



BCB 5250 Introduction to BIOINFORMATICS II

Instructors:

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Class Meeting Time/Location:

Time: TR 11:00 am – 12:15 pm

Location: 117 Ritter Hall

Credits/Pre-requisites:

3 Credits

BCB 5200 (Into to Bioinformatics I) and undergraduate level genomics are required.

Course Description:

Introduction to Bioinformatics I and II are designed to introduce senior/graduate students to the fundamental concepts, methods, and research topics in Bioinformatics for analyzing biological and health data. Introduction to Bioinformatics I course will cover introduction of Bioinformatics, introduction of computer skills for Bioinformatics, Bioinformatics database, sequence alignment, phylogenetic analysis, gene expression analysis, protein analysis, modeling and simulation of biological pathways, and systems biology. Introduction to Bioinformatics II will intensely cover omics (genomics, transcriptomics, and metagenomics) research topics especially including genome assembly, RNA-Seq analysis, and genome identification and annotation of metagenomic samples. In the Introduction to Bioinformatics II course, students will be divided into groups and work on their selected projects. Exciting cutting-edge research topics in Bioinformatics will be proposed to students.

Learning Objectives:

After successfully complete this course, students are expected:

- 1) Know fundamental concepts of bioinformatics
- 2) Understand underlying basic bioinformatics algorithms
- 3) Use bioinformatics applications and tools to study omics data
- 4) Recognize how to apply different bioinformatics tools
- 5) Write scripts to automate existing applications
- 6) Understand cutting edge bioinformatics research topics
- 7) Ability to propose new algorithms and implement software tools for them

Course Textbook/Reading Materials (optional):



No textbook is required for this course. Assigned materials will be posted on class website. Optional reference books are as below:

- R Cookbook by Paul Teetor (O'Reilly Cookbooks)
- Bioinformatics Programming Using Python: Practical Programming for Biological Data (O'Reilly)
- Bioinformatics Data Skills: Reproducible and Robust Research with Open Source Tools 1st Edition by Vince Buffalo (O'Reilly)
- An Introduction to Bioinformatics Algorithms (Computational Molecular Biology) 1st Edition by Neil C. Jones (Cambridge, Mass. : MIT Press, c2004)
- Algorithms on Strings, Trees and Sequences: Computer Science and Computational Biology 1st Edition by Dan Gusfield (Univ. of Cambridge)
- Bioinformatics and Functional Genomics 2nd or 3rd Edition by Jonathan Pevsner (Hoboken, N.J. : Wiley-Blackwell, c2009)

Assignment and Grades:

Assignments: There will be multiple assignments in a variety of format such as (but not exclusively) in-class assignments, online assignments, and take home assignments. If you miss an assignment of any kind (in class or online), there is NO make-up. You will not receive any credit for assignments turned in late. If you receive a 0 for an assignment due to an academic integrity violation, that 0 will count toward your final grade and may not be dropped.

Exams: There will be no exams. Instead of exams, literature review presentation will be held before/during midterm exam period and term project presentation will be held before the final exam period.

Grading Scheme

Course Item	Percent of Final Grade
Homework Assignments	40%
Literature Review Presentation	20%
Final Project and Presentation	40%
Total	100%

Final grades for the course will be based on the following scale. The instructor reserve the right to make adjustments to grades based on overall performance in the course. There will be no opportunity for “extra credit” to improve grades that have already been earned. Bargaining for grades will not be tolerated.

Letter Grade	F	D	C-	C	C+	B-	B	B+	A-	A
%	<60	≥60 <70	≥70 <73	≥73 <77	≥77 <80	≥80- <83	≥83 <87	≥87 <90	≥90 <93	≥93

Attendance policy:



You are expected to attend every lecture and take notes. There is no makeup for exams unless you demonstrate in advance (and agreed by the instructor) that a significant life-event prevents you from attending class or if you have a documented emergency. If you schedule something else during a class when you take an exam, you will get a zero for that grade.

ACADEMIC INTEGRITY AND HONESTY

Students are expected to be honest in their academic work. The University reserves the right to penalize any student whose academic conduct at any time is, in its judgment, detrimental to the University. Such conduct shall include cases of plagiarism, collusion, cheating, giving or receiving or offering or soliciting information in examinations, or the use of previously prepared material in examinations or quizzes. Violations should be reported to your course instructor, who will investigate and adjudicate them according to the policy on academic honesty of the College of Arts and Sciences. If the charges are found to be true, the student may be liable for academic or disciplinary probation, suspension, or expulsion by the University. Students should review the College of Arts and Sciences policy on Academic Honesty (<http://www.slu.edu/x16363.xml>).

STUDENTS WITH SPECIAL NEEDS-DISABILITY SERVICES

In recognition that people learn in a variety of ways and that learning is influenced by multiple factors (e.g., prior experience, study skills, learning disability), resources to support student success are available on campus. Students who think they might benefit from these resources can find out more about:

- Course-level support (e.g., faculty member, departmental resources, etc.) by asking your course instructor.
 - University-level support (e.g., tutoring/writing services, Disability Services) by visiting the Student Success Center (BSC 331) or by going to www.slu.edu/success.
- Students who believe that, due to a disability, they could benefit from academic accommodations are encouraged to contact Disability Services at 314-977-8885 or visit the Student Success Center. Confidentiality will be observed in all inquiries.

Course instructors support student accommodation requests when an approved letter from Disability Services has been received and when students discuss these accommodations with the instructor after receipt of the approved letter.

COURSE CONTENT DISCLAIMER

In this course, students may be required to read text or view materials that they may consider offensive. The ideas expressed in any given text do not necessarily reflect the views of the instructor, the English Department, the Writing Program, or Saint Louis University. Course materials are selected for their historical and/or cultural relevance, or as an example of stylistic and/or rhetorical strategies and techniques. They are meant to be examined in the context of intellectual inquiry of the sort encountered at the university level.

WRITING CENTER

I encourage you to take advantage of the writing services in the Student Success Center; getting feedback benefits writers at all skill levels. Trained writing consultants can help



with any writing, multimedia project, or oral presentation. During the one-on-one consultations, you can work on everything from brainstorming and developing ideas to crafting strong sentences and documenting sources. These services do fill up, so please make an appointment! For more information, or to make, change, or cancel an appointment, call 977-3484 or visit <http://www.slu.edu/writingservices.xml>.

**Tentative schedules**

Week	Dates	Topic	Lecturer
1	01/12/2016	Introduce Sequencing Techniques	Lin
	01/14/2016	Genome Assembly	Ahn
2	01/19/2016	Genome Assembly	Ahn
	01/21/2016	Genome Assembly	Ahn
3	01/26/2016	Lab	Ahn
	01/28/2016	Variant Calling	Ahn
4	02/02/2016	Gene Prediction	Ahn
	02/04/2016	Lab	Ahn
5	02/09/2016	Metagenomics	Ahn
	02/11/2016	Metagenomics – De novo assembly	Ahn
6	02/16/2016	Metagenomics – Binning	Ahn
	02/18/2016	Metagenomics – Taxonomy Profiling	Ahn
7	02/23/2016	Lab	Ahn
	02/25/2016	Lab	Ahn
8	03/01/2016	Literature Review Presentation	Lin & Ahn
	03/03/2016	Literature Review Presentation	Lin & Ahn
9	03/08/2016	Spring Break (No Class)	
	03/10/2016	Spring Break (No Class)	
10	03/15/2016	Transcriptomics analysis-overview	Lin
	03/17/2016	Reference based assembly of transcriptome – Tophat -1	Lin
11	03/22/2016	Reference based assembly of transcriptome – Tophat -2	Lin
	03/24/2016	Transcriptomics analysis –Cufflinks -1	Lin
12	03/29/2016	Transcriptomics analysis –Cufflinks -2	Lin
	03/31/2016	De novo assembly of transcriptome – Trinity -1	Lin
13	04/05/2016	Transcriptomics analysis –edgeR 1	Lin
	04/07/2016	GO enrichment analysis	Lin
14	04/12/2016	KEGG enrichment analysis	Lin
	04/14/2016	GO, KEGG lab	Lin
15	04/19/2016	Comparative genomics analysis	Lin
	04/21/2016	Comparative genomics analysis - lab	Lin
16	04/26/2016	Term Project Presentation	Lin & Ahn
	04/28/2016	Term Project Presentation	Lin & Ahn
		Final (No Final Exam)	

Literature review presentation requires students to ask questions!