Bioinformatics
Biology 312

Spring 2012, Jan. 23 – May 12, 1108 Snell Hall, MW 12:40-1:40, T 2:20-4:20

Instructor:
Dr. Claire Rinehart, Lab: 2108 Snell, Office: 312 TCCW, Phone: 745-5997, 535-8445(c)

Date	Day	Topic	Before Class Reading
Jan. 23	M	L1-Introduction	http://www.ncbi.nlm.nih.gov/About/primer/bioinformatics.html
24	T	Lab 1: Introduction to Sequencing and Mycobacterium phages. Notebooks	454 Sequencing video
25	W	L2-Central Dogma of genome expression. Gene structure & control.	http://www.ncbi.nlm.nih.gov/About/primer/genetics_cell.html
30	M	L3-Introduction to Proteins	
31	T	Lab 2: Assembly and Quality Checking of KyKar	In Silico Manual, pages pages 1-41.
Feb. 1	W	L4-Genome components & organization. Sequence Conservation.	http://www.ncbi.nlm.nih.gov/About/primer/genetics_genome.html
6	M	L5-Databases, NCBI http://www.ncbi.nlm.nih.gov/Entrez/tutor.html	http://www.ncbi.nlm.nih.gov/books/NBK21097/ Do overview of section headings.
7	T	Lab 3: DNA Master Gene Calling and Annotation of KyKar	DNA Master Annotation Guide pages 1-100
8	W	L6-Database searches, NCBI BLAST… http://blast.ncbi.nlm.nih.gov/Blast.cgi?CMD=Web&PAGE_TYPE=BlastDocs&DOC_TYPE=ProgSelectionGuide	http://www.ncbi.nlm.nih.gov/books/NBK21097/
13	M	**Exam 1 over L1-6**	
14	T	Lab 4: DNA Master Functional Annotation of KyKar	DNA Master Annotation Guide pages 101-120, 157-211
15	W	L7-Alignment methods and scoring matrices	
20	M	L8-Multiple sequence alignments	
21	T	Lab 5: Confirm KyKar Annotations	
22	W	L9-Evolutionary History: Synteny and comparative genomics	http://www.ncbi.nlm.nih.gov/About/primer/phylo.html
27	M	L10-Gene prediction and annotation. Gene Ontology.	
28	T	Lab 6: Work on Project Genomes	
29	W	L11-Defining Exons and alternative splicing, the role of ESTs	http://www.ncbi.nlm.nih.gov/About/primer/est.html
Mar.5-9		Spring Break	
12	M	**Exam 2 over L7-11**	
13	T	Lab 7: Work on Project Genomes	
14	W	L12-Protein secondary structure prediction and analysis	http://www.ncbi.nlm.nih.gov/About/primer/molecularmod.html
19	M	L13-Transmembrane protein predictions	
20	T	Lab 8: Work on Project Genomes	
21	W	L14-Protein tertiary structure analysis and prediction	

26	M	L15-Protein Structure-Function relationships 1	
27	T	Lab 9: Work on Project Genomes	
28	W	L16-Protein Structure-Function relationships 2	
Apr. 2	M	L17-Gene expression analysis 1	http://www.ncbi.nlm.nih.gov/About/primer/microarrays.html
3	T	Lab 10: Work on Project Genomes	
4	W	L18-Gene expression analysis 2	
9	M	**Exam 3**	
10	T	Lab 11: Work on Project Genomes	
11	W	L19-SNPs	http://www.ncbi.nlm.nih.gov/About/primer/snps.html
16	M	L20-Using SNPs	
17	T	Lab12: Work on Project Genomes	
18	W	L21-Systems Biology	
23	M	L22-Pathway analysis, KEGG …	
24	T	Lab13: Work on Project Genomes	
25	W	L23-Interactome, network analysis	
30	M	**Exam 4**	
May 1	T	Lab14: Work on Project Genomes	
2	W	Notebook check. Assemble Genome Presentations.	
May 8	T	Final Exam Project Genome Presentations, 1-3 PM	

Prerequisites: Introductory course in biology.
This course will explore the techniques and tools used to analyze genomic information. In practice, students will determine the quality of DNA sequence from a bacteriophage genome, define the locations of genes, annotate the location and function of those genes and prepare the annotated genome for submission to GenBank.

Required Texts.
Online SEA NGRI Part 2 In Silico manual from HHMI can be downloaded from the BlackBoard site.
Online DNA Master Annotation Guide can be downloaded from the BlackBoard site.
Lecture material is available as powerpoint presentations and .pdfs on the BlackBoard site.

Additional reading:
"Understanding Bioinformatics" by Marketa Zvelebil and Jeremy O. Baum 2008, Garland Science, may be used as a good reference if you need a text to read (I have not asked the WKU bookstore to stock it, so you will need to order it online).

Course Design
Mondays and Wednesdays the class meets for 1 hr and will be used mainly for interactive concept introduction. On Tuesdays the class will meet for 2 hours to analyze and annotate a bacteriophage genome. Groups will regularly present their results to the class and a final poster presentation will be made during the regularly scheduled final exam period.

Participation
Students are expected to read the online material found on Blackboard for the class period before attending class as outlined in the syllabus. Write down and bring questions to class. The
first part of class will be used to answer question. Each class period will have an assignment that will be started in class and may be completed and turned in at the beginning of the following class period.

Final Exam Project
A course sequence annotation project will be presented as a poster during the scheduled final exam for the course. Multiple pairs of students will be given a genomic sequence, towards the beginning of the semester, and they will be responsible for the assembly and complete annotation of the genome by the final exam period. Pursuit of additional phage bioinformatics questions beyond annotation are encouraged. Each set of annotators working on a genome will be responsible for checking the other pair's work and resolving differences.

Do Your Own Work and Use Proper Citation
All writings, programs and answers to questions throughout the course must be in your own words. **Do not share answers**.
If you want to quote either the text or an online source you must put " " around the quote and include the complete reference in ( ) after the sentence.
If you get ideas from a published source just include the reference in ( ) after the sentence describing the published material.
Failure to give proper credit (considered plagiarism), or extensive cutting/pasting from published sources or other students, will result in a grade of 0 for the assignment and will jeopardize you grade for the course.

Point Summary:

Exam 1 100
Exam 2 100
Exam 3 100
Exam 4 100
Daily Assignments up to 23 @ 5 pts each =115
Participation 40
Notebook 100
Project 200
Project Evaluations 20
Total points 875

Grades: A = 90-100%, B = 80-89.99%, C = 70-79.99%, D = 60-69.99%, F = 0 - 59.99%.

Policies
Academic Integrity - It is expected that each student will do his/her own work at all times and contribute equitably in all group projects.

Academic Misconduct - Dishonesty, in any form (cheating on quizzes or exams, plagiarism, copying another's assignment answers, etc.) will result in a failing grade.

Disabilities: "Students with disabilities who require accommodations (academic adjustments and/or auxiliary aids or services) for this course must contact the Office for Student Disability Services, Room 445, Potter Hall. The OFSDS telephone number is (270) 745-5004 V/TDD. Please DO NOT request accommodations directly from the professor or instructor without a letter of accommodation from the Office for Student Disability Services."

Withdrawals: If you wish to withdraw from the course you should do so by the dates mandated by the University. Be sure you are aware of these dates because credit for the course will not be changed after the university's designated time. You also cannot drop the class or Withdraw after the designated time. Be aware that it is YOUR responsibility to drop the class. Do not assume that I will do this for you.

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When you have finished reading this syllabus, you must send a signed email to your

instructor (claire.Rinehart@wku.edu) indicating whether or not you will abide by this syllabus and the prescribed policies.
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