OEB 192 – Microbial Evolution – Fall 2011 – Course Syllabus

Instructor: Christopher Marx
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Office hours: Mondays, 4:00 – 5:00 pm

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Office hours: Wednesdays, 4:00 – 5:00 pm (in Biolabs 3081)

Course location:
Biolabs 2062

Time: MW 2:30 – 4:00 pm

Website: http://isites.harvard.edu/k82101

8/31 – Course introduction & example

No reading required

9/7 – Fundamentals of evolution: natural selection, modern synthesis, adaptation

Gould & Lewontin, 1979; Nielsen, 2009

9/12 – Phylogeny and the tree of life

Woese, 1987 (p.222-232; 253-264)

9/14 – Molecular evolution & phylogenetic inference: case of HIV

Gao et al., 1999 (& comment: Weiss & Wrangham, 1999)

9/19 –Horizontal gene transfer

Lawrence &Ochman, 1997

Phylogenetic project: introduce assignment

9/21 – Limits to gene transfer

Daubin et al., 2003

9/26 – Microbial species & biogeography

Papke et al., 2007

9/28 – Microbial speciation

Retchless & Lawrence, 2007

10/3– Selection upon codons

Coleman et al., 2008

Phylogenetic project: turn in

10/5 – Mid-term exam (material through 10/4)

10/10 – No class (Columbus Day)

10/12 – Evolution of digital organisms (Avida)

Lenski et al., 2003 (& background: Adami, 2006)

Avida project: introduce project

10/17 – Dynamics of adaptation

Lenski et al., 1991

Avida project: practice assignment due

10/19 – Tradeoffs, specialization & pleiotropy

De Paepe & Taddei, 2006

10/24 – Mutation rate & population size I.

Wilke et al., 2001

10/26 – Mutation rate & population size II.

Hegreness et al., 2006

10/31- Genetic & physiological basis of adaptation

Barrick et al., 2009

Avida project: proposa due

11/2 – Fitness & optimality

Dykhuizen et al., 1987; Ibarra et al., 2002

11/7 – Epistasis

Chou et al., 2011 (& comment: Kryazhimskiy et al., 2011)

11/9 – Phenotypic diversity & epigenetics

Beaumont et al., 2009

Avida project: project due 11/12

11/14 – Diversification & coevolution

Kerr et al., 2002 (& comment: Novak & Sigmund, 2002)

11/16 – Evolution of cooperation

Harcombe, 2010

11/21 – Presentations on Avida projects

11/23 – No class (immediately before Thanksgiving break)

(revised project due 11/23, if desired)

11/28 – Evolution of pathogens

Russell et al., 2008 (& story:Enserink, 2008)

11/30 – In-class final exam (material since 10/12)

Grading:

10%	Class participation
10%	Reading questions
10%	Phylogenetics assignment
30%	Avida project
15%	Mid-term exam
25%	Final exam

Late assignments will not be accepted without prior approval. If approved beforehand, there will still be a reduction of 10% of the points available per day late. This penalty may be waived due to extenuating circumstances. (This would include health issues or family emergencies. Note that having midterms in other classes that week, for example, does not count.)

Papers for discussion:

New to this year, we will try to begin to cover background material for the next session's topic during the end of the prior day. It is our hope that this additional context, as well as the reading questions will aid in understanding the material of the papers. The reading questions will be due by 1 pm the day that paper will be discussed, giving the instructors time to look these over.

Background readings:

If you would like further background on evolution I would turn Futuyma's excellent text, Evolutionary Biology (Sinauer, I have the third edition, but any will do and it is easy to come across a used copy). In addition, if you want some additional basics about microbes, I have made scanned chapters from Brock Biology of Microorganisms (Prentice Hall, these versions from eleventh edition) available on the website. These include microbial metabolism (Ch. 5), microbial growth (Ch. 6), microbial genetics (Ch. 10) and microbial evolution and systematic (Ch. 11).