Course Information
Location: 332 Irving II
Meeting Time: TR 11:30-1:00
Prerequisites: Graduate student standing in a natural science, social science, or the Resilience and Adaptation (IGERT) interdisciplinary graduate program, and/or or permission of the instructors.

Instructors
Joshua Greenberg, 372 O’Neill; 474-7189; j.greenberg@uaf.edu; office hours, MW 10-11
Craig Gerlach, 309 Eielson; 474-6752; ffscg@uaf.edu; office hours by appointment
Phil Loring, 302 Eielson; 474-7051; ftpal@uaf.edu; M 1:00-4:00, or by appointment

Course Materials
Textbook: There is no required text for this course, although we will draw heavily from Bell and Morse, “Sustainability Indicators,” and the Ecosystems and Human Well-Being Book throughout the course. Course materials will be provided as handouts in class, on Blackboard, links on the web, and/or will be placed on reserve in the library.

Primary readings (Hard Copies on reserve):
Sustainability Indicators, Measuring the Immeasurable, Simon Bell & Stephen Morse. Earthscan Publications Ltd. Readings will be assigned and made available as needed, with one hard copy of the Bell and Morse book on reserve in the library. This book is between printings and is on back order, although Gulliver’s books will make every effort to obtain one for you if you contact them directly (talk to Jill, Summer, Kim, Annie or David). We will also use “Resilience Thinking, Sustaining Ecosystems and People in a Changing World by Brian Walker and David Salt, 2006. This will be available on erez, and as “hard” copy in the library.


Recommended (Hard copies on reserve)
Bennett, J.W. The Ecological Transition, Cultural Anthropology and Human Adaptation.
Other Resources: See attachment - this is a working document that will be developed throughout the semester by both the instructors and students.

Course Description
This course develops the basic principles that govern sustainability, resilience and change of linked ecological and social systems. We explore the roots of these concepts as they have
developed in the fields of ecology, economics, and anthropology. We then explore the integration of these concepts through applied case studies and examples. Emphasis throughout will be on drivers of stability and change, thresholds, feedbacks and interactions, emergent properties, temporal and spatial scales, linkages between urban and rural components of coupled social and biophysical systems, and cross-scale linkages. Resilience, Sustainability, and Vulnerability are general frameworks for discussion.

One purpose of the course is to explore the problem solving implications of interdisciplinary thought and practice; while the study of complex adaptive systems requires interdisciplinary organization, the focus here will be as much on understanding the problem as it will be on how interdisciplinary teams are organized and function. Apart from that theoretical frameworks presented and discussed, emphasis will also be how theory structures observations and informs research, and on environmental and economic design as a way to model “ideal” solutions to real world problems. Through all of the discussions we will also look at the way that different disciplines describe people, places and ecosystems, and stress the common ground that integrates rather than fragments understanding across the disciplines of ecology, economics, anthropology and human geography.

Course Goals/Learning Objectives

- Develop a conceptual framework for exploring resilience and sustainability
- Develop skills applying basic principles to the analysis of real-world issues related to resilience and sustainability
- Apply these principles to case study of Yukon River Watershed of interior Alaska, with focus on integrating social, economic and ecological dimensions of system organization, and framing a problem within the appropriate spatial and temporal scale
- Use these case studies to outline plans for a sustainable future for this area of Alaska

Expectations/Grades/Requirements

You are expected to do all of the assigned readings and to come to every class prepared to discuss or lead discussion. You will be graded on a combination of short, weekly (not every week) written assignments or problem sets, oral presentations and contributions to weekly class discussions, and your research contributions to the final research paper. Specific reading and writing assignments will be made on a weekly basis throughout the semester. Rather than viewing this course as rigidly organized in terms of a specific typology, consider the outline below to be fluid, and the overall organization a work in progress.

Contributions to class discussion, discussion leadership, and weekly written assignments count for 30% of the final grade, the “take-home” mid-term/problem set counts for 20%, annotated bibliography accounts for 20%, and research contributions to the final paper, along with the final presentation, counts for 30% of the final grade (see below). The annotated bibliography will be discussed in class, but it will be built from topics covered in the course outline, but more depth and detail required on your part as you are expected to briefly discuss and evaluate each paper cited. The research paper will be discussed in detail in class. These bibliographies will be shared electronically with everyone at the end of the class. Assignment deadlines will be discussed in class. In the final accounting, effort counts for much in all areas!!!!
Instructors reserve the right to modify the final grade in consideration of notable progress demonstrated by an individual, or unforeseen and extenuating circumstances. In such cases, extra credit assignments and/or makeup work may be used at the discretion of the instructors. Assignments handed in after the due dates will receive reduced credit.

**Instructional Methods**
The course will use a combination of lectures, student discussions and presentations, and guest speakers from time to time. This is a seminar, and this means that it is interactive, with you just as involved in every class as are the instructors. A class like this works best when everyone participates.

**UAF Policies**
Students are expected to read, understand, and adhere to the academic honor code detailed in the UAF Catalog. If you have a disability or for any reason need special consideration, please let us know and we will modify and accommodate as appropriate to meet your needs. There is an elevator located in Irving I that offers access to the third floor of Irving II. Priority seating close to the board and screen is provided for students who need to be in close proximity to the board.

**Disabilities Services**
The University of Alaska Fairbanks is committed to providing equal access for students with disabilities. 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, 474-7043) to provide reasonable accommodation to students with disabilities. If you have a physical or learning disability, please advise us in writing of any special consideration necessary by the beginning of the second class. We will do everything possible to accommodate you in accordance with the Americans with Disabilities Act.

**Blackboard**
We will use the UAF Blackboard site for this course to send emails and post readings, assignments and other materials. All registered UAF students should have a Blackboard username and password. Blackboard can be accessed at [http://classes.uaf.edu/?bbatt=Y](http://classes.uaf.edu/?bbatt=Y) and go to Login. Your Username and default Password should both be your UAF computing account name, fsxxx. You may change your password after your initial log-in. Blackboard will not work for a non-UAF email address. If you principally use a non-UAF email service (such as hotmail) then go to your Aurora account and forward your UAF email to that address. You are responsible for all emails sent to your UAF email account.

Blackboard resources, links and support information are available at the UAF Blackboard homepage.
<table>
<thead>
<tr>
<th>Day</th>
<th>Date</th>
<th>Topic</th>
<th>Discussant</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>Aug 31</td>
<td>Class introduction and overview. Introduction to resilience theory &amp; ecology: Reading Assignment: Gunderson and Holling, Chaps 1 and 2; Walker 2004</td>
<td>Greenberg/Gerlach/Chapin.</td>
</tr>
<tr>
<td>T</td>
<td>Sep 05</td>
<td>Ecological foundations of resilience theory continued in more detail; student assignments for September 7 made; Readings: Chapin_Ch1 Framework Understanding Change, Chapin_Ch2 Ecological Bases of resilience, Folke 2006. Assignment: Define terms on P 5 of syllabus; to be turned in and discussed on Sept 19. Reading Assignment and presentations from Resilience Thinking, Sustaining Ecosystems and People in a Changing World (Walker and Salt).</td>
<td>Chapin</td>
</tr>
<tr>
<td>R</td>
<td>Sep 07</td>
<td>Adaptive Cycle. Thresholds, feedback, cross-scale interactions. Class presentations of Walker and Salt, Resilience Thinking, discussion of terms and definitions.</td>
<td>Gerlach/Greenberg</td>
</tr>
<tr>
<td>T</td>
<td>Sep 12</td>
<td>The Human Dimensions of resilience introduced; components and integration of ecology, economics, social and cultural aspects outlined and discussed</td>
<td>Gerlach/Greenberg</td>
</tr>
<tr>
<td>R</td>
<td>Sep 14</td>
<td>Ecosystems and Human Well-Being; Introduction to the Millennium Ecosystem Assessment (MEA) and Integrated Assessment Concepts discussed.</td>
<td>Gerlach</td>
</tr>
<tr>
<td>T</td>
<td>Sep 19</td>
<td>The Human Dimensions of The MEA outlined in more detail; class presentations and discussion of Ecosystems and Human Well-Being book.</td>
<td>Greenberg/Gerlach</td>
</tr>
<tr>
<td>R</td>
<td>Sep 21</td>
<td>Yukon River Case, Class Project defined &amp; discussed. Various chapters and presentations will be assigned from the Bell and Morse book; sustainability defs assigned for Sept 26</td>
<td>Greenberg/Gerlach</td>
</tr>
<tr>
<td>T</td>
<td>Sep 26</td>
<td>Sustainability: origins, history definitions &amp; concepts. Various chaps assigned from (Bell &amp; Morse)</td>
<td>Gerlach/Greenberg</td>
</tr>
<tr>
<td>R</td>
<td>Sep 28</td>
<td>Sustainability and economic perspectives introduced and discussed. Indicators assignments for Oct 10 made.</td>
<td>Greenberg</td>
</tr>
<tr>
<td>T</td>
<td>Oct 03</td>
<td>Sustainability: Indicators (ecosystems, cultural/social/economic, etc), tools and techniques: class presentations and discussion</td>
<td>Gerlach/Greenberg</td>
</tr>
<tr>
<td>R</td>
<td>Oct 05</td>
<td>Alaska, Africa seminar/discussion – cross comparative analysis of vulnerability to various drivers of change in rural communities globally</td>
<td>Guests from Kenya, Sudan, Michael Glantz (NCAR), John Walsh, Craig Fleener (CATG)</td>
</tr>
<tr>
<td>T</td>
<td>Oct 10</td>
<td>Sustainability indicators, tools &amp; measurements: student presentations and discussion of</td>
<td>Greenberg/Gerlach/class</td>
</tr>
<tr>
<td>Date</td>
<td>Day</td>
<td>Topic</td>
<td>Instructor(s)</td>
</tr>
<tr>
<td>--------</td>
<td>-----</td>
<td>----------------------------------------------------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>R</td>
<td>Oct 12</td>
<td>Sustainability discussions continued</td>
<td>Greenberg/Gerlach/class</td>
</tr>
<tr>
<td>T</td>
<td>Oct 17</td>
<td>Organizational theory, Institutions, adaptive capacity introduced</td>
<td>Kofinas</td>
</tr>
<tr>
<td>R</td>
<td>Oct 19</td>
<td>Institutional organizations continued and expanded; readings assigned for class presentations on Oct 24</td>
<td>Kofinas</td>
</tr>
<tr>
<td>T</td>
<td>Oct 24</td>
<td>Institutional organizations and theory: class presentations and discussion</td>
<td>Kofinas</td>
</tr>
<tr>
<td>R</td>
<td>Oct 26</td>
<td>Vulnerability analysis introduced; theory and indicators. Additional readings, class presentations assigned for Oct 31</td>
<td>Gerlach/Greenberg</td>
</tr>
<tr>
<td>T</td>
<td>Oct 31</td>
<td>Class presentations and discussion of vulnerability; emphasis is on illustrating approaches to vulnerability through specific case studies assigned and/or selected by students.</td>
<td>Gerlach/Greenberg/class</td>
</tr>
<tr>
<td>R</td>
<td>Nov 02</td>
<td>Vulnerability of human systems: concepts and cases from economics</td>
<td>Greenberg</td>
</tr>
<tr>
<td>T</td>
<td>Nov 07</td>
<td>Vulnerability of human systems: concepts and case studies from food systems and climate change research. Mid-term/essays and problem set hand out and assigned</td>
<td>Gerlach</td>
</tr>
<tr>
<td>R</td>
<td>Nov 09</td>
<td>The Social and Ecological Dimensions of Human Dimension of Northern Systems: Introduction to villages and regions in Alaska</td>
<td>Gerlach</td>
</tr>
<tr>
<td>T</td>
<td>Nov 14</td>
<td>Resource management and development issues in the Yukon river watershed: Fisheries; readings and discussion assignments for Nov 16 made</td>
<td>Greenberg</td>
</tr>
<tr>
<td>R</td>
<td>Nov 16</td>
<td>Resource management and development in the Yukon River watershed: oil and gas development, land use and climate change impacts on food systems, food security, nutritional ecology, etc.</td>
<td>Gerlach/class</td>
</tr>
<tr>
<td>T</td>
<td>Nov 15</td>
<td>Working group presentations on research progress; working bibliography due, with 5-7 page progress report from working group due. Presentations should be no more than 15 minutes, with as much time for evaluation and discussion as needed</td>
<td>Class</td>
</tr>
<tr>
<td>R</td>
<td>Nov 23</td>
<td><strong>THANKSGIVING</strong></td>
<td>Happy Holiday!</td>
</tr>
<tr>
<td>T</td>
<td>Nov 28</td>
<td>Mid-Term due. Class presentations and general discussion of the same</td>
<td>Class/Greenberg/Gerlach</td>
</tr>
<tr>
<td>R</td>
<td>Nov 30</td>
<td>Final Paper Presentations</td>
<td>Class/Greenberg/Gerlach</td>
</tr>
<tr>
<td>T</td>
<td>Dec 05</td>
<td>Final Paper Presentations</td>
<td>Class</td>
</tr>
<tr>
<td>R</td>
<td>Dec 07</td>
<td>Final Paper Presentations continued</td>
<td>Class</td>
</tr>
</tbody>
</table>
** The Course Schedule is tentative and subject to change, and will depend on the number of students.

| T | Dec 15 | Final thoughts, summary, prospective and retrospective | Gerlach/Greenberg/class |
LEAD/DISCUSSANT RESPONSIBILITIES

Your responsibility is to lead a classroom discussion based on articles assigned to you. The articles will be related to the particular topic being discussed in class and will be assigned by the instructors. Through your classroom presentation you should provide the following:

- summary of the article(s);
- authors’ main theses and conclusions;
- analyses and critiques of the authors’ arguments (this is a critique of the authors arguments and not your personal opinion on the topic);
- your opinion and arguments in its support to the topics addressed by the authors;
- questions to the class that generate classroom discussion.

Grading Criteria – each of the above items carries a weight of 10 points, for a total of 50 possible points per assignment.

**MID-TERM TAKE HOME:**
Mid-Term will be handed out on Nov 7, due on Nov 28.

**FINAL PAPERS**
Papers will be defined and discussed on September 21.

Final papers will be due Dec 5, 06
SELECTED REFERENCES (These and many additional references are on reserve/erez in
the library; contact Phil Loring if you have trouble accessing any of this material)

**Introduction to sustainability concepts**


Levin, S.A. 1999. Fragile Dominion: Complexity and the Commons. Perseus Boos, Reading, MA.


**Introduction to Resilience concepts**


CLIFF NOTE:

Ecosystem resilience is the capacity of an ecosystem to tolerate disturbance without collapsing into a qualitatively different adaptive state that is controlled by a different set of processes. A resilient ecosystem can withstand shocks and still rebuild when necessary. Resilience in coupled
social systems has the added capacity of humans to anticipate and plan for the future, including anticipation of “surprise” and change, and the potential to impact in positive and negative ways local, regional and global ecosystems. Resilience is a property of linked social-ecological systems (SES). Resilience as applied to ecosystems, or to integrated/coupled biophysical and social systems has at least 3 defining characteristics: (1) the amount of change a system can undergo and still retain the same controls over structure and function; (2) the degree to which a system is capable of self-organization; and (3) the ability to build and increase the capacity for learning and adaptation.