general methods to be employed; information on the data to be used, product or products to be generated, organization of the study team (roles and responsibilities), the project schedule, and organization or organizations to be engaged in the project.
- *Project updates:* Class time during the second half of the semester will be used for teams to provide a progress reports on their projects and get feedback from fellow students and the instructor. As needed, teams should meet with the instructor.
- *Final public presentation*: This event is held each year by the class and attended by many members of the UAF and broader community. The public presentation will include a presentation on individual and team. All students are expected to be present in person to present. The exam period for the class will serve as the time for the presentation.
- *Final paper*: The final paper should be 20 to 25 single spaced pages in length, plus bibliography and footnotes, and suitable for publication in an interdisciplinary journal such as *Ecology and Society*. See paper guidelines for details on length and formatting (http://www.ecologyandsociety.org/submissions.php#guidelines).
- In addition to the paper, each student team member must evaluate the performance of other members of the team and assign them a grade (10 to 1 with, 10 the highest) on the quality of the individual's contribution to the group project.

All project deliverables are to be submitted through Digital Dropbox in Bb.

Percentages for grading and schedule deadlines: The table below shows the percentages attributed to each project item and their due dates. All together, project deliverables are worth 25% of your grade.

Item	*Percentage*	*Date Due*
Project proposal	20%	March 22
Final public presentation	35%	3:15 - 5:15p.m., Tuesday, May 10
Final paper	45%	May 10

Criteria for evaluating the project:

- Quality of work and professionalism,
- Depth of analysis,
- Overall organization,
- Resourcefulness and creativity,
- Meeting deadlines,

Grading Scheme for Course:

- Passing grades: 97% (A+), 92 % (A), 90% (A-); 87% (B+), 80 % (B)
- Non-passing grades: 77% (B-); 65% (C) ; 50% (D); 0% (F)

Earning an A grade entails excelling in all aspects of the course, and demonstrating a mastery of the material covered and exceptional depth of analysis, resourcefulness, and quality of work. Earning a B grade entails demonstrating a mastery of the course material and doing well in all aspects of the course. Any performance below this level will result in a B- grade or below.

Attendance: Consider this class to be a professional training session where you are expected to attend all classes. Activities related to your thesis, important conferences, and personal emergencies may require that you miss some classes. Missing more than four classes may result in a significant lowering of your course grade. If you know ahead of time that you will not be attending a class, let the instructor know. Where possible, Skype call ins should be used while traveling. It is your responsibility to make up all missed work and or in-class activities. Ask the instructor what is needed to make up a missed class. In some cases writing a reflection paper about the reading will satisfy the requirement of missing a class.

Other Course Policies/Expectations:

- This is a small class that depends on your full participation.
- Good participation means leaving time and space for encouraging ALL students to talk and share ideas.
- We will share many different perspectives. Make your points respectfully, while listening openly to the ideas of others. Seek ways beyond the dialectics of thesis - antithesis.
- You are expected to come to class having read assigned material, answered study questions when relevant, and being prepared to discuss or lead discussion.
- Assignments that are turned in late will be penalized.
- Use of internet and the reading and writing of email messages during class are not permitted.

- 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. We will work with the Office of Disabilities Services (203 WHIT, 4747043) to provide reasonable accommodation to students with disabilities.
- You are expected to do your own work in accordance with the UAF Student Code of Conduct (http://www.uaf.edu/catalog/current/academics/regs3.html). Cheating and plagiarism are very serious offenses, and will not be tolerated. Any exam or paper that contains plagiarized material will receive a grade of zero. Be sure you understand what constitutes plagiarism and cheating (see below for help on this). Any student who turns in a paper not written by him/herself (such as purchased from a company or downloaded from the Internet) will flunk the entire course. Rasmuson Library has prepared materials to help you understand how to cite sources properly. There are links to these on our Blackboard site. For an explanation of what constitutes plagiarism see:
  http://www.uaf.edu/library/instruction/handouts/Plagiarism.html
  For an explanation of how to properly cite sources see:
  http://www.uaf.edu/library/instruction/handouts/Citing.html

Class Schedule – (May change as new opportunities arrive)

date	*Topic & Readings*
1/20/2010	intro overview
1/25/2010	*Session Topic:* **Interdisciplinary Inquiry** • Nassani, Moti, (1997) Ten Cheers for Interdisciplinary, The Case for Interdisciplinary Research and Knowledge, Social Science Journal, Volume 34, Number 2, Pages 201-216. *Recommended Readings:* • Committee on Facilitating Interdisciplinary Research, (2004) *Facilitating Interdisciplinary Research,* National Academy of Sciences, National Academy of Engineering, Institute of Medicine. Chapter 8. Evaluating Outcomes of Interdisciplinary Research and Teaching • Rhoten, Dian and Andrew Parker, "Risks and Rewards of an Interdisciplinary Research Path," *Science*, December 17, 2004, Volume 306, page 2046. •
1/27/2010	*Session Topic:* **Collaboration in Interdisciplinary Science** *Readings:* • Eigenbrode, Sanford D, et al., *Employing Philosophical Dialogue in Collaborative Science, January 2007 / Vol. 57 No. 1* • BioScience *In-Class Activity* (readings-related assignment): Class discussion based on questions posed in Eigenbrode et al.
Tue, Feb 1	*Session Topic:* **Example of an Integrated Assessment: "The Sustainability of Arctic Community Project"** *Readings:* • Kruse, J., B. White, B. Archie, M. Berman, S. Braund, T. Chapin, J. C. Sr., N. Flanders, B. Griffith, S. Haley, E. Howard, L. Huskey, J. Eame, D. Klein, G. Kofinas, S. Martin, C. Nicolson, K. Peter, T. Starfield, M. Steve, J. Tetlichi, A. Tussing, M. Walker and O. Young (2005). "Modeling Sustainability of Arctic Communities: An Interdisciplinary Collaboration of Researchers and Local Knowledge Holders." Ecosystems **7**: 1-14. • Berman, M., and G. Kofinas. 2004. Hunting for Models: Grounded and Rational Choice Approaches to Analyzing Climate Change Effects on Subsistence Hunting in an Arctic Community. Ecological Economics **49**:31-46.Risbey, J., M. Kandlikar and A. Patwardhan (1996). "Assessing Integrated Assessments." *Climate Change* 34: 369-395. *Recommended Readings* *1.* Any material in the on-line jounral http://journals.sfu.ca/int_assess/index.php/iaj • Risbey, J., M. Kandlikar and A. Patwardhan (1996). "Assessing Integrated Assessments." Climate Change 34: 369-395. • Parson, E. A. (1996). "Three Dilemmas in the Integrated Assessment of Climate Change." Climate Change 34: 315-326.

	Questions: -Was the Sustainability Project sufficiently interdisciplinary in its approach? -Does the Possible Futures Model effectively communication the scientific discoveries presented in the Kruse et al paper? -Does the Possible Futures Model of the Sustainability Project capture the right level of detail to be useful to decision makers or is it too simple? -What dilemmas (social, political, economic, cultural, operational) would you? anticipate if you were the lead investigator of the Sustainability Project? -What would you anticipate the challenges of teamwork and coordination with this project to be? *Assignment:* Review material about the Sustainability project at www.taiga.net/sustain and play the Possible Futures Model (Note: Use MS Explorer as the browser)
2/3/2010	*Session Topic:* . **Working in Interdisciplinary Teams** *Reading:* • Nicholson, C. R., A. M. Starfield, J. Kruse and G. P. Kofinas. 2002. "Ten Heuristics for Interdisciplinary Modeling Projects. Ecosystems **5**:376-3384."
2/8/2010	*Session Topic*: **Models of IAs** – Student presentations by groups 1 & 2 *Assigned readings* TBA by student groups
2/10/2010	*Session Topic*: **Models of IAs** – Student presentations by groups 3 & 4 *Assigned readings* TBA by student groups
2/15/2010	*Session Topic:* **Case study research as method** *Readings:* • Yin, R. K. (1989). Case Study Research: Design and Methods. Newbury Park, Sage Publications. *Recommended Readings:* • Flyvbjerg, Bent, (2004) "Five Misunderstandings about Case Study Research," in *Qualitative Research Practice*, Seale, Cline et al (eds), Sage Press, London and Thousand Oaks, CA. pp 420-434 • *In-Class Activity:* Lecture and discussion
2/17/2010	*Session Topic:* **Comparative Case Studies** *Readings: Poteete, Amy R., Marco A. Janssen, and Elinor Ostrom, 2010, Working Together, Collective Action, the Commons, and Multipe Methods in Practice,* Princeton University Press, Princeton, Chapters 1-4 (pages 4-88)

	Recommended Reading: Ragin, Charles C. "Using Qualitative Comparative Analysis to Study Causal Complexity." *Health Services Research* 1999, 34, 5 (Part 2), Dec, 1225-1239. *In-Class Activity*Lecture and discussions of readings
2/22/2010	*Session Topic:* **Systems Thinking** *Guest Speaker:* David Newman, Dept. of Physics, UAF (unconfirmed) *Readings:* Meadows, Donella H., (2008), *Thinking in Systems: a Primer* *Recommended Readings:* • Senge, P. M. (1994). Chapter 5: A Shift of Mind. The Fifth Discipline. New York, Currency Doubleday: 68-92.
2/24/2010	*Session Topic:* **Conceptual Modeling:** *Readings:* TBA *Recommended Readings:* TBA *Assignment: Develop a conceptual model of the central problem of your thesis research. Represent key feedbacks, your study's boundaries, and critical drivers. Be creative and think multi dimensionally.* *In-Class Activity:* Each student presents their model as a 5 minutes speed talk
3/1/2010	*Session Topic:* **Sustainability and resilience indicators: Part 1** (community sustainability indicator programs; what makes a good indicator; indicators of resilience vs. sustainability) *Readings:* • Rydin, Yvonne, Nancy Holman and Esther Wolff Local Sustainability Indicators. *Local Environment, Vol. 8, No. 6, 581–589, December 2003.* • Astleithner, Florentina and Alexander Hamedinger, The Analysis of Sustainability Indicators as Socially Constructed Policy Instruments: benefits and challenges of 'interactive research,' *Local Environment, Vol. 8, No. 6, 627–640, December 2003* • Schlossberg, Marc and Adam Zimmerman, Developing Statewide Indices of Environmental, Economic, and Social Sustainability: a look at Oregon and the Oregon Benchmarks, *Local Environment, Vol. 8, No. 6, 641–660, December 2003* *Recommended Readings:*

	• Kruse, Jack, (2006), Indicators of Social, Economic, and Cultural Cumulative Effects Resulting from Petroleum Development in Alaska: A Review, Unpublished paper. • Custance, John; Hilary Hillier, Statistical Issues in Developing Indicators of Sustainable Development, *Journal of the Royal Statistical Society. Series A (Statistics in Society)*, Vol. 161, No. 3. (1998), pp. 281-290. • Reed, Mark S.; Andrew J. Dougill, Participatory Selection Process for Indicators of Rangeland Condition in the Kalahari, *The Geographical Journal*, Vol. 168, No. 3. (Sep., 2002), pp. 224-234. • Levett, Roger, Sustainability Indicators--Integrating Quality of Life and Environmental Protection**,** *Journal of the Royal Statistical Society. Series A (Statistics in Society)*, Vol. 161, No. 3. (1998), pp. 291-302.
3/3/2010	*Session Topic:* **Computational and Simulation Modeling: Part 1** *Readings:* • Haefner, J. W. (1996). Chapter 1: Models of Systems & Chapter 2: The Modeling Process. Modeling Biological Systems: Principles and Applications. Chapman & Hall: 3-30 *Recommended Readings:* • Janssen, M. A. (1998). Chapter 3: Integrated Assessment Modeling. In Modeling Global Change: The Art of Integrated Assessment Modeling. Cheltenham, UK, Edward Elgar: 23-37. • Janssen, M. A. (1998). Chapter 4: Methodological Issues. In Modeling Global Change: The Art of Integrated Assessment Modeling. Cheltenham, UK, Edward Elgar: 38-59. • Janssen, M. A. (2004). Chapter 8: Agent-Based Modeling. Modeling in Ecological Economics. J. L. R. Proops and P. Safonov. Cheltenham, UK, Edward Elgar Publishing: 155-172. • Walters, C. J. (1986). Chapter 3: A Process for Model Building. Adaptive Management of Renewable Resources, The Blackburn Press: 43-63. *In-Class Activity:* Lecture
3/8/2010	*Session Topic*: **Computational and Simulation Modeling: Part 2** *In-class Activity* (hands-on assignment): Hands-on intro to computational modeling (Location: WWRB Computer Lab)
3/10/2010	*Session Topic:* **Scenario Analysis** *Readings:* • Carpenter, S. R., E. M. Bennett, and G. D. Peterson. 2006. Editorial: special feature on scenarios for ecosystem services. *Ecology and Society* **11**(2): 32. [online] URL:

	http://www.ecologyandsociety.org/vol11/iss2/art32/ • IPCC (2001). Chapter 3: Developing and Applying Scenarios. Climate Change 2001: *Impacts, Adaptation and Vulnerability, Intergovernmental Panel on Climate Change* (IPCC): 147-190. • MEA (2005). Summary: Comparing Alternate Futures of Ecosystem Services and Human Well-Being. In *Ecosystem and Human Well-Being: Scenarios*; The Millennium Ecosystem Assessment (MEA) Series, Volume 2, Scenarios Working Group of the Millennium Ecosystem Assessment: 1-17. *Recommended Readings:* • Ascher, William, 2009 Bringing in the Futures: Strategies for Farsightedness and Sustainability in Developing Countries, University of Chicago Press, Chicago • Fahey, Liam and, Robert M. Randall (eds) 1998 Learning form he Future: Competitive Foresight Scenarios • Armitage, D., F. Berkes and N. Doubleday, Eds. (2007). *Adaptive Co-management*¸ UBC Press – Chapters 15. • Peterson et al. Assessing Future Ecosystem Services: A Case Study of the Northern Highlands Lake District, Wisconsin, *Conservation Ecology*, Vol. 7, No. 3. (2003), 1. [online] URL: http://www.consecol.org/vol7/iss3/art1 *Assignment:* Watch streamed lecture by Steve Carpenter on Scenarios *In-Class Activity:* Lecture and discussion
3/15/2010	SPRING BREAK
3/17/2010	SPRING BREAK
3/22/2010	Project Week
3/24/2010	Project Week (take home exam)