



## BIOL406 – Genomics Fall 2025

This course covers the fundamental theories and bioinformatic methodologies underlying comparative, evolutionary, and functional genomics, with examples from bacteria, plants, animals and humans.

### ***Instructor***

Dr. Stavrinides  
john.stavrinides@uregina.ca  
LB250

### ***Time***

TR 10:00-11:15pm

### ***Location***

CL112

### ***Resources***

Lecture notes, assignment information, discussion forum: <https://urcourses.uregina.ca>

### ***Free Online Textbooks***

Genomes	<a href="http://www.ncbi.nlm.nih.gov/books/NBK21128/">http://www.ncbi.nlm.nih.gov/books/NBK21128/</a>
Sequence - Evolution – Function	<a href="https://www.ncbi.nlm.nih.gov/books/NBK20260/">https://www.ncbi.nlm.nih.gov/books/NBK20260/</a>
The Pangenome	<a href="https://www.ncbi.nlm.nih.gov/books/NBK558825/">https://www.ncbi.nlm.nih.gov/books/NBK558825/</a>
Comparative Genomics	<a href="https://www.ncbi.nlm.nih.gov/books/NBK1732/">https://www.ncbi.nlm.nih.gov/books/NBK1732/</a>

### ***Grade Allocation***

	Undergraduate	Graduate
*Exam I	25%	20%
*Exam II	25%	20%
*Exam III	25%	20%
Assignment (Outline)	5%	5%
Assignment (Full Report)	<u>20%</u>	<u>35%</u>
TOTAL	100%	100%

*\*required course component*

### ***Exams***

- All exams are in class
- Each covers the lecture material since the last exam, and while largely non-cumulative, many concepts flow across the entire course.
- Save your exam dates. There is no final exam. There are no make-up exams.
- If a student misses an exam for any reason, the student must email the instructor and arrange to write the exam within 48 hours of the scheduled exam time.

### ***Course Policies***

- 1) The passing grade for this course is 50%.
- 2) You must report any issues or discrepancies with any grade within 20 business days of receiving that grade.

- 3) Students who fail to write an exam, or fail to make arrangements to write it within 48 hours of the scheduled exam date will be assigned a grade of zero for that exam. The value of the exam cannot be transferred to any other course component. There are no make-up exams. Students cannot do extra work or assignments to improve an exam grade.
- 4) The grading scheme for the course is the same for all students in the course. Grades cannot be increased by doing extra work, and the grade allocations for each course component cannot be adjusted or altered.
- 5) There are no extensions on the assignments.
- 6) The use of generative AI tools in the preparation or completion of assignments for this course is prohibited, and any evidence of such use is considered academic misconduct and will be subject to academic penalties.

### ***Assignment (Outline + Full Review)***

You will write a mini-review on a topic in genomics. A mini-review provides an overview of the **latest** developments in a particular subject area. Because of this, the majority of the literature used for a mini-review will be within the last 10 years. Your mini-review should follow the structure of mini-reviews found in the journal, Genomics. Here is an example article:

<https://www.sciencedirect.com/science/article/pii/S0888754315300410>

Topics can include new approaches for genome analyses, new genomes of a particular group, ancient DNA, and advances in human genomics. You can request help from the instructor if you are having difficulty selecting a topic. Here's a good place to start if you do not know what fields are included in genomics: <https://en.wikipedia.org/wiki/Genomics>. See the "See also" section at the bottom.

#### Outline (5%)

You will first select a topic in genomics, and create a rough outline of what will be covered. It should look something like this:

#### ***Advances in Genome Sequencing***

- 1) First generation
  - a. Sanger (Sanger et al, 1975; Holley et al. 1964; Maxam et al, 1977)
    - i. Manual (Maxam, et al 2020)
    - ii. Automated ([insert references])
- 2) Second generation
  - a. Pyrosequencing ([insert references])
  - b. Illumina ([insert references])
  - c. SOLiD ([insert references])
  - d. Ion Torrent ([insert references])
- 3) Third generation
  - a. PacBio ([insert references])
  - b. Nanopore ([insert references])

#### References (use formatting style of the journal "Genomics")

1. R.W. Holley, J.T. Madison, A. Zamir. **A new method for sequence determination of large oligonucleotides.** Biochem. Biophys. Res. Commun., 17 (1964), pp. 389-394
2. Sanger, A. Coulson. **A rapid method for determining sequences in DNA by primed synthesis with DNA polymerase.** J. Mol. Biol., 94 (1975), pp. 441-448
3. A.M. Maxam, W. Gilbert. **A new method for sequencing DNA.** Proc. Natl. Acad. Sci. U. S. A., 74 (1977), pp. 560-564

Submit your outline on URCourses using the Assignment Outline Submission link, as either a PDF (generated electronically, and not scanned) or a Word DOC/DOCX.

***The submission portal will close at 11:59pm on the due date. Please submit before then.***

Evaluation

Content, Relevance of Subtopics	2%
Literature Used, Comprehensiveness	2%
Layout, Structure, Flow	<u>1%</u>
TOTAL	5%

Full Review (20%)

Your mini-review should be structured using key headings, and should incorporate any feedback you received on your outline. You do not need an abstract.

Title – provides a description of the mini-review

Introduction – provides appropriate background to the topic. This section should set up the rationale for the review, and often concludes with a thesis statement. “In this review, we will highlight....”.

[other headings as appropriate] – create logical subdivisions for your mini-review to provide structure. See outline example above.

Conclusions – state the major conclusions of your review

References – use the referencing style and citation style of the journal, Genomics:

<https://www.elsevier.com/journals/genomics/0888-7543/guide-for-authors>

The final document should not exceed 4000 words (including references). Please use Times New Roman 12 pt (or Arial 11 pt). There should be no title page, but include a descriptive title at the top of the page, and your name and student number in the header. You may include figures and tables that summarize important information or concepts. These should be your own figures and tables.

References should be formatted in the style of the journal, Genomics. There is no limit to the number of references, but you may not use web pages or web-only sources. All references should come from the primary literature. Use Pubmed for your searches if you do not have another preferred database: <https://pubmed.ncbi.nlm.nih.gov/>. Web of Science is another excellent database, since it allows you to see who has cited a particular article.

Submit your assignment on URCourses using the Assignment Submission link, as an electronically generated PDF or a Word DOC/DOCX. Your assignment will be analyzed by Turnitin, and will be given a similarity score. If this score is 20.1% or greater, portions of your report may be too similar to other submissions, so may want to revise and resubmit your assignment. Ensure that any revised versions are submitted before the deadline. Do not include direct quotes from any source. All students are responsible for ensuring that their assignments are in their own words, and include the appropriate citations when necessary. See the Course Policies about AI.

**Final assignments that deviate substantially from their outline will be assigned a grade of 0.**

Evaluation

Content (literature used, how comprehensive)	15%
Layout and Flow	2.5%
Writing style (clarity, spelling, grammar)	<u>2.5%</u>
TOTAL	20%

## Lecture Schedule

DATE		TOPIC
September	2	Introduction
September	4	Genes and Genomes I
September	9	Genes and Genomes II
September	11	Sequencing
September	16	Annotation and BLAST
September	18	PERL / Software
September	23	PERL / Software
September	25	PERL / Software
<b>September</b>	<b>30</b>	<b>HOLIDAY – NO CLASS</b>
<b>October</b>	<b>2</b>	<b>Exam I</b>
October	7	Introduction to NCBI/Genbank
October	9	Where do I begin? (Molecular Weight)
<b>October</b>	<b>10</b>	<b>Assignment outline due (11:59pm)</b>
October	14	Where do I begin? (Novel Element)
October	16	Where do I begin? (Format, Search)
October	21	Genome Analysis I
October	23	Genome Analysis II
<b>October</b>	<b>28</b>	<b>Exam II</b>
October	30	Alignments and Phylogenetics I
November	4	Alignments and Phylogenetics II
November	6	DEMO (Alignment + MEGA)
<b>November</b>	<b>10-14</b>	<b>BREAK – NO CLASS</b>
November	18	DEMO (Mr. Bayes)
November	20	Phylogenomics
<b>November</b>	<b>21</b>	<b>Mini-review due date (11:59pm)</b>
November	25	Metagenomics
November	27	Transcriptomics
<b>December</b>	<b>2</b>	<b>Exam III</b>
December	4	No class

## ***Plagiarism***

Plagiarism is using the words, ideas or thoughts of others and presenting them as your own. Any submissions that are plagiarized will receive a grade of zero.

All students must read “Recognizing and Avoiding Plagiarism” located here:

<https://www.uregina.ca/student/ssc/assets/docs/pdf/Recognizing-and-Avoiding-Plagiarism.pdf>

Students must also review the Plagiarism Spectrum located here:

<https://www.turnitin.com/static/plagiarism-spectrum/>

## ***Student Conduct***

This course is governed by the Code of Student Conduct as described in the University of Regina Academic Regulations. Students who engage in plagiarism, cheating, coordinating during exams or quizzes, or any other type of misconduct outlined in the Academic Regulations will be subject to disciplinary action.

## ***Accommodations***

Students in this course who may require specialized accommodations should contact the Center for Student Accessibility (<https://www.uregina.ca/student/accessibility/>).