

MBG325 Molecular Evolution

3 credit hours

Instructor: Prof. Anne Frary
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Office hours: Monday 9:45-10:45; Wednesday 9:45-10:45 and by appointment
Team: MBG325 Molecular Evolution Fall 2024, code: uk00yi3

Objectives:

Students will learn about the dynamics of evolutionary change at the molecular level, the driving forces behind the evolutionary process, the effects of the various molecular mechanisms on the structure of genes and genomes, and the methodology involved in dealing with molecular data from an evolutionary perspective.

Topics:

Introduction

Review of gene structure and function

Genes in populations: natural selection, random genetic drift, gene substitution

What drives evolution: historical overview

Evolutionary changes in DNA sequences: nucleotide substitution, sequence divergence

Estimating number of nucleotide substitutions & amino acid replacements

Alignment

Rates & patterns of nucleotide substitution

Molecular clocks

Rates of substitution in organelle DNA

Molecular phylogenetics: trees, character & distance data, tree reconstruction methods

Gene duplication & loss

Evolution of new genes & proteins

Textbooks (not required):

Grauer, D (2016) Molecular and Genome Evolution. Sinauer Assoc.,USA. ISBN:9781605354699

Grauer, D & Li W-H (2000) Fundamentals of Molecular Evolution, Sinauer Assoc.,USA. ISBN: 978-0878932665

Grading:

exams: midterm I 35%; midterm II 35%

homework: 30%

Academic Integrity:

Cheating and plagiarism are unacceptable. Everyone is expected to do his/her own work, therefore, copying will not be tolerated. Assignments containing evidence of cheating or plagiarism (appropriate software will be used to check assignments) will receive a 0. A second plagiarism infraction will result in a one-grade reduction in the semester grade (for example, BA will be reduced to BB). Further infractions will result in further grade reductions. Cases of cheating will be referred to the Dean's office for further investigation, as needed.