Genomics and Bioinformatics – GMS6231
(3 credits)

COURSE DESCRIPTION:
Principles of genomic characterization and bioinformatic analysis of eukaryotes, including an overview of analytical platforms, computational tools, experimental design, analysis methods and databases used to study DNA sequence, gene expression and protein levels.

COURSE OBJECTIVES: Understanding the principles of genomic analysis of eukaryotes at various levels (DNA, mRNA and protein), and bioinformatics methods used in these analysis.

MEETING PERIODS: Tuesday (11:45-1:40) & Thursday (11:45-12:35)

MEETING ROOM: UFGI 451A&B (4th floor of UF Genetics and Cancer Research Complex, between the Cancer and Genetics wings)

OFFICE HOURS: By appointment.

COURSE WEBSITE: http://bioinformatics.ufl.edu/courses/GMS6231/

COURSE PREREQUISITE:
STA6166 & STA6167 (Statistical Methods in Research I & II) and PCB5065 (Advanced Genetics) or permission from the instructor.

INSTRUCTORS:

Dr. Sixue Chen
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Dr. Lauren McIntyre
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Dr. Matias Kirst (Course leader)
School of Forest Resources and Conservation
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REFERENCES:
A Primer of Genome Sciences (3rd edition, 2009), by Greg Gibson and Spencer V. Muse, Sinauer Associates, ISBN: 0878932321 (suggested but not required).
Required reading will be indicated by the instructor throughout the semester.

GRADES:
The final grade will be composed by grades received in each of the three main sections of the course (30% each) and class participation (10%). Please note that the instructors of each section will describe the form of grading for their section, in the beginning of the course.
30% Genome sequencing, annotation and DNA sequence analysis (Kirst)
30% Transcriptomics (McIntyre)
30% Proteomics (Chen)
10% Class participation
The participation grade will be derived from involvement in discussions and assignments.

ACADEMIC HONESTY. As a result of completing the registration form at the University of Florida, every student has signed the following statement: "I understand that the University of Florida expects its students to be honest in all of their academic work. I agree to adhere to this commitment to academic honesty and understand that my failure to comply with this commitment may result in disciplinary action up to and including expulsion from the University".

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES: Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodations.

UF COUNSELING SERVICES: Resources are available on campus for students having personal problems or lacking clear career and academic goals, which interfere with their academic performance. These resources include:

1. University Counseling Center, 301 Peabody Hall, 2-1575, personal and career counseling;
2. Student Mental Health, Student Health Care Center, 2-1171, personal counseling;
3. Sexual Assault Recovery Services (SARS), Student Health Care Center, 2-1161, sexual assault counseling;
4. Career Resource Center, Reitz Union, 2-1601, career development assistance and counseling.

TENTATIVE CLASS SCHEDULE

Week	Day	Topic (Instructor)
1	Jan 7	Introduction, DNA sequencing (1st, 2nd and 3rd generation) (K)
	Jan 9	**Paper discussion topic:** Comparison of sequencing platforms (K)
2	Jan 14	DNA sequence alignment (K)
	Jan 14	**Paper discussion topic:** Comparison of performance of DNA sequence aligners (K)
	Jan 16	**Demo:** Server use and DNA sequence alignment (invited lecture)
3	Jan 21	Genome sequencing strategies and genome complexity reduction (K)
	Jan 23	**Paper discussion topic:** Genome complexity reduction and exome sequencing (K)
4	Jan 28	Genome structural and functional annotation (K)
	Jan 30	**Paper discussion topic:** Comparative genomics (K)
5	Feb 4	Genotyping tools and genotyping by sequencing (K)
	Feb 4	**Paper discussion topic:** SNP detection from sequencing reads using GATK (K)
	Feb 6	**Demo:** SNP detection from sequencing reads using GATK (invited lecture)
	Feb 12	**Exam: Genomic sequencing, assembly and annotation and sequence diversity**
6	Feb 11	Transcriptome analysis tools (M+K)
	Feb 11	RNA-seq algorithms (M+R)
	Feb 13	**Paper discussion:** RNA-seq – transcriptional variation (All)
7	Feb 18	**Project 3:** RNA-seq mapping (Due date Mar 5) (R)
	Feb 20	Differential gene expression and GLM (M)
8	Feb 25	**Project 4:** Transcriptome analysis (Due date Mar 28) (M+R)
	Feb 27	**Project 4:** Transcriptome analysis (Due date Mar 28) (M+R)
	Mar 12	**Exam: Transcriptomics**
	Mar 1-8	Spring Break – No Class
9	Mar 11	Proteomics Introduction (C)
	Mar 13	Protein separation and fractionation (C)
10	Mar 18	Mass spectrometry (C)
	Mar 20	Protein database and MS data analysis (C)
11	Mar 25	Proteomics applications (C)
	Mar 27	Introduction to Proteomics Databases (C)
12	Apr 1	ICBR Proteomics Lab visit
	Apr 1	**Paper discussion:** Proteomics (All)
	Apr 3	Proteomics analysis tools (M)
	Apr 9	**Exam: Proteomics**
13	Apr 8	TBD
	Apr 10	TBD
14	Apr 15	TBD
	Apr 17	TBD
15	Apr 22	Course evaluation