Cover Page Note to the UMCES PCC and UMCES VPE Office

To help in the scheduling of courses please answer any of the following questions that apply:

1. What type of course is this? Please check which applies;

   ☐ A new course offering
   X A continued course offering (with modifications to the syllabus)
   ☐ A continued course offering (no changes)

2. Preferred days and times of the week. Please list 3 alternatives in order of preference:

   - First choice:
   - Second choice:
   - Third choice

3. Please indicate the frequency you plan to offer this course (e.g. odd falls or every spring):

   Even year spring semester.

4. Will you be (co-) teaching any other courses in the same semester?, if so please detail them:No

5. Are there any courses that you would like to avoid overlap with ? i.e. courses that you foresee a student of yours may want to take in the same semester? If so please list them:
   Please avoid Wed afternoons which is when our weekly seminar is scheduled.

6. Does your class have specific room or IT requirements?

An ability to connect to the UMCES network is required.

7. Are there any other course issues that you would like to make us aware of? For example, any other course time conflicts with any other of your activities?

PLEASE EMAIL YOUR COVER LETTER (AND SYLLABUS) TO: UMCESPCC@UMCES.EDU

University of Maryland
CENTER FOR ENVIRONMENTAL SCIENCE

Next-Generation Sequence Analysis

2 credits

MEES 618C
Spring

Course Objectives / Overview

If you are using sequencing in your thesis project, then this course is for you. The goal is to provide students with hands on experience with Next-Generation sequence datasets and tailor the instruction to further your research.

This course will provide a general background to sequence analysis and then move through a series of student-directed tutorials, mostly on the command line, working with your own datasets for your thesis. If you don't yet have data in hand, we can find comparable sequence files for you to work with to gain fluency. I will present my own current sequencing project in parallel with the students. In the previous classes we covered a wide range of projects including 16S amplicon sequencing, annotation and phylogeny, multiple bacterial genomes, transcriptome, eukaryotic genome, and annotation projects.

Expected Learning Outcomes

Ideally the student will be able to independently tackle sequence analysis projects for your thesis.
I expect students will leave with:
A general understanding of typical sequence analysis pitfalls and artifacts.
Familiarity and more fluency on the unix command line.
Understanding of how to structure your project to answer questions or visa versa.
Troubleshooting skills for installing, running and interpreting sequence analysis software.

Course Assessment / Grading

Each student will lead at least one sequence analysis tutorial.
Almost every class will involve a one slide presentation for all students.
Each student will create a sequence analysis blog, essentially a lab book of commands and results that will be shared with your peers. You will present results from your own project in class and the final product will be a single sequence analysis 'pipeline' figure describing both your methods and results.

INSTRUCTOR DETAILS:
Tsvetan Bachvaroff
bachvarofft@umces.edu
410 234 8849

CLASS MEETING DETAILS:
Dates:
Times:
Originating Site:
IVN bridge number:
(*******)
Phone call in number:
(***)
Room phone number:
(*****)

CURRICULUM FULLFILMENT:
MEES618C fulfills an elective MEES requirement.

Prerequisites
N/A

Teaching Assistant
N/A

Tentative Weekly Course Schedule

• indicates general assignments; (students) indicates student presenters.

Jan-25 Week 1 Syllabus, Login to server, Sanger sequencing, CLC & Sanger tutorial (Instructor)

Feb-1 Week2 Unix survival (Student) and Sanger artifacts (Instructor)

Feb-8 Week3 Outside data sources (GenBank and others), running blast, reformatting data, possible GO terms

Feb-15 Week 4 Assembly of next-gen data, read processing, unix piping. Instructor presents his project introduction.

•Feb-22 Week 5 Initial presentations on projects (4 students) and Student with RNA-seq to genome of Zebrafish

•Mar 1 Week 6 Initial project presentations continue. Guided visits to selected genome websites.

Week 7 Amplicon sequencing pipelines

Week 8 More on annotation, installing software

Week 9 Read mapping, 'variant' calling for pop gen

Week 10 Transcript assembly

Week 11 Genome assembly

•Week 12 Intermediate project presentations

Week 13 More on annotation: MEGAN; genome browsers

Week 14 Amazon cloud

•Week 15 Final presentations

•Final exam week: A graphic summary of your sequence analysis pipeline

Required textbooks, reading and/or software or computer needs

A laptop that can connect to the UMCES IT network.

Course Communication

Via email and google drive.

Resources

Campus Policies

The University of Maryland Center for Environmental Science has drafted and approved of various academic and research-related policies by which all students and faculty must abide.

Please see especially Policy III-1.00: Policy on Faculty, Student and Institutional Rights and Responsibilities for Academic Integrity.

Course-Specific Policies and Expectations