

Week of:	Week#		[Notes]
26 August		i) Discuss schedule	[Friday 30 th [Monday 2 nd , Labor Day, off]
2 September	1	i) Molecules & Evolution: Genes & Trees ii) No lecture-Discuss <i>Darwin's Ghost</i>	
9 September	2	i) Darwinism to Neo-Darwinism: Genes in Populations I ii) Selection & Drift: Genes in Populations II	
16 September	3	i) Rates & Patterns of Substitution: How Genes & Proteins Evolve I ii) Assessing natural selection from sequences (Ananias Escalante, CDC)	
23 September	4	i) Homology 101 & Basics of Evolutionary Trees ii) Distance Methods: Molecular Phylogeny I	
30 September	5	i) Molecular evolution of viruses (Philip Pellett, CDC) ii) Parsimony & Likelihood Methods: Molecular Phylogeny II	
07 October	6	i) Examples & Applications: Molecular Phylogeny III ii) Molecular Phylogeny Methods: Computer Laboratory	[Dental School 109]
14 October	7	i) Fall break, off ii) Genes & Trees in Molecular Epidemiology: Cholera & <i>E. coli</i> (Robert Tauxe, CDC)	
21 October	8	i) Duplication, Shuffling & Conversion: How Genes & Proteins Evolve II ii) Adaptation, Selection & New Functions: How Genes & Proteins Evolve III	
28 October	9	i) Gene Number & Genome Size: Evolution of Genomes I ii) Transposons & Lateral Gene Transfer: Evolution of Genomes II	
4 November	10	i) Organelles: Evolution of Genomes III ii) Introns: Evolution of Genomes IV	[Topic for paper decided by Friday 8 th]
11 November	11	i) <i>In vitro</i> Evolution of Genes & Proteins (I. Matsumura, Biochemistry) ii) Tracing Gene History in Space & Time: Phylogeography	
18 November	12	i) Changing Gene Expression Patterns & Timing: Development & Evolution ii) Evo-Devo of the Eye (K. Moses, Cell Biology)	
25 November	13	i) 3 Student Presentations (25 min each.) ii) Thanksgiving, off	
2 December	14	i) 3 Student Presentations ii) 3 Student Presentations	
9 December	15	i) 3 Student Presentations ii) Any Remaining Student Presentations (final exam period)	[Tuesday 10 th , classes end]
16 December	16	Final term paper due Monday (5 pm)	[Wednesday 18 th , term ends]

General Issues

- The class will meet twice weekly (unless otherwise noted)
- Each class will meet for approximately 1.5 hours, including a short break. Please be prompt.
- For each class period, there will be a lecture (generally 50 min) followed by a discussion (ca. 25 min), although in some cases the amount of time allocated to each will be swapped.
- Attendance is expected for each class meeting but will not be formally kept. Grading, however, will be partly based on participation (see below).
- There will be assigned readings for each class, a few copies of which will be available at:
 - a) room 1117 Rollins (the “people’s room”), &/or b) as PDFs at <<http://euplotes.biology.emory.edu/IBS593/>>.
- For each class period, the discussion will be led by a student. Preparation for this will possibly include, if relevant, making a few overhead transparencies. Volunteers will be solicited, but empty slots will be assigned. Each student must lead at least one discussion. Sign-up will begin on the first full day of class.
- The discussion leader will be required to post three “lead off” questions by email before the class period prior to that discussion, and bring a hard copy to the prior class to give to the instructor.
- A few (3-4) short exercises will be assigned to help solidify and generalize some concepts.
- A term paper (15-20 pages in length) will be the major assignment, the topic of which will need to be discussed with and approved (deadline, Nov. 8) by the instructor. Topics which are relevant to—but are not a central focus of—your thesis research are encouraged.
- The student presentations will be semi-formal (lecture-style, using overheads or powerpoint) and will be 25 min. each, including questions. They will be on the topic chosen for the term paper, but need not cover exactly the same material. Practicing your talk is highly encouraged—both content and delivery will be evaluated.
- Student presentations will be evaluated by the instructor and by other students.
- Late assignments (including term paper) will be deducted one letter grade for each day late.

Grading

- Term paper 40 %
- Presentation 20%
- Short assignments (including phylogenetics “labs”) 20%
- Attendance and participation (including as discussion leader) 20%
- Attendees at the four showings of the PBS series “Evolution” will be noted and may be awarded extra credit
- Students registered for the BIOL 470 version of this course will be evaluated using separate criteria

Texts :

• **Required:**

- Hall B.G. (2001) *Phylogenetic Trees Made Easy*. Sinauer.
- Jones S. (2000) *Darwin’s Ghost: The Origin of Species Updated*, Random House.
- Page R.D.M. & Holmes E.C. (1998) *Molecular Evolution: A Phylogenetic Approach*, Blackwell.

• **Optional/Recommended:**

- Nei M. & Kumar S. (2000) *Molecular Evolution and Phylogenetics*, Oxford.
- Graur D. & Li W-H. (2000) *Fundamentals of Molecular Evolution*, 2nd ed. Sinauer.
- Li W-H. (1997) *Molecular Evolution*, Sinauer.
- Li W-H. & Graur D. (1991) *Fundamentals of Molecular Evolution*, Sinauer.
- Patthy, L. (1999) *Protein Evolution*, Blackwell.
- Avise J.D. (2000) *Phylogeography*, Harvard.
- Avise J.D. (1994) *Molecular Markers, Natural History and Evolution*, Chapman and Hall.
- Freeman S. & Herron J.C. (2000) *Evolutionary Analysis*, 2nd. ed., Prentice Hall.
- Hillis D. Moritz C. & Mable B.K., eds. (1995) *Molecular Systematics*, 2nd ed, Sinauer.
- Maddison W.P. & Maddison D.R. (2000) *MacClade Version 4*, Sinauer.
- Maynard Smith J. (1998) *Evolutionary Genetics*, Oxford.

Discussion leaders for Week 3-Week 12

Responsibilities:

- 1) Send three questions to “kick off” the discussion to the email list. Do this prior to the session *preceding* the discussion (and bring a copy of the questions to the preceding class).
- 2) Make a few transparencies (e.g. of the key figures), if helpful.
- 3) Provide a short (5-10 min.) introduction to the paper(s).
- 4) Lead the discussion!

Week 3	i) Rates & Patterns of Substitution: How Genes & Proteins Evolve I ii) Assessing natural selection from sequences	
Week 4	i) Homology 101 & Basics of Evolutionary Trees ii) Distance Methods: Molecular Phylogeny I	<u>Elizabeth</u> <u>Tonya</u>
Week 5	i) Molecular evolution of viruses (P. Pellett) ii) Parsimony & Likelihood Methods: Molecular Phylogeny II	<u>Vandy</u> <u>Mike</u>
Week 6	i) Examples & Applications: Molecular Phylogeny III ii) No discussion-computer laboratory	<u>Judith</u>
Week 7	i) Fall break, off ii) Genes & Trees in Molecular Epidemiology (R. Tauxe)	<u>John C</u>
Week 8	i) Duplication, Shuffling & Conversion: How Gs & Ps Evolve II ii) Adaptation, Selection & New Functions: How Gs & Ps Evolve III	<u>Mindy</u> <u>Jenn</u>
Week 9	i) Gene Number & Genome Size: Evolution of Genomes I ii) Transposons & Lateral Gene Transfer: Evolution of Genomes II	<u>Justin</u> <u>Andy</u>
Week 10	i) Organelles: Evolution of Genomes III ii) Introns: Evolution of Genomes IV	<u>Andrea</u> <u>Shana</u>
Week 11	i) <i>In vitro</i> Evolution of Genes & Proteins (I. Matsumura) ii) Tracing Gene History in Space & Time: Phylogeography	<u>Jeanine</u> <u>Kristin</u>
Week 12	i) Gene Expression Patterns & Timing: Development & Evolution ii) Evo-Devo of the Eye (K. Moses)	<u>John McQ</u> _____