GMS6014 Application of Bioinformatics   Spring 2023 Syllabus

Credits:1

Course Director: Lei Zhou, Ph.D. (leizhou@ufl.edu)

  Office: CGRC-261 No formal office hours, appointment may be made by request.

Course web site: http://zhoulab.net/GMS6014/home.html

Course Description: This course is designed to help graduate students in molecular biology or related disciplines to understand the basis of bioinformatics applications, and to develop the necessary skills that will enable them to use these tools accurately and creatively in their research.

Prerequisite: GMS 6001 (BMS core course), or equivalent, or permission of Dr. Zhou

Course Objectives: Topics covered in the course include: Biological databases, Sequence and bio-information representation, RNA-Seq, ChIP-Seq data analysis. Sequence comparison and similarity search, Identification of protein motifs and transcription factor binding site, protein structure prediction, phylogenetic analysis, manipulation and analysis of genomic sequences, Etc. In addition to lectures, students will participate in surrogate bioinformatics projects and gain hands-on experience in the following areas: advanced database query, Identifying bioinformatics application and resources over the web, Installation and utilization of free bioinformatics applications, such as ClustalX and Blast, protein domain/motif analysis, identifying and analysis of DNA regulatory sequences, RNA-Seq and ChIP-Seq analysis, etc.

Place/time: CGRC-Rm291, 12:00 - 1:00 pm MWF.   Module 2: 2/10-3/17 (13 class meetings).

Computer: A laptop computer with wireless internet connection is required for all classes.

Grading: Grading will be based on homework (50%), and attendance + participation (50%).

Professionalism: Students are expected to attend all classes, arrive at class on time, be courteous and helpful to other students and instructors, pay attention, and be prepared to discuss assigned reading or other topics open for discussion. Cell phones must be silenced and put away during class.

Accommodations for Students with Disabilities: According to UF policy, students requesting classroom accommodation must first register with the Dean of Students Office which will provide documentation to the student, who must then provide it to the Course Director when requesting accommodation.

References:

  "**Bioinformatics Data Skills: Reproducible and Robust Research with Open Source Tools.**" by Vince Buffalo (2015, O'Reilly; Amazon Link) – *this book is more useful for those who already had some exposure with the Linux (Unix) system but want to be more efficient.*

  "**Practical Computing for Biologist**" by Haddock & Dunn. (2011, Sinauer; Amazon Link) – *if you don't know the difference between a .txt file vs a .docx file or have never executed a command on a command line interface, this book is good to get you started.*

Academic Honesty: It is each student's responsibility to adhere to UF policies regarding academic integrity and the UF Student Conduct and Honor Code: https://sccr.dso.ufl.edu/policies/student-

honor-code-student-conduct-code/. Cheating, lying, or plagiarism is unacceptable and will invoke consequences.

Lecturers:
Dr. Raad Gharaibeh
Dr. Matt Gitzendanner
Dr. Lei Zhou (course director)

Textbook: Not required. See "References" above for recommended reading.

	Date	Topic	Lecturer	Location
1	2/10	Introduction	LZ	CGRC-291
2	2/13	Resources for bioinformatics, command line environment in Linux.	LZ	CGRC-291
3	2/15	HiPerGator	MG	CGRC-291
4	2/17	Standalone tools and Python	LZ	CGRC-291
5	2/20	Basis of sequence comparison	LZ	CGRC-291
6	2/22	Motifs and protein families	LZ	CGRC-291
7	2/24	Phylogenetic tools	LZ	CGRC-291
8	2/27	Protein structure & AlphaFold	LZ	CGRC-291
9	3/1	High throughput sequencing (HTS) data analysis	LZ	CGRC-291
10	3/3	RNA-Seq and expression profiling	LZ	CGRC-291
11	3/6	Analysis of genome and genomic sequences	LZ	CGRC-291
12	3/8	Intro to R & machine learning	RG	CGRC-291
13	3/10	GO, pathways, and functional genomics	LZ	CGRC-291
	3/13-17	UF spring break		
	3/22	Final homework assignment due	LZ	CGRC-291