

## Syllabus for Fall 2017

### MCB 3421: Introduction to Molecular Evolution and Bioinformatics

[http://gogarten.uconn.edu/mcb3421\\_2017](http://gogarten.uconn.edu/mcb3421_2017)

Mondays & Wednesdays 11.15AM-12.05PM Austin 445

Fridays 10:10AM - 11:40AM or 1:25PM - 2:55PM Whetten Graduate Center

#### Instructors:

##### J Peter Gogarten

Dept. Molecular and Cell Biology

University of Connecticut

Storrs, CT 06269-3125

Phone: 486-4061

Email: [gogarten@uconn.edu](mailto:gogarten@uconn.edu)

#### Teaching Assistant:

##### Matthew Fullmer

Email: [Matthew.Fullmer@uconn.edu](mailto:Matthew.Fullmer@uconn.edu)

#### Office hours

MW after class - 2pm or after arrangement: for fast response send an [email!](#)

For questions of general interest, use the bulletin board on WebCT.

#### Basis for grading:

**Participation** (webct discussion board, in class discussions, in class pop-up quizzes),

**Assignments from the computer labs, Take-home exams, Midterm, Final.**

##### Weights:

Final: 30%,

Midterm: 25%,

Participation, bulletin board postings, pop-up quizzes, other in-class assignments: 15%

Take-home assignments: 30%

(You can **drop the worst 4** grades from the Take Home Assignments).

**Expectation: More than** 4h reading/studying per week (most will do fine with about 3-6h/week).

**Plagiarism** and "collaborations" for writing assignments and take-home exams will not be tolerated!

In case of misconduct you will receive an F for the assignment, AND the F will count towards the final grade (*i.e.*, you cannot drop an F due to academic misconduct).

**Exam policy:** When students are forced to miss the final examination due to illness, accident, death in the family, or other unavoidable reasons they need to contact the Office of Student Services & Advocacy to receive approval to arrange another exam time. Students should present appropriate documentation to support their request. Students who have a conflict about which they have or should have had advanced notice (bunched finals, religious obligation, legal/medical appointments ...) MUST seek permission to reschedule their assessment NO LATER THAN November 30th. If you need to reschedule your midterm or final exam, please let your instructor know ASAP.

The general policy for Syllabi, including links to the expected workload and class attendance is at <http://provost.uconn.edu/syllabi-references/>

## Very Preliminary Schedule

**red:** computer lab exercises in the Whetten Graduate Center (F 10.10 -11.40 or 13.25-14.55);

**blue:** lectures, demonstrations and discussions in Gentry 140 (MW 11.15-12.05)

Class 1: Overview; topics; textbook; reading materials; How will grades be calculated?

Class 2: Protein structure, protein evolution, Swiss Protein Data bank Viewer

Class 3: Using Deep View

Class 4: Why is an evolutionary perspective important?

Class 5: Aligning protein pdb files in deep view

Class 6: Aligning pdb file in Deep view, review of the homology concept

Class 7: Databanks, Entrez

Class 8: Simple Databank searches using Entrez and Web of Science

Class 9: Discussion and review

Class 10: Z scores, expectations and probabilities

Class 11: Simple homology searches

Class 12: Multiple substitutions, dot matrix representation

Class 13: Blast and the command line

Class 14: Simple blast and blastall searches

Class 15: blastall discussion, optimal pairwise alignment

Class 16: dotlet, optimal alignments, intro to trees - part 1

Class 17: dotlet, inspecting protein protein and protein DNA alignments

Class 18: dotlet, exon shuffling, chromosome rearrangements

Class 19: clustal, muscle and SATE

Class 20: clustal and jalview

Class 21: Trees, terminology and coalescence

Class 22: Tree terminology, part 1

Class 23: Finding ORFs, Gene Plots, and Synteny

### **midterm**

Class 24: Tree terminology, part 2

Class 25: Intron/Exon detection, prediction of membrane spanning helices

Class 26: Gene duplications, types of homology

Class 27: Gene duplications continued

Class 28: TaxPlot, TaxTable and Mummer

Class 29: Genes, populations and selection

Class 30: In vitro selection, recombination and linkage between protein evolution and the encoding genes

Class 31: Trees with clustal and phylip

Class 32: Neutral Evolution

Class 33: PSI blast

Class 34: PSI blast exercises

Class 35: Building trees, support values

Class 36: Bayes and ASRV

Class 37: Distance matrix, bootstrap and parsimony analyses - long branch attraction.

Class 38: Probability mapping and detecting positive selection

Class 39: Detecting positive and purifying selection.

Class 40: MrBayes - Introductory Exercises

The Center for Students with Disabilities (CSD) at UConn provides accommodations and services for qualified students with disabilities. If you have a documented disability for which you wish to request academic accommodations and have not contacted the CSD, please do so as soon as possible. The CSD is located in Wilbur Cross, Room 204 and can be reached at (860) 486-2020 or at [csd@uconn.edu](mailto:csd@uconn.edu). Detailed information regarding the accommodations process is also available on their website at [www.csd.uconn.edu](http://www.csd.uconn.edu).