

SUGGESTED READING, COURSES, and other RESOURCES

This list provides a suggested reading list and resources for students to obtain skills and knowledge as outlined in the core requirements for Ph.D. students in the Graduate Program of Ecology and Evolution at Rutgers University. The list will be continuously updated and posted publicly on the E&E website.

TOPIC: GENERAL LIFE SCIENCE

Textbooks and other books

Bryson, B. 2003. **A short history of nearly everything.**

Popular literature. A run-through from the beginning of the universe to today, the beginning of science to today, and the development of scientific knowledge through time in an easy to read book. A perfect introduction to the natural and physical sciences. Recommended by Lena Struwe.

Noble, Denis. 2008. **The Music of Life: Biology Beyond Genes.**

A brilliant, short, and very readable exploration of epigenetics and systems biology, the new frontier of evolution (and ecology) -- written by a pioneer of biological modeling and systems physiology. Filled with interesting examples, from music to oriental languages. Noble is professor emeritus at Oxford. Recommended by David Ehrenfeld.

Classic research articles

Watson, J. D. & F. H. C. Crick. 1953. **A structure for deoxyribose nucleic acid.** *Nature* 171:737-738. Undergraduate level. It's 1.25 pages long, there's no excuse for not reading the original. Recommended by Siobain Duffy.

Review articles

Non-E&E courses at Rutgers University (for E&E courses, please see the E&E website)

Courses at other institutions

Websites and other media

Extra-curricular and popular novels, movies, and other works

Carson, R. 1962. **Silent Spring.** Classic novel about the dangers of pesticides. Started the environmental movement in the 1960s. Recommended by Lena Struwe.

Wilson, E. O. 1994. **Naturalist.** Warner Books. An autobiography of the extraordinary contributor to all aspects of our program. Recommended by Joan Ehrenfeld.

TOPIC: INDIVIDUALS, POPULATIONS, AND COMMUNITIES

Textbooks and other books

Karasov, W.H., and Martinez del Rio, C. 2007. **Physiological Ecology: How Animals Process Energy, Nutrients, and Toxins.**

A unique, graduate-level introduction to physiological ecology, where emphasis is clearly on ecology, not physiology. Indeed, many physiological systems, which are covered in all other animal physiology and environmental physiology textbooks, are not discussed at all in this book. Recommended by Henry John-Alder.

Levin, Simon A., Steven R. Carpenter, H. Charles J. Godfray and Ann P. Kinzig. 2009. **The Princeton Guide to Ecology.** Princeton University Press, Princeton, NJ. A new text that offers brief essays on a very broad array of topics in ecology and evolution. Essays (each by a different expert) offer upper undergraduate to graduate level introduction to each topic. Should provide an excellent resource for qualifying exams. Recommended by J. Ehrenfeld.

Maynard-Smith, J. & E. Szathmáry. 1998. **The Major Transitions in Evolution.**

Oxford U Press. Beginning Graduate level. An overview of biological and physical innovations and events that led to the evolution of life as we know it. A great primer that spans macromolecules arising from primordial ooze to the evolution of language. Recommended by Siobain Duffy.

Van Straalen, N.M. and Roeloes, D. 2006. **An Introduction to Ecological Genomics,** especially chapters 4-7.

This is “a textbook for a discipline that is yet to develop”, as written by the authors. It introduces a genomics perspective on classic issues in community ecology, life-history patterns, and ecological stress. Recommended by Henry John-Alder.

Willmer, P., Stone, G., and Johnston, I. 2005. **Environmental Physiology of Animals, 2nd ed.**

A comprehensive, graduate-level introduction to environmental physiology, with emphasis on physiological traits of organisms in different types of habitats. Recommended by Henry John-Alder.

Classic research articles

Barkai, A. & McQuaid, C. (1988). **Predator-prey role reversal in a marine benthic ecosystem.** *Science*, 242, 62-64. Nice example of how even the most seemingly fundamental aspects of predator-prey interactions (who's the predator and who's the prey) can be density dependent. Recommended by Olaf Jensen.

Tilman, D. 1996. **Biodiversity: population versus ecosystem stability.** *Ecology* 77:350-363. Recommended by Rachael Winfree.

Review articles

Arnold, S.J. 1983. **Morphology, performance, and fitness.** *American Zoologist*. 23: 347-361. Recommended by Henry John-Alder.

Bartholomew, G.A. 1986. **The role of natural history in contemporary biology.** *BioScience*. 36(5): 324-329. Recommended by Henry John-Alder.

Feder, M.E., Bennett, A.F., and Huey, R.B. 2000. **Evolutionary physiology.** *Annu. Rev. Ecol. Syst.* 31: 315-341. Recommended by Henry John-Alder.

Stearns, S.C. and Magwene, P. 2003. **The naturalist in a world of genomics.** *The American Naturalist*. 161(2): 171-180. Recommended by Henry John-Alder.

Thomson, J. 2003. When is it mutualism? *American Naturalist* 85: S1-S9.
Recommended by Rachael Winfree.

Zera, A.J. and Harshman, L.G. 2001. **The physiology of life-history trade-offs in animals.** *Annual Review of Ecology and Systematics*. 32: 95-126. Recommended by Henry John-Alder.

Zera, A.J., Harshman, L.G., and Williams, T.D. 2007. **Evolutionary endocrinology: the developing synthesis between endocrinology and evolutionary genetics.** *Annual Review of Eco. Evol. Syst.* 38:793-817. Recommended by Henry John-Alder.

Non-E&E courses at Rutgers University (for E&E courses, please see the E&E website)

Courses at other institutions

Websites and other media

Darwin, An origin of species

(PBS interactive): [LINK](#) Undergraduate and Beginning Graduate Level.
Recommended by Lena Struwe.

Darwin's Diary

(PBS interactive): [LINK](#) Undergraduate and Beginning Graduate Level.
Recommended by Lena Struwe.

Evolution Enclaves: Darwin the Botanist and Origins of Life Research,

interview with David Kohn by Steve Mirsky (Science Talk), (NPR Scientific American; read transcript, download or listen online): [LINK](#) Undergraduate and Beginning Graduate Level. Recommended by Lena Struwe.

Extra-curricular and popular novels, movies, and other works

Any of the David Attenborough “Life of…” videos (mammals, birds, invertebrates (“Life in the Undergrowth”), reptiles). Unbelievable photography, and a huge amount of excellent natural history and ecology. Recommended by J. Ehrenfeld

TOPIC: PHYLOGENETICS AND SYSTEMATICS

Textbooks and other books

Dawkins, R. 2005. **The Ancestor's Tale: A Pilgrimage to the Dawn of Evolution.**

Undergraduate and Beginning Graduate Level. Interesting take on walking the phylogenetic tree down from humans to the smallest bacteria, also includes descriptions of many evolutionary concepts on both the macro and microlevel. Recommended by Lena Struwe.

Graur, D. & W.-H. Li. 2000. **Fundamentals of Molecular Evolution.** Sinauer.

Beginning Graduate level An introduction to nucleotide sequence evolution that balances theory and application. Population genetics, molecular biology and phylogenetics. Recommended by Siobain Duffy.

Simpson, M. 2005. **Plant systematics.** Undergraduate/Basic Graduate level. Good

chapters on molecular systematics, population evolution, speciation, phylogenetics, plant morphology, plant biodiversity and evolution of especially vascular plants. Recommended by Lena Struwe.

Classic research articles

Soltis, P. S., D. E. Soltis, & M. W. Chase. 1999. **Angiosperm phylogeny inferred from multiple genes as a tool for comparative biology.** *Nature* 402: 402-404. (molecular systematics). Advanced Graduate level. Recommended by Lena Struwe.

Review articles

Non-E&E courses at Rutgers University (for E&E courses, please see the E&E website)

Methods of Plant Systematics (3 credits). Rutgers (16: 765: 503).

Hands-on course in plant systematics methods and techniques used in plant systematics, phylogenetics, and biogeography. Lab, software demos, and lectures will be intermingled with independent projects and discussions. how to write a good paper, peer-review. Taught by Lena Struwe, every second spring semester.

Plant Systematics

Organization for Tropical Studies. Intense, 4-week graduate course in Costa Rica, a classic. Recommended by Lena Struwe. <http://www.ots.duke.edu/>

Courses at other institutions

Websites and other media

The complete work of Charles Darwin Online. Undergraduate to Advanced Graduate level. His books, articles, letters, it is all here, evolutionary topics. <http://darwin-online.org.uk/> Recommended by Lena Struwe

All in the family

building phylogenetic trees, PBS (online interactive): [LINK](#) Undergraduate to Beginning Graduate level. Recommended by Lena Struwe.

Evolution 101,

University of California Museum of Paleontology (online tutorial): [LINK](#) Undergraduate to Beginning Graduate level. Recommended by Lena Struwe.

Extinction

(PBS interactive): [LINK](#) Recommended by Lena Struwe.

Judgment Day: Intelligent Design on Trial,

PBS NOVA (on-line video and other materials about the Dover trial): [LINK](#) Undergraduate to Beginning Graduate level. Recommended by Lena Struwe.

Phylogenetic Systematics,

University of California Museum of Paleontology (online tutorial): [LINK](#) Beginning Graduate level. Recommended by Lena Struwe.

Understanding Evolution,

University of California Museum of Paleontology (online tutorial): [LINK](#) Undergraduate to Beginning Graduate level. Recommended by Lena Struwe.

Extra-curricular and popular novels, movies, and other works

TOPIC: ECOSYSTEMS

Textbooks and other books

Chapin, F. Stuart III, Pamela Matson , and Harold A. Mooney. 2002. **Principles of Terrestrial Ecosystem Ecology**. Springer, NY. The now classic– yet up-to-date-text of ecosystems ecology. Covers basic environmental ecology, water, carbon, nutrient cycles in detail; also disturbance and community dynamics from ecosystems point of view; temporal changes, trophic dynamics, landscapes, global cycles, and human effects on and management of ecosystems. Recommended by J. Ehrenfeld.

Likens, Gene E., F. Herbert Borman. 1995. **Biogeochemistry of a Forested Ecosystem**, **2nd ed.** Springer-Verlag, NH. Classic analysis of the Hubbard Brook ecosystem.

An excellent example of how ecosystems analyses are done, and how they are applied to understanding human effects and disturbances. Short but well worth the read. Recommended by J. Ehrenfeld.

Swift, M.J., O.W. Heal, and J.M. Anderson. 1979. **Decomposition in terrestrial ecosystems. Studies in Ecology Vol 5**. Univ. of California Press, Berkeley. Recommended by J. Ehrenfeld.

Classic research articles

Chadwick, O.A, L.A. Derry, P.M. Vitousek, B.J. Huebert, L.O. Hedin. 1999. **Changing sources of nutrients during four million years of ecosystem development.** *Nature* 397: 491-497. Recommended by Olaf Jensen.

Jenny, H. 1980. **The Soil Resource. Origin and Behavior.** *Ecological Studies* Vol. 37. Springer-Verlag, New York. 377 p. Recommended by J. Ehrenfeld.

Odum, E.P. 1969. **The strategy of ecosystem development.** *Science* 164:262-270
Recommended by J. Ehrenfeld.

Ryther, J. 1969. **Photosynthesis and fish production in the sea.** *Science* 166: 72-76. A back of the envelope calculation that has proven to be astonishingly accurate. Recommended by Olaf Jensen.

Tansley, A.G. 1935. **The use and abuse of vegetational concepts and terms.** *Ecology* 16:284-307 Recommended by J. Ehrenfeld.

Vitousek, P.M., and W.A. Reiners. 1975. **Ecosystem succession and nutrient retention: A hypothesis.** *BioScience* 25:376-381. Recommended by J. Ehrenfeld.

Review articles

Aerts R, Chapin FSI (2000) **The mineral nutrition of wild plants revisited: a re-evaluation of processes and patterns.** *Advances in Ecological Research* 30:1-67. Recommended by J. Ehrenfeld.

Dilling, L., S. C. Doney, J. Edmonds, K. R. Gurney, R. Harriss, D. Schimel, B. Stephens, and G. Stokes. 2003. **The role of carbon cycle observations and knowledge in carbon management.** *Annual Review of Environment and Resources* 28:521–55. Recommended by J. Ehrenfeld.

Pace, M.L., J.J. Cole, S.R. Carpenter and J.F. Kitchell. 1999. **Trophic cascades revealed in diverse ecosystems.** *Trends in Ecology and Evolution* 14: 483-488. Recommended by Olaf Jensen.

Vitousek, P.M., H.A. Mooney, J. Lubchenco, and J.M. Melillo. 1997. **Human domination of Earth's ecosystems.** *Science* 277:494-499. Recommended by J. Ehrenfeld.

Non-E&E courses at Rutgers University (for E&E courses, please see the E&E website)

Courses at other institutions

Tropical Biology: An Ecological Approach. Summer graduate course in Costa Rica organized by Organization for Tropical Studies (OTS), with lots of field work in ecology. <http://www.ots.ac.cr/>. Recommended by Lena Struwe.

Websites and other media

The Millennium Ecosystem Assessment. A unique attempt to catalog the most important ecosystem changes at a global scale and envision alternative “scenarios” for society and their ecosystem consequences.

<http://www.millenniumassessment.org/en/index.aspx> Recommended by Olaf Jensen

Extra-curricular and popular novels, movies, and other works

TOPIC: BIODIVERSITY, TEMPORAL AND SPATIAL SCALE

Textbooks and other books

Simpson, M. 2005. **Plant systematics**. Undergraduate/Basic Graduate level. Good chapters on molecular systematics, population evolution, speciation, phylogenetics, plant morphology, plant biodiversity and evolution of especially vascular plants. Recommended by Lena Struwe.

Classic research articles

Costanza, R., d’Arge, R., de Groot, R., Farber, S., Grasso, M., Hannon, B., Limburg, K., Naeem, S., O’Neill, R.V., Paruelo, J., Raskin, R.G., Sutton, P., and van den Belt, M. 1997. **The value of the world's ecosystem services and natural capital.** *Nature* 387: 253-260. Love it or hate it, but definitely worth reading. Recommended by Olaf Jensen.

Eldredge, N. & Gould, S.J. 1972. **Punctuated equilibria: an alternative to phyletic gradualism.** In *Models in paleobiology*, edited by TJM Schopf. Freeman, Cooper & Co, San Francisco. Pp 82-115. Recommended by Lena Struwe.

Kenrick P. & P. R. Crane. 1997. **The origin and early evolution of plants on land.** *Nature* 389: 33-39. Beginner Graduate level. Recommended by Lena Struwe.

Larsen, T. H., Williams, N. W. & Kremen, C. 2005 **Extinction order and altered community structure rapidly disrupt ecosystem functioning.** *Ecol. Lett.* 8, 538–547. (doi:10.1111/j.1461-0248.2005.00749.x) Recommended by Rachael Winfree.

Review articles

Futuyma, D. J. & G. Moreno. 1988. **The evolution of ecological specialization.** *Ann. Rev. Ecol. Syst.* 19:207-33. Beginner Graduate level. A thorough (for its time)

examination of the various reasons and mechanisms that most organisms fail to be generalists. A good introduction to how evolutionary biologists pose questions and think them through. Recommended by Siobain Duffy.

Kassen, R. 2002. **The experimental evolution of specialists, generalists, and the maintenance of diversity.** *J Evol Biol* 15:173-190. Beginner Graduate level. Results from experimental studies with eukaryotes, bacteria and viruses are summarized and applied to how niche breath evolves in nature. Recommended by Siobain Duffy.

Kremen.C. 2005. **Managing ecosystem services: what do we need to know about their ecology?** *Ecology Letters* 8: 468-479. Recommended by Rachael Winfree.

Niklas, K. 1999. **What's so special about flowers?** *Natural History* 5/99: 42-45. Undergraduate/popular article. Paleobotany, angiosperms, morphology. Recommended by Lena Struwe.

Tilman, D. 1999. **The ecological consequences of changes in biodiversity: a search for general principles.** *Ecology* 80, 1455–1474. (doi:10.2307/176540) Recommended by Rachael Winfree.

Non-E&E courses at Rutgers University (for E&E courses, please see the E&E website)

Courses at other institutions

Courses at Woods Hole: Microbial Diversity, etc. Check current offerings. Recommended by Lena Struwe.

Websites and other media

Classifying life

(PBS interactive): [LINK](#) Recommended by Lena Struwe.

Fearless Planet: Earth Story

Discovery Channel (view online, 44 min): [LINK](#) Recommended by Lena Struwe.

History of Life on Earth

(PBS interactive): [LINK](#) Recommended by Lena Struwe.

Origins of Earth

(PBS interactive): [LINK](#) Recommended by Lena Struwe. ***Plant Evolution Timeline***
University of Cambridge (online interactive): [LINK](#) Recommended by Lena Struwe.

Tree of Life

(PBS interactive): [LINK](#) Recommended by Lena Struwe.

Extra-curricular and popular novels, movies, and other works

TOPIC: ANALYSIS OF DATA

Textbooks and other books

Hilborn, R., and Mangel, M. 1997. **The ecological detective: confronting models with data**. Princeton University Press, Princeton, New Jersey. One of the most readable introductions to maximum likelihood and Bayesian data analysis methods. Recommended by Olaf Jensen.

Sokal, R.R. and Rohlf, F.J. 1994. **Biometry: The Principles and Practices of statistics in Biological Research. 3rd Edition** W.H. Freeman. Sokal and Rohlf's classic text deals with statistics from numerous areas of biological research, focusing on practical applications and incorporates computer calculations. Recommended by Rae. Winfree and Peter Morin.

Tufte, E. 2005. **The Visual Display of Quantitative Information, ed. 2**. General audience level. How to make great graphics with the highest information content, one of several great books by Ed Tufte about visual communication. Recommended by Lena Struwe.

Classic research articles

Hurlbert, S.H. 1984. **Pseudoreplication and the design of ecological field experiments.** *Ecological Monographs* 54(2): 187-211. Recommended by Olaf Jensen.

Legendre, P. 1993. **Spatial autocorrelation: trouble or new paradigm?** *Ecology* 74(6): 1659-1673. Recommended by Olaf Jensen.

Review articles

Non-E&E courses at Rutgers University (for E&E courses, please see the E&E website)

Courses at other institutions

Websites and other media

AD (Automatic Differentiation) Model Builder (ADMB). Website for downloading the best available software (now free) for many kinds of nonlinear optimization (estimating the parameters of nonlinear models by fitting models to data). If you're running up against the limits of functions like Solver (Excel), fmins (Matlab), or optim (R), ADMB is the place to go. Unfortunately, ADMB is not at all user friendly. <http://admb-project.org/> Recommended by Olaf Jensen.

The R Project. Website for downloading the most widely used (and free) software for statistical analysis and modeling in ecology (and many other disciplines). <http://www.r-project.org/> Recommended by Olaf Jensen.

Extra-curricular and popular novels, movies, and other works

Mlodinow, Leonard. 2009 **The Drunkard's Walk: How Randomness Rules Our Lives** Recommended by Ed Green.

Salsburg, David. 2002. **The Lady Tasting Tea: How Statistics Revolutionized Science in the Twentieth Century** Recommended by Ed Green.

TOPIC: ACADEMIC INTEGRITY, INFORMATION DISSEMINATION, MENTORING, TEACHING, ETC.

Textbooks and other books

Carraway, Leslie N. 2009. **Improve Scientific Writing and Avoid Perishing**. Amer. Midland Naturalist 161:361-370. Another very useful article on how to assemble a manuscript, with many good pointers on writing. Recommended by J. Ehrenfeld.

Chandler, C. R., L. M. Wolfe & D. E. L. Promislow. 2007. **The Chicago Guide to Landing a Job in Academic Biology**. U Chicago Press. Three eco/evo biologists discuss presentation, writing and self-promotion skills in the context of job searching, but applicable before one is at that point. Very approachable, cartoon drawings abound. Recommended by Siobain Duffy.

Donovan, M.S., J. Bransford, & J. Pellegrino. 2000. **How people learn: bridging research and practice**. National Academies Press. This is a very accessible book that provides the reader a global perspective on both theory and application in education. This is a nice way to become familiar with the research behind the best practices in education and can be useful for teaching philosophies. Recommended by Rebecca Jordan.

Gopen, George and Judith Swan. Nov-Dec, 1990. **The Science of Scientific Writing, American Scientist**. (available online through American Scientist). An absolutely essential article about how to write clearly, no matter how complex the subject matter. One of the best articles I've seen on writing, especially for scientists. Recommended by J. Ehrenfeld

Nersessian, N. 2008. **Creating scientific concepts**. Book. This book is for those seeking to dig deeper into teaching and learning. While still an accessible read, this book provides perspectives on how individuals learn in the context of classroom practice. Recommended by Rebecca Jordan.

Nilson, L. 2010. **Teaching at its best: a research-based resource for college instructors**. Book. This is an excellent and very comprehensive resource for those

interested in post-secondary education. This book will provide practical tips on almost every aspect of preparing for the college classroom. Recommended by Rebecca Jordan.

Reif, F. 2008. **Applying cognitive science to education: thinking and learning in scientific and other complex domains.** Book. This book digs deeply into cognitive theory and the science classroom. One need not have a background in the cognitive sciences but should be prepared for a deep exploration into cognitive ideas. Recommended by Rebecca Jordan.

Svinicki, M. & W. McKeachie. 2010. **Teaching tips: strategies, research, and theory for college and university teachers.** Book. This is an advanced edition of a classic text detailing essential teaching survival skills. A must read. Recommended by Rebecca Jordan.

Strunk, W. 2009. **Elements of style: original edition.** Book. This is a writing classic and an excellent shelf reference. Recommended by Rebecca Jordan.

Classic research articles

Chess, C., T. Dietz, & M. Shannon. 1998. **Who should deliberate when?** *Human Ecology Review*. A general article that focuses on communication between scientists, stakeholders, and government agencies. Recommended by Rebecca Jordan.

Groffman, P., C. Stylinski, M. Nisbet, C. Duarte, R. Jordan, A. Burgin, M.A. Previtali & J. Coloso. 2010. **Restarting the conversation: challenges at the interface between ecology and society.** *Frontiers in Ecology and the Environment*. A very general piece about communicating science to broad audiences. Recommended by Rebecca Jordan.

Review articles

San Diego University. 2000. Fundamental Principles of Academic Integrity. <http://ethics.sandiego.edu/eac/Summer2000/Readings/Principles.html> Recommended by Lena Struwe.

Non-E&E courses at Rutgers University (for E&E courses, please see the E&E website)

Courses at other institutions

Websites and other media

Chronicle of Higher Education Advice section (though many articles in the CoHE

might be of interest) <http://chronicle.com/section/Advise/66/> The Chronicle predominately covers teaching-oriented institutions, including community colleges, so this can be a great resource for teaching advice. Recommended by Siobain Duffy.

Female Science Professor. A tenured physicist relates how she has navigated grad school, postdocing, mentoring, applying for funding as a junior and senior researcher, negotiating multiple jobs, teaching, and work-life balance. Sometimes off-topic (novels, cats) but some of the best mentoring-oriented blogging out there. <http://science-professor.blogspot.com/> Recommended by Siobain Duffy.

General Communication website.

<http://communicatingscience.aaas.org/CommunicationBasics/Pages/SciencePublic.aspx>. Recommended by Rebecca Jordan.

General advice about writing website.

<http://www.cs.unc.edu/~azuma/hitch4.html>. Recommended by Rebecca Jordan.

Resources for students on Academic Integrity, web link list at Rutgers University

<http://academicintegrity.rutgers.edu/students.shtml> Recommended by Rebecca Jordan.

Some Modest Advice for Graduate Students Accept few imitations of this empowering screed. <http://www.yale.edu/eeb/stearns/advice.htm> Recommended by Siobain Duffy.

Surviving Graduate Schools websites.

<http://eebio.tulane.edu/graduate/survive-grad-school.php> and (with focus on computer science, but still relevant) <http://www.cs.unc.edu/~azuma/hitch4.html>. Recommended by Rebecca Jordan.

Extra-curricular and popular novels, movies, and other works