GEO 721 Ecological Theory in Geography

FALL 2012

Fridays 12:00 pm - 2:45 pm
Whitehall Classroom Bldg Whitehall Classroom Bldg-Rm.305-CB

Dr. J. Anthony Stallins

869 Patterson Office Tower
859-257-2138
ja.stallins@uky.edu
Office hours: 11:00 - 1:00 Wed or by appointment

Home Page: Available in Blackboard

Course description
This seminar examines current ideas in ecology and biology for their relevance to geographic thought. Geographers have long debated, refined, and reacted to ideas from the life sciences, from environmental determinism to the nature of succession and ecological stability. However, recent life science scholarship has produced insights that have yet to be recognized for the geographical concepts and reasoning underlying them. While acknowledging that the ways scientific knowledge is produced, used, and given power is a necessary subject of critical inquiry, we concentrate on more material instantiations of life and the insights arising from less representational views of organisms. Taking the posthuman as our jumping off point, this seminar is organized around what might be considered a spatial turn in biology and evolution. Rather than concentrate on posthumanism's curiosity about how humans are made and remade by the non-human, we explore the implications for geographic thought of the ongoing reconfiguration of two 20th century paradigms in biology, the Modern Synthesis of evolution and the Central Dogma of DNA. In what is being labeled postgenomics and the Extended Synthesis of evolution, biology is taking a turn toward concepts that have long held sway in geography regarding the importance of space, place, contingency, and a causality intertwined with environment. For example, our observations of the microbial and macrobial worlds suggest a causality that is more deeply biotic than previously conceived, even in former domains of the physical sciences where organisms were considered irrelevant. Epigenetics suggests that genes may be followers as much as leaders in the expression of biological phenomena. In light of these and other developments, some scholars in the life sciences are calling for a restructuring of how we conceptualize ecological causality. We explore these life science topics so at to begin to articulate how they intersect with geography and how they might lead to new lines of geographical questioning and research.

Student learning outcomes/objectives
Upon completion, students should be able to:

Recognize how evolutionary thought has changed in the past few decades and its relevance for aspects of geography.

Explain how the logic and reasoning characterizing postgenomic life science invoke ideas from human and physical geography

Recognize how biology and ecology are pluralistic disciplines with their own tensions among different epistemological communities**.**

Extend new biological and ecological ideas to issues in geography, from visualization and cartography to political ecology and physical geography.

Required texts (order online on your own)

Mitchell, S. D. 2009. *Unsimple Truths: Science, Complexity, and Policy*. University of Chicago Press.

Ulanowicz, R.E. 2009. *Third Window: Natural Life Beyond Newton and Darwin*. Templeton Press.

Email account
You are required to have (and actively check or forward) a UK email account so as to receive electronic postings of class announcements.

Evaluation
Final letter grade is based on a percentage of points you earn out of a possible 210.

Course activities and assignments

Weekly summary paper	11 at 10 points each	110
Final presentation	100	100
	Total points	**210**

Grading scale and sample grade calculation

A	> 90%	Your paper summary grades are 8, 9, 7, 7, 8, 5, 9, 10, 10, 9, 8, for a total of 90 points. Your final presentation score is 85 points. The total points you have earned for the course are 175 or 83% (175/210). This would be a B.
B	80 – 89%	
C	70 – 79%	
D	60 – 69%	
E	< 60%	

Description of course activities and assignments

Weekly written article summary paper. Each week you will submit a one to two page single-spaced paper (12 point font) that 1) summarizes the key take-home points in the assigned readings and any associated materials given to support them and 2) speculates (within reason) where in geography these ideas might have relevance and how they might be put into practice in an actual study. No electronic submissions will be accepted, hardcopy only.

Final presentation. Your final presentation (15 minutes) should be designed to convey how a subset of the life science ideas presented in our class can be put into practice for a particular problem or question in geography. Emphasis should be placed on contextualizing an issue in geography in the language and logic that threads through our two assigned textbooks and/or our article and chapter readings. This presentation can be thought of as a proposal for research or a reinterpretation of an aspect of geographic thought that takes a more evolutionary or biological view. Evaluation will be based on how well you have incorporated ideas from the class, and the overall feasibility and originality of ideas in your proposal.

COURSE SCHEDULE

Aug 24
Introduction: Cultures of causality
Mitchell, S. D. 2009. *Unsimple Truths: Science, Complexity, and Policy*. University of Chicago Press.

Ulanowicz, R.E. 2009. *Third Window: Natural Life Beyond Newton and Darwin*. Templeton Press.

Aug 31
Extended Synthesis of Evolution
Koonin, E.V. 2012. The postmodern state of evolutionary biology. Pp. 397-420 in *The Logic of Chance: The Nature and Origin of Biological Evolution*.

Pigliucci, M. 2009. An extended synthesis for evolutionary biology*. Annals of the New York Academy of Sciences*, 1168, 218–228.

Godfrey-Smith, P. 2007. Is it a revolution? *Biology and Philosophy*, 22(3), 429–437.

Sept 7
Niche construction, and ecosystem engineering
McKey, D., Rostain, S., Iriarte, J., Glaser, B., Birk, J.J., Holst, I., Renard, D. 2010. Pre-Columbian agricultural landscapes, ecosystem engineers, and self-organized patchiness in Amazonia. *Proceedings of the National Academy of Sciences of the United States of America* 107 (17), 7823–7828.

Corenblit, D., Gurnell, A. M., Steiger, J., & Tabacchi, E. (2008). Reciprocal adjustments between landforms and living organisms: extended geomorphic evolutionary insights. *Catena*, 73(3) 261–273.

Margulis, L. 2007. Welcome to the machine. Pp. 76-88 in *Dazzle Gradually: Reflections on the Nature of Nature*. Chelsea Green Publishing.

Sept 14
Resiliency theory
Scheffer, M. 2009. Theory of critical transitions. Pp. 11-36 in *Critical Transitions in Nature and Society*. Princeton University Press.

Barnosky, A. D., Hadly, E. A., Bascompte, J., Berlow, E. L., Brown, J. H., Fortelius, M., Getz, W. M., et al. 2012. Approaching a state shift in Earth/'s biosphere. *Nature*, 486(7401) 52–58.

Kirchhoff, T. et al 2010. The one-sidedness and cultural bias of the resilience approach. *Gaia* 19(1): 25-32.

Sept 21
Landscape dynamics: representation and reality
Jackson, S. T., & Sax, D. F. 2010. Balancing biodiversity in a changing environment: extinction debt, immigration credit and species turnover. Trends in Ecology & Evolution, 25(3), 153–160.

Laurance, W. F. 2008. Theory meets reality: How habitat fragmentation research has transcended island biogeographic theory. Biological Conservation, 141(7), 1731–1744.

Wearn, O. R., D. C. Reuman, and R. M. Ewers. 2012. Extinction debt and windows of conservation opportunity in the Brazilian Amazon. *Science* 337: 228–232.

Sept 28
Niche versus neutrality
Pavé, A. (2007). Necessity of chance: biological roulettes and biodiversity. *Comptes Rendus Biologies*, 330(3): 189–198.

Farjalla, V. F., Srivastava, D. S., Marino, N. A. C., Azevedo, F. D., Dib, V., Lopes, P. M., Rosado, A. S., et al. (2012). Ecological determinism increases with organism size. Ecology 93(7): 1752–1759.

Hubbell, S. 2005. Reconciling niche and neutrality: the continuum hypothesis. *Functional Ecology* 19: 166–172.

Oct 5
Defining organisms and species
Queller, D. C., & Strassmann, J. E. (2009). Beyond society: the evolution of organismality. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 364(1533): 3143–3155.

Hird, M. 2009. Plenty of room at the bottom: thinking bacteria. Pp. 21-57 in *The Origins of Sociable Life: Evolution after Science Studies*. Palgrave Macmillan.

Salthe, S. N. 2007. What Is the scope of biosemiotics? Pp. 133-148 in M. Barbieri (Ed.), *Introduction to Biosemiotics*. Springer.

Oct 12
Animal culture and personality
Wolf, M., and Weissing, F. J. 2012. Animal personalities: consequences for ecology and evolution. Trends in Ecology & Evolution, 27(8): 452–461.

McDougall, P. T., Réale, D., Sol, D., & Reader, S. M. 2006. Wildlife conservation and animal temperament: causes and consequences of evolutionary change for captive, reintroduced, and wild populations. Animal Conservation, 9(1): 39–48.

Galef, B.G. 2009. Culture in animals. Pp. 222-246 in *The Question of Animal Culture*. Harvard University Press.

Oct 19
Microbes, microbiomes, and microbiomics

Viles, H. A. 2012. Microbial geomorphology: A neglected link between life and landscape. *Geomorphology*, 157–158: 6–16.

Yatsunenko, T., Rey, F. E., Manary, M. J., Trehan, I., Dominguez-Bello, M. G., Contreras, M., Magris, M., et al. (2012). Human gut microbiome viewed across age and geography. *Nature.*

O'Malley, M., & Dupré, J. (2007). Size doesn't matter: towards a more inclusive philosophy of biology. *Biology and Philosophy* 22(2): 155–191.

Oct 26
Scale and visualization in the life science era
Page, R. D. M. 2012. Space, time, form: viewing the Tree of Life. *Trends in Ecology & Evolution*, 27(2): 113–120.

Prager, S. D., & Reiners, W. A. 2009. Historical and emerging practices in ecological topology. *Ecological Complexity* 6(2): 160–171.

Oyama, S. 2006. Boundaries and (Constructive) interaction. Pp. 272-289 in *Genes in Development: Re-reading the Molecular Paradigm*. Duke University Press

Nov 2
Culture and evolution
Richerson, P. J., Boyd, R., & Henrich, J. 2010.. Gene-culture coevolution in the age of genomics. *Proceedings of the National Academy of Sciences of the United States.*

Laland, K. N., Odling-Smee, J., & Myles, S. 2010. How culture shaped the human genome: bringing genetics and the human sciences together. *Nature Reviews Genetics*, 11(2), 137–148.

Madden et al 2009. Modeling the monkey habitat in Brazil. *Geospatial Today*.

Nov 9
Guest lecturer (TBA)

Nov 16
Epigenetics and the new heredity
Bonduriansky, R. 2012. Rethinking heredity, again. *Trends in Ecology & Evolution* 27(6): 330–336.

Bossdorf, O., Richards, C. L., & Pigliucci, M. 2008. Epigenetics for ecologists. *Ecology Letters* 11(2): 106–115.

Pennisi, E. 2009. The case of the midwife toad: fraud or epigenetics. *Science* 235: 1194-1195.

Nov 23
Thanksgiving - No class

Nov 30
Open discussion

Final exam week class meeting - Wed, Dec 12, 1:00 - 3:30 pm
Individual presentations (or groups) depending upon class size.

Course policies

Attendance. You can have one free unexcused absence. Each additional absence will lower your final grade approximately three final percentage points. For example, if you have an 89% final average and two unexcused absences, your final grade will be lowered to an 83%. With your third unexcused absence your final grade will be lowered six percentage points. Keep in mind that if you are absent without a valid excuse, you can accrue a zero on the summary paper submission for that week. Students are expected to withdraw from the class if more than 20% of the classes scheduled for the semester are missed (excused or unexcused) per university policy. The instructor reserves the right to withdraw any students for non-attendance.

Excused Absences. Students need to notify the professor of absences prior to class when possible. S.R. 5.2.4.2 defines the following as acceptable reasons for excused absences: (a) serious illness, (b) illness or death of family member, © University-related trips, (d) major religious holidays, and (e) other circumstances found to fit "reasonable cause for nonattendance" by the professor.

Note: generic notes from a health clinic, on campus or off campus, will not generally suffice for an unexcused absence.

Students must contact the instructor **before** the administration of a test if they are ill or otherwise unavailable on the day it is scheduled, and 2) in all cases of a pre-announced absence an official, original and signed excuse is also required.

Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays no later than the last day in the semester to add a class. Information regarding dates of major religious holidays may be obtained through the religious liaison, Mr. Jake Karnes (859-257-2754).

Verification of Absences. Students may be asked to verify their absences in order for them to be considered excused. Senate Rule 5.2.4.2 states that faculty have the right to request "appropriate verification" when students claim an excused absence because of illness or death in the family. Appropriate notification of absences due to university-related trips is required prior to the absence.

Academic Integrity. Per university policy, students shall not plagiarize, cheat, or falsify or misuse academic records. Students are expected to adhere to University policy on cheating and plagiarism in all courses. The minimum penalty for a first offense is a zero on the assignment on which the offense occurred. If the offense is considered severe or the student has other academic offenses on their record, more serious penalties, up to suspension from the university may be imposed.

Plagiarism and cheating are serious breaches of academic conduct. Each student is advised to become familiar with the various forms of academic dishonesty as explained in the Code of Student Rights and Responsibilities. Complete information can be found at the following website: http://www.uky.edu/Ombud. A plea of ignorance is not acceptable as a defense against the charge of academic dishonesty. It is important that you review this information as all ideas borrowed from others need to be properly credited.

Part II of Student Rights and Responsibilities (available online http://www.uky.edu/StudentAffairs/Code/part2.html) states that all academic work, written or otherwise, submitted by students to their instructors or other academic supervisors, is expected to be the result of their own thought, research, or self-expression. In cases where students feel

unsure about the question of plagiarism involving their own work, they are obliged to consult their instructors on the matter before submission.

When students submit work purporting to be their own, but which in any way borrows ideas, organization, wording or anything else from another source without appropriate acknowledgement of the fact, the students are guilty of plagiarism. Plagiarism includes reproducing someone else's work, whether it be a published article, chapter of a book, a paper from a friend or some file, or something similar to this. Plagiarism also includes the practice of employing or allowing another person to alter or revise the work which a student submits as his/her own, whoever that other person may be.

Students may discuss assignments among themselves or with an instructor or tutor, but when the actual work is done, it must be done by the student, and the student alone. When a student's assignment involves research in outside sources of information, the student must carefully acknowledge exactly what, where and how he/she employed them. If the words of someone else are used, the student must put quotation marks around the passage in question and add an appropriate indication of its origin. Making simple changes while leaving the organization, content and phraseology intact is plagiaristic. However, nothing in these Rules shall apply to those ideas which are so generally and freely circulated as to be a part of the public domain (Section 6.3.1).

Please note: Any assignment you turn in may be submitted to an electronic database to check for plagiarism.

Accommodations due to disability. If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (Room 2, Alumni Gym, 257-2754, email address: jkarnes@email.uky.edu) for coordination of campus disability services available to students with disabilities.

Classroom behavior policies. All electronic devices are to be put aside upon entering the room. Laptop users will be required to sit in the front row and be prepared to send me a screenshot of their URL history, or otherwise have it inspected before leaving each class meetings. Chronic, habitual use of digital devices to communicate to the outside world is highly discouraged, and referrals will be made for those students exhibiting symptoms of addiction to this practice.