EVR 5705 Natural Resource Management and Innovation Systems (NRMIS)
Spring 2016

Class meets on Mondays 7th period, and Wednesdays 7th & 8th periods at BLK 315

Instructor information:
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Phelps Lab, office Hours by appointment

"Theory without practice is gratuitous; practice without theory, aimless." (Anonymous, 1972)

Course Description: Natural-resource science, technology, and the innovation process; cases in food, agriculture, forestry, water, urban environment, and energy, and their role in sustaining society.

Course Framing: This course addresses how human societies perceive, use, and change natural resources, by examining the drivers, feedbacks, and social impacts of the innovation process. The course connects the ecological and economic systems studied during the first semester of the Master's in Development Practice degree program with the social realm. Whereas innovation systems have traditionally taken the perspective of a market economy and how firms rely on and influence innovation, this course focuses on the materials and energy on which societies depend, the ecological- economic-social dynamics of change in materials/energy use, and the ways science, technology and society integrate to foster sustainable development. This course recognizes that industrial civilization relies upon natural resources for its support, development, and growth.

The course will analyze which kinds of technologies can be called sustainable and which criteria we should employ to define them as such. It will also adopt the view that innovation does not only encompass the biophysical world, but that it can extend to the sphere of social institutions and organizations, which may have to change in order to make the search for and adoption of sustainable practices possible.

Course objectives:

- Identify and discuss the unresolved dilemmas in the fields of science, technology and innovation, with particular attention to the gaps in our understanding of their inter-connections and impacts upon social well-being.
- Conduct a critical survey of how the innovation process works: its drivers, its impacts, its feedbacks, with particular emphasis upon cases in agriculture, forestry, water management and energy alternatives.
- Address specific innovation cases from a sustainability perspective: new products, new processes and their impacts upon the scientific realm and social processes.
- Develop an understanding of the role that technology and innovation play in present-day concerns about the environment and sustainability.

Format
An initial reading list will be provided in CD form. During each class session individual students will present a summary and lead a discussion of the selected papers. Students will also add to the course content from the literature they are employing, case studies from their own background or experience, and group projects. An interactive mode of discussion will be pursued, through which particular points of interest, conflict, or suggestions for research will be addressed in a collective

manner. To allow for ample discussion, we will meet for three consecutive periods, once a week (or two periods and one period during one week), to *work through* ideas and problems, inspect their soundness and perspective, and advance towards clarity and coherence.

The class will also undertake a research project. It will split into 3-4 groups (depending upon total enrollment); each group will choose –at the beginning of the semester- an ongoing existing sustainability initiative such as a wind-farm, a particular forest region being harvested sustainably, a poverty-mitigating effort, an urban problem (or similar) and will analyze it from three perspectives: its technological background, its governance structure, and its implementation and management. Each group will present advances in its research during weeks 5, 10 and 15.

Course etiquette: **The instructor turns his cell phone off during class and students are expected to do likewise**. Class meetings are considered to enact a compact between the instructor and the students; that is, the students enter into an agreement to come together with the instructor during the established times –students who for any reason cannot make it to class should let the instructor know, especially if the student is expected to present or participate in a specific discussion.

Course materials:
Recommended Reference Book:
Fagerberg, J., Mowery, D., and Nelson, R. (Eds.). 2005. **The Oxford Handbook of Innovation**. Oxford University Press. Required and recommended articles and book chapters as listed below in the Topical Outline; a reading list in CD form shall be distributed.

Prerequisites: There are no formal prerequisites.

Course Requirements:
- **Participation = 40%** (20% for presentation of assigned readings, 20% for class discussion). Getting each class or topic started effectively depends on leadership by the day's presenters. Attendance and informed discussion are essential; students should do very well if they are present, have read the assignments, and participate. This is a discussion-based and project-driven course. Students should participate voluntarily and assertively; the small class size will enable the instructor to call on reticent students for their input. The substance of students' comments will show whether each has read and thought about the assigned material.
- **Essays = 40%** (20% each for a midterm and a final essay). For each essay, students will select one of three topics distributed by the instructor, selected from any subject dealt with during class presentations and discussions. The assignment is to synthesize material presented in the classroom along with a more complete and up-to-date literature review, and discuss the current issues this subject presents to society, proposed solutions, and their prospects. Each essay should be about 5,000 well-edited words, plus tables and figures (if appropriate) and complete literature citations.
- **Group Project = 20%**. As described above, the class will divide into 4-5 groups who will research a project designed and operating as a "sustainable" solution to a defined problem; it should contemplate sustainability constraints in terms of growth, inputs, waste, ecological footprint, etc. Students will present on weeks 5, 10, and 15. They will be peer and instructor-graded.

Grading: Students' individual class presentations and discussion will be evaluated according to the following criteria: a) strength of their participation in class, including presentations and

discussion; b) writing skills in their written submissions, especially in their midterm and final essays; and c) performance and ability to function as members of a student team in selecting, studying and analyzing a particular case from reality. Priority will be given to the clear presentation and discussion of new insights and evidence, as well as to the linkages made between the issues under study and to both their theoretical underpinnings and their practical implications. Students are expected to argue correctly their points of view–verbally and in writing- with precision, using evidence from substantial sources and be able to express their ideas with a clear structure, pointing out conclusions, uncertainties and possible avenues of research.

Criteria for grading Essays and Group Projects will be: thesis clearly stated, essay structure clear and easy to follow, well formatted and edited, word usage and grammar correct, written in an engaging and compelling style, concepts presented in your own words, argument factually correct and complete, peer-reviewed articles and other references cited appropriately, essay contains original conclusions, conclusion backed by substantial evidence, and substance of the specific argument. An essay not handed in will receive zero credit.

Grading Scale:

A	93.4-100 %	4.0
A-	90-93.3 %	3.67
B+	86.7-89.9 %	3.33
B	83.4-86.6 %	3.0
B-	80-83.3 %	2.67
C+	76.7-79.9 %	2.33
C	73.4-76.6 %	2.0
C-	70-73.3 %	1.67
D+	66.7-69.9 %	1.33
D	63.4-66.6 %	1.0
D-	60-63.3 %	0.67
E	<60.0 %	0.0

Topical Outline:

*Most papers in **bold letters** are required reading. The other papers are recommended reading. A CD will be available with all readings, although students are encouraged to submit their own selections about relevant subjects. Literature in this field(s) is abundant and dynamic, so some papers and topics can change suddenly –this should be considered a tentative list as it can be upgraded frequently.*

Week 1: Introduction to the course: a review of ecological principles and sustainability.

Cash, D.W., W.C. Clark, F. Alcock et al. 2003. Knowledge systems for sustainable development. PNAS 100(14): 8086-8091.

Duffy, J.E. 2009. Why biodiversity is important to the functioning of real-world ecosystems. Front Ecol Environ 7(8): 437-444.

Karlsson, R. 2009. A global Fordian compromise?-And what it would mean for the transition to sustainability. Environmental Science & Policy 12: 190-197.

Norvig, P., D.A. Relman, D.B. Goldstein et al. 2010. 2020 Visions. Nature 463: 26-32.

Graham, M.H. and P.K. Dayton. 2002. On the evolution of ecological ideas: paradigms and scientific progress. Ecology 83(6): 1481-1489.

Hooper, D.U., F.S. Chapin III, J.J. Ewel et al. 2005. Effects of biodiversity on ecosystem functioning: a consensus of current knowledge. Ecological Monographs 75(1): 3-35.

Hughes, B.B. and P.D. Johnston. 2005. Sustainable futures: policies for global development. Futures 37: 813-831.

Week 2: Natural capital and ecosystem services

Garnett, S.T., J. Sayer, and J. du Toit. 2007. Improving the effectiveness of interventions to balance conservation and development: a conceptual framework. Ecology and Society 12(1) art 2. www.ecologyandsociety.org/vol12/art2/

Heinzerling, L. and F. Ackerman. 2002. Pricing the priceless: Cost Benefit Analysis of environmental protection. Georgetown Environmental Law & Policy Institute and Georgetown University Law Center.

Pejchar, L. and H.A. Mooney. 2009. Invasive species, ecosystem services and human well-being. Trends in Ecology and Evolution 24(9): 497-504.

Kullander, S. 2010. Food security: crops for people not for cars. Ambio 39: 249-256.

Lovins, A. 2010. Profitable solutions to climate, oil, and proliferation. Ambio 39: 236-248.

Max-Neef, M. 2010. The world on a collision course and the need for a new economy. Ambio 39: 200-210.

Ranganathan, J., F. Irwin, and C. Pricopé Ripinski. 2009. Banking on Nature's Assets. How multilateral development banks can strengthen development by using ecosystem services. www.wri.org

Week 3: Man and nature, natural resources. An overview of issues related to hunger, shelter, nutrition, health and survival.

Harris, J.M. and N.R. Goodwin. March 2003. Reconciling growth and the environment. Global Development and Environment Institute Working Paper No. 03-03.

Kim, W. Chan and R. Mauborgne. 2004. Blue Ocean Strategy. Harvard Business Review 82(10): 76-84.

Leach, M., I. Scoones, and A. Stirling. 2010. Governing epidemics in an age of complexity: Narratives, politics and pathways to sustainability. Global Environmental Change 20: 369-377.

Rammohan, S. 2010. Fueling growth. Stanford Social Innovation Review 8(3): 68-71.

Akçomak, I.S., and ter Weel. 2009. Social capital, innovation and growth: evidence from Europe. European Economic Review 53: 544-567.

Chapin, F.S. III, S.R. Carpenter, G.P. Kofinas et al. 2009. Ecosystem stewardship: sustainability strategies for a rapidly changing planet. Trends in Ecology and Evolution 25(4): 241-249.

Charles J. Godfray, H., J.R. Beddington, I.R. Crute et al. 2010. Food security: the challenge of feeding 9 billion people. Science 327: 812-817. Or: www.sciencemag.org/cgi/content/full/327/5967/812

Rowe, G. and L.J. Frewer. 2000. Public participation methods: a framework for evaluation. Science, Technology, & Human Values 25(1): 3-29.

Woodcock, J., P. Edwards, C. Tonne et al. 2009. Public health benefits of strategies to reduce greenhouse-gas emissions: urban land transport. Lancet 374: 1930-1943.

Week 4: Agricultural Systems I: origins, and the evolution of different types of systems.

Galt, R.E. 2009. "It just goes to kill Ticos": natural market regulation and political ecology of farmers' pesticide use in Costa Rica. Journal of Political Ecology 16: 1-33.

Krugman, P. 1999. The role of geography in development. International Regional Science Review 22(2): 142-161.

Mehra, K. 2001. Indian system of innovation in biotechnology –a case study of cardamon. Technovation 21: 15-23.

Ruttan, V.W. 1977. Induced innovation and agricultural development. Food Policy 2(3): 196-216.

Greiner, R., L. Patterson, and O. Miller. 2009. Motivations, risk perceptions and adoption of conservation practices by farmers. Agricultural Systems 99: 86-104.

Thompson, J. and I. Scoones. 2009. Addressing the dynamics of agri-food systems: an emerging agenda for social science research. Environmental Science and Policy 12: 386-397.

Week 5: Agricultural Systems II: the scale of agricultural systems, industrial agriculture and the food system; local economies, organic farming and the question of inputs. First Presentation of Group Projects –Technological Background.

Chiffoleau, Y. 2005. Learning about innovation through networks: the development of environment-friendly viticulture. Technovation 25: 1193-1204.

Giombolini, K.J., K.J. Chambers, S.A. Schlegel et al. 2010. Testing the local reality: does the Willamette Valley growing region produce enough to meet the needs of the local population? A comparison of agriculture production and recommended dietary requirements. Agriculture and Human Values July 10 (in print).

Hubert, B., M. Rosegrant, M.A.J.S. van Boekel et al. 2010. The future of food: scenarios for 2050. Crop Science 50: S33-S50 .

Pretty, J.N., A.S. Ball, T. Lang et al. 2005. Farm costs and food miles: an assessment of the full cost of the UK weekly food basket. Food Policy 30: 1-19.

Arias-Aranda, D. and M.M. Romerosa-Martínez. 2010. Innovation in the functional foods industry in a peripheral region of the European Union: Andalusia (Spain). Food Policy 35: 240-246.

Conrad, J. 2007. The role of public policy in promoting technical innovations. The case of the regional innovation network InnoPlanta. Science, Technology and Innovation Studies 3: 67-85.

Isserman, A.M., E. Feser, and D.E. Warren. 2009. Why some rural places prosper and others do not. International Regional Science Review 32(3): 300-342.

Week 6: Biotechnologies and GMOs, a study in the application and outcomes of technical change, innovation and their consequences.

Azadi, H. and P. Ho. 2010. Genetically modified and organic crops in developing countries: a review of options for food security. Biotechnology Advances 28: 160-168.

Batista, R. and M.M. Oliveira. 2009. Facts and fiction of genetically engineered food. Trends in Biotechnology 27(5): 277-286.

Lu, B-R, and C. Huang. 2009. Gene flow from genetically modified rice to its wild relatives: potential ecological consequences. Biotechnology Advances 27: 1083-1091.

Tamis, W.L.M., A. van Dommelen, and G.R. de Snoo. 2009. Lack of transparency on environmental risks of genetically modified micro-organisms in industrial biotechnology. Journal of Cleaner Production 17: 581-592.

Ahrweiler, P., N. Gilbert and A. Pyka. 2006. Institutions matter but…Organisational alignment in knowledge-based industries. Science, Technology and Innovation Studies 2: 3-18.

Arechavala-Vargas, R., C. Díaz-Perez, and J. Huerta-Ruvalcaba. 2007. Genetically modified maize in Mexico: varied responses to technology. Atlanta Conference on Science, Technology and Innovation Policy: 1-7.

Drucker, P.F. 2002. The discipline of innovation. Harvard Business Review 80(8): 95-103.

Kuzma, J., A. Kuzhabekova, and K.M. Wilder. 2009. Improving oversight of genetically engineered organisms. Policy and Society 28: 279-299

Week 7: Crop rotations, recycling, restoration. Nutrient cycles and energy flows.

Bennett, E.M. and P. Balvanera. 2007. The future of production systems in a globalized world. Frontiers in Ecology and the Environment 5(4): 191-198.

Castanheira, E.G., A.C. Dias, L. Arroja et al. 2010. The environmental performance of milk production on a typical Portuguese dairy farm. Agricultural Systems 103: 498-507.

Lahsen, M. and C. Nobre. 2007. Challenges of connecting international science and local level sustainability efforts: the case of the Large-Scale Biosphere-Atmosphere experiment in Amazonia. Environmental Science & Policy 10: 62-74.

Plassmann, K., A. Norton, N. Attarzadeh et al. 2010. Methodological complexities of product carbon footprinting: a sensitivity analysis of key variables in a developing country context. Environmental Science & Policy 13: 393-404.

Byrne, F., M.J. Robertson, A. Bathgate et al. 2010. Factors influencing potential scale of adoption of a perennial pasture in a mixed crop-livestock farming system. Agricultural Systems 103: 453-462.

Klerkx, L. and C. Leeuwis. 2008. Matching demand and supply in the agricultural knowledge infrastructure: experiences with innovation intermediaries. Food Policy 33: 260-276.

Pielke Jr., R.A. 1997. Asking the right questions: atmospheric sciences research and societal needs. Bulletin of the American Meteorological Society 78(2): 255-264.

Week 8: Forests, forestry, deforestation and GHG emissions: a study in the relationship between science, technology and policy at various scales.

Alencar, A., D. Nepstad, and M. del C. Vera Diaz. 2006. Forest understory fire in the Brazilian Amazon in ENSO and non-ENSO years: area burned and committed carbon emissions. Earth Interactions 10, paper 6.

Al-Juaied, M.A. and A. Whitmore. 2009. Realistic costs of carbon capture. Discussion Paper 2009-08. Cambridge, MA: Belfer Center for Science and International Affairs, Harvard Kennedy School.

Davis, C., A. Williams, L. Goers et al. 2010. Getting ready with forest governance: a review of the World Bank Forest Carbon Partnership Facility readiness preparation proposals (version 1.4). Working Paper, World Resources Institute. Online at: http://www.wri.org/gfi

Catalan, P., C. Moreno, and S. Cozzens. 2008. Exploring R&D evolution in the forestry industry: the cases of Chile and Finland. Atlanta Conference on Science, Technology and Innovation Policy: 1-12.

Foley, J.A., G.P. Asner, M.H. Costa et al. 2007. Amazonia revealed: forest degradation and loss of ecosystem goods and services in the Amazon Basin. Frontiers in Ecology and the Environment 5(1): 25-32.

Week 9: The urban landscape, social and environmental opportunities, constraints, dilemmas.

Burris, S., T. Hancock, V. Lin et al. 2007. Emerging strategies for healthy urban governance. Journal of Urban Health: Bulletin of the New York Academy of Medicine 84(1): i154-i163.

Feldman, M.P. and D.B. Audretsch. 1999. Innovation in cities: science-based diversity, specialization and localized competition. European Economic Review 43: 409-429.

Grimm, N.B., S.H. Faeth, N.E. Golubiewski et al. 2008. Global Change and the Ecology of Cities. Science 319: 756-760.

Osolen, R. and N-M. Lister. 2004. Social capital, urban sprawl, and smart growth: a preliminary investigation into sustainable communities in Canada. Discussion Paper Series No. 3. Community Research Connections at www.crcresearch.org

Boardman, B. 2007. Home truths: a low-carbon strategy to reduce UK housing emissions by 80% by 2050. http://www.eci.ox.ac.uk/research/energy/downloads/boardman07-hometruths.pdf

Coleman, J.S. 1988. Social capital in the creation of human capital. The American Journal of Sociology 94 Supplement: Organizations and Institutions pp: S95-S120.

Fernández-Maldonado, A.M., and J. Bredenoord. 2010. Progressive approaches in the current Peruvian policies. Habitat International 34: 342-350.

Zabala-Iturriagagoitia, J.M., A. Gutiérrez-Gracia, and F. Jiménez-Sáez. 2008. Benchmarking innovation in the Valencian Community. European Urban and Regional Studies 15: 333-347.

Week 10: Practical project and water issues. Second Presentation of Group Projects – Governance Structures.

Bencala, K.R. and G. D. Dabelko. 2008. Water wars: obscuring opportunities. Journal of International Affairs 61(2): 21-33.

Calow, R.C., A.M. MacDonald, A.L. Nicol et al. 2010. Ground water security and drought in Africa: linking availability, access, and demand. Ground Water 48(2): 246-256.

Pahl-Wostl, C., M. Craps, A. Dewulf et al. 2007. Social learning and water resources management. Ecology & Society 12(2) art 5.

Chappin, M.M.H., W.J.V. Vermeulen, M.T.H. Meeus et al. 2009. Enhancing our understanding of the role of environmental policy in environmental innovation: adoption explained by the accumulation of policy instruments and agent-based factors. Environmental Science & Policy 12: 934-947.

Gupta, J., C. Termeer, J. Klosterman et al. The Adaptive Capacity Wheel: a method to assess the inherent characteristics of institutions to enable the adaptive capacity of society. Environmental Science & Policy 13: 459-471.

Lal, H., J.A. Delgado, C.M. Gross et al. 2009. Market-based approaches and tools for improving wáter and air quality. Environmental Science & Policy 12: 1028-1039.

Leach, W.D., N.W. Pelkey, and P.A. Sabatier. 2002. Stakeholder partnerships as collaborative policiymaking: evaluation criteria applied to watershed management in California and Washington.

Tortajada, C. 2008. Challenges and realities of water management of megacities: the case of Mexico City metropolitan area. Journal of International Affairs 61(2): 147-166.

Week 11: Knowledge systems and research needs for sustainability; policy and technology constraints. Implications of climate change science.

Acs, Z.J. and A. Varga. 2002. Geography, endogenous growth, and innovation. International Regional Science Review 25(1): 132-148.

Amable, B. 2000. Institutional complementarity and diversity of social systems of innovation and production. Review of International Political Economy 7(4): 645-687.

Fichman, R.G. and C. Kemerer. 1999. The illusory diffusion of innovation: an examination of assimilation gaps. Information Systems Research 10(3): 255-275.

Nabel, G.J. 2009. The coordinates of truth. Science 326: 53-54.

Wonglimpiyarat, J. 2010. Innovation index and innovative capacity of nations. Futures 42: 247-253.

Acs, Z.J. and D.B. Audretsch. Innovation in large and small firms: an empirical analysis. The American Economic Review 78(4): 678-690.

Berkes, F. 2009. Evolution of co-management: role of knowledge generation, bridging organizations and social learning. Journal of Environmental Management 90: 1692-1702.

Björk, J. and M. Magnusson. 2009. Where do good innovation ideas come from? Exploring the influence of network connectivity on innovation idea quality. Journal of Production Innovation and Management 26: 662-670.

Gilbert, R. 2006. Looking for Mr. Schumpeter: where are we in the competition-innovation debate? Innovation Policy and the Economy 6: 159-215.

Week 12: Energy and fuels. A look at the economic and environmental costs and efficiencies of various sources and technologies.

Blackman, A. 1999. The economics of technology diffusion: implications for climate policy in developing countries. Resources for the Future Discussion Paper 99-42, Washington DC.

Boardman, B. 2004. Achieving energy efficiency through product policy: the UK experience. Environmental Science & Policy 7: 165-176.

Gallagher, K.S. and J.P. Holdren. 2004. U.S. Government policies relating to international cooperation on energy. Belfer Center for Science and International Affairs, John. F. Kennedy School of Government, Harvard University.

Schubert, C. 2006. Can biofuels finally take center stage? Nature Biotechnology 24(7): 777-784.

Smith, V.H., B.S.M. Sturm, F.J. de Noyelles et al. 2009. The ecology of algal biodiesel production. Trends in Ecology and Evolution 25(5): 301-309.

Cairns, S. and C. Newson. 2006. Predict and decide. Aviation, climate change and UK policy. Environmental Change Institute, University of Oxford. Final Report.

Kempton, W., F.M. Pimenta, D.E. Veron et al. 2010. Electric power from offshore wind via synoptic-scale interconnection. Proceedings of the National Academy of Sciences 107(16): 7240-7245.

Kok, R.A.W. and W.B. Biemans. 2009. Creating a market-oriented product innovation process: a contingency approach. Technovation 29: 517-526.

Mautz, R. 2007. The expansion of renewable energies in Germany between niche dynamics and system integration –opportunities and restraints. Science, Technology & Innovation Studies 3(2): 113-131.

Melillo, J.M., J.M Reilly, D.W. Kicklighter et al. 2009. Indirect emissions from biofuels: how important? Science 326: 1397-1399.

Searchinger, T.D., S.P. Hamburg, J. Melillo et al. 2009. Fixing a critical climate accounting error. Science 326: 527-528.

Week 13: Establishing relationships among knowledge, science, technology and innovation systems. Which stakeholders are involved? Uncertainty and risk.

Aghion, P., N. Bloom, R. Blundell et al. 2005. Competition and innovation: an inverted-U relationship. The Quarterly Journal of Economics 120(2): 701-728.

Almeida, M. 2008. Innovation entrepreneurship in Brazilian universities. International Journal of Technology Management and Sustainable Development 7(1): 39-58.

Cassia, L., A. Colombelli, and S. Paleari. 2009. Firms' growth: does the innovation system matter? Structural Change and Economic Dynamics 20: 211-220.

Flores, M., C. Boër, C. Huber et al. 2009. Universities as key enablers to develop new collaborative environments for innovation: experiences from Switzerland and India. International Journal of Production Research 47(17): 4935-4953.

Nelson, R.R., and K. Nelson. 2002. Technology, institutions, and innovation systems. Research Policy 31: 265-272.

Wejnert, B. 2002. Integrating models of diffusion of innovation: a conceptual framework. Annual Review of Sociology 28: 297-326.

Buesa, M., J. Heijs, M. Martínez Pelllitero et al. 2006. Regional systems of innovation and the knowledge production function: the Spanish case. Technovation 26: 463-472.

Etzkowitz, H. 2003. Innovation in innovation: the Triple Helix of university-industry-government relations. Social Science Information 42(3): 293-337.

Hage, M., P. Leroy, and A.C. Petersen. Stakeholder participation in environmental knowledge production. Futures 42: 254-264.

López-Claros, A. and Y. Mata. 2010. The Innovation Capacity Index: factors, policies, and institutions driving country innovation at: http://www.innovationfordevelopment.org/ici.html

Week 14: Foresight and policy –choosing among strategies for development. Which technologies for which aims?

Bidault, F. and A. Castello. 2010. Why too much trust is death to innovation. MIT Sloan Management Review 51(4): 33-38.

Carraro, C. and D. Siniscalco. 1994. Environmental policy reconsidered: the role of technological innovation. European Economic Review 38: 545-554.

Chesborough, H.W. and D.J. Teece. 2002. Organizing for innovation: when is virtual virtuous? Harvard Business Review 80(8): 127-135.

Dosi, G. 1988. Sources, procedures, and microeconomic effects of innovation. Journal of Economic Literature 26(3): 1120-1171.

Freeman, C. 2002. Continental, national and sub-national innovation systems – complementarity and economic growth. Research Policy 31: 191-211.

Van de Ven, A.H. 1986. Central problems in the management of innovation. Management Science 32(5): 590-607.

Archibugi, D. and A. Coco. 2004. A new indicator of technological capabilities for developed and developing countries (ArCo). World Development 32(4): 629-654.

Cunningham, P. 2010. European Union. Measuring success. Issues in Science and Technology 26(3): 75-80.

Farrell, D. and T. Kalil. 2010. United States. A strategy for innovation. Issues in Science and Technology 26(3): 41-50.

Gatignon, H., M.L. Tushman, W. Smith et al. 2002. A structural approach to assessing innovation: construct development of innovation locus, type, and characteristics. Management Science 48(9): 1103-1122.

van der Meulen, B. 1999. The impact of foresight on environmental science and technology policy in the Netherlands. Futures 31: 7-23.

Week 15: The dimensions of sustainability: studying and managing science and technology for innovation. Endogenous and exogenous drivers – Final Presentation of Group Projects.

Ackerman, F. 2008. Climate economics in four easy pieces. Development 51: 325-331.

Arrow, K.J., M.L. Cropper, G.C. Eads et al. 1996. Is there a role for Benefit-Cost Analysis in environmental, health and safety regulation? Science 272(5259):221-222.

Epstein, M.J. 2010. Thinking straight about sustainability. Stanford Social Innovation Review: 50-55.

Lueneburger, C., and D. Goleman. 2010. The change leadership sustainability demands. MIT Sloan Management Review 51(4): 49-55.

Audretsch, D.B. and M.P. Feldman. 1996. R&D spillovers and the geography of innovation and production. The American Economic Review 86(3): 630-640.

Helmsing, A.J.H. 2003. Local economic development: new generation of actors, policies and instruments for Africa. Public Administration and Development 23: 67-76.

Suurs, R.A.A. 2009. Motors of sustainable innovation. Ph.D. Thesis, Utrecht University, The Netherlands.

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Academic Honesty, Software Use, UF Counseling Services, Services for Students with Disabilities

In 1995 the UF student body enacted a new honor code and voluntarily committed itself to the highest standards of honesty and integrity. When students enroll at the university, they commit themselves to the standard drafted and enacted by students.

In adopting this honor code, the students of the University of Florida recognize that academic honesty and integrity are fundamental values of the university community. Students who enroll at the university commit to holding themselves and their peers to the high standard of honor required by the honor code. Any individual who becomes aware of a violation of the honor code is bound by honor to take corrective action. The quality of a University of Florida education is dependent upon community acceptance and enforcement of the honor code.

The Honor Code: We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.

On all work submitted for credit by students at the university, the following pledge is either required or implied: "**On my honor, I have neither given nor received unauthorized aid in doing this assignment."**

The university requires all members of its community to be honest in all endeavors. A fundamental principle is that the whole process of learning and pursuit of knowledge is diminished by cheating, plagiarism and other acts of academic dishonesty. In addition, every dishonest act in the academic environment affects other students adversely, from the skewing of the grading curve to giving unfair advantage for honors or for professional or graduate school admission. Therefore, the university will take severe action against dishonest students. Similarly, measures will be taken

against faculty, staff and administrators who practice dishonest or demeaning behavior.

Students should report any condition that facilitates dishonesty to the instructor, department chair, college dean or Student Honor Court. *(Source: 2008-2009 Undergraduate Catalog.)*

It is assumed all work will be completed independently unless the assignment is defined as a group project, in writing by the instructor. This policy will be vigorously upheld at all times in this course.

Software Use:
All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

Campus Helping Resources
Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. Both the Counseling Center and Student Mental Health Services provide confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance. The Counseling Center is located at 301 Peabody Hall (next to Criser Hall). Student Mental Health Services is located on the second floor of the Student Health Care Center in the Infirmary.

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

- *University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575,* **www.counseling.ufl.edu/cwc/**

Counseling Services
Groups and Workshops
Outreach and Consultation
Self-Help Library
Training Programs
Community Provider Database

- *Career Resource Center,* First Floor JWRU, 392-1601, **www.crc.ufl.edu/**

Students with Disabilities
The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues.

0001 Reid Hall, 392-8565, **www.dso.ufl.edu/drc/**