GMS6014 Application of Bioinformatics Spring 2025 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 website: 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 comparison and similarity search, protein structure prediction, phylogenetic analysis, genomics, etc. In addition to lectures, students will gain hands-on experience in the following areas: advanced database search; identifying bioinformatics applications and resources over the web; installation and utilization of free bioinformatics applications such as BLAST; structure prediction with Alphafold2, RNA-Seq gene expression profiling analysis, etc.

Place/time: CGRC-Rm291, 12:00 - 1:00 pm MWF. Module 2: 2/17-3/14 (12 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 during 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. Matt Gitzendanner

Dr. Lei Zhou (course director)

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

	Date	Topic	Lecturer	Location
1	**2/17**	Introduction	LZ	CGRC-291
2	**2/19**	Resources for bioinformatics, command line environment in Linux.	LZ	CGRC-291
3	**2/21**	HiPerGator	MG/LZ	CGRC-291
4	**2/24**	Set up your computer for bioinformatics; Standalone tools and Python	LZ	CGRC-291
5	**2/26**	Basis of sequence comparison	LZ	CGRC-291
6	**2/28**	Motifs and protein families	LZ	CGRC-291
7	**3/3**	Phylogenetic tools	LZ	CGRC-291
8	**3/5**	Protein structure & AlphaFold	LZ	CGRC-291
9	**3/7**	High throughput sequencing (HTS) data analysis	LZ	CGRC-291
10	**3/10**	RNA-Seq and expression profiling Representation of genomic data	LZ	CGRC-291
11	**3/12**	Analysis of genome and genomic sequences; GO, pathways, and functional genomics	LZ	CGRC-291
12	**3/14**	Machine learning and AI in bioinformatics	LZ	CGRC-291