**SCB207 Genomics and Bioinformatics** (**3 credits, 3 hours)**

**The City University of New York**

**LaGuardia Community College**

Prerequisite: SCB201 General Biology I, MATH 115

Requirements: 1 lecture (3 hours) in the computer lab per week.

***I. Course Description***

This course is a computer laboratory-based interdisciplinary course that introduces the principles of genomics and bioinformatics. Topics include genomics science vocabulary and application in annotation and trascriptiomics, synthesizing and interpreting genomics information, formulating questions and testing hypotheses, detecting reasoning, and application of genomic science to medicine, agriculture, and society.

***II. Course Objectives***

1. Interpret concepts and proficiently use vocabulary related to genomics science and bioinformatics.

2. Describe the Human Genome Project.

3. Demonstrate genetic mapping, sequencing, annotation, and major databases of Bioinformatics.

4. Define genomic evolution.

5. Describe the genomic features of prokaryotes, viruses, and eukaryotes.

6. Compare and contrast genomics.

7. Explain the impacts of genomics on human health and disease.

8. Interpret transcriptomics, proteomics, metabolomics, and systems biology.

9. Demonstrate experimental approaches that have led to the development of genomics science.

10. Write lab reports on Bioinformatics subjects using the correct vocabulary.

11. Synthesize and interpret genomics information from numerous sources.

12. Formulate questions and testable hypotheses in the context of genomic data.

13. Demonstrate integrative learning and global learning skills by explaining how genomics is relevant to medicine, agriculture, and society.

14. Demonstrate critical thinking, problem-solving, and written communication skills through written assignments.

***III. Recommended Textbook***

### Introduction to Genomics. Arthur Lesk. Third edition (2017), ISBN: 978019875483, Oxford University Press; Includes customized resources and handouts

***IV. Course Requirements:***

You will need to attend class regularly and arrive on time. If you are counted absent for more than six hours of the course, you will be automatically failed by CUNY. Two late arrivals count as one absence. You are late if you arrive after attendance is taken. Keep in mind that if you arrive late you need to make sure I count you late rather than absent by talking to me after class. Early departures without prior notice and leaving class for more than 5 minutes will count as absences. Absences are not excused unless accompanied by a written medical or emergency explanation.

***V. Course Grades and Grading Scale***

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| ***COURSE COMPONENT*** | ***The percentage towards COURSE GRADE*** |
| In-class Quiz: 8 quizzes @ 1.5% each  | 12% |
| 3 lecture exams @ 11% each | 33% |
| 3 Project Report @ 10% each | 30% |
| Project Assay  | 5% |
| Final Exam  | 20% |
| **TOTAL** | **100%**  |

**Grading Scale**

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| **Percentage** | **Letter Grade** | **Description** |
| 93-100 | A (4.0) | Superlative |
| 90-92 | A- (3.7) | Excellent |
| 87-89 | B+ (3.3) | Very good |
| 83-86 | B (3.0) | Good |
| 80-82 | B- (2.7) | Above Average |
| 77-79 | C+ (2.3) | Satisfactory |
| 73-76 | C (2.0) | Average |
| 70-72 | C- (1.7) | Minimum Effort |
| 67-69 | D+ (1.3) | Poor |
| 63-66 | D (1.0) | Very Poor |
| 60-62 | D- (0.7) | Barely Sufficient |
| 0-59 | F (0.0) | Insufficient |

Students are required to take all exams and no make-up exams will be given (without consultation). A zero (0) will be given for any examinations that cannot be taken on the day they are scheduled or where prior arrangements have not been made with the instructor. No personal calculators or cell phones will be permitted for use on any exam or quiz; use of any such device will earn you an automatic zero on the exam or quiz.

#### VII: College Policies

#### Policy on Academic Integrity:

The College has established an Academic Integrity Policy that describes procedures and penalties for students who are suspected of academic dishonesty. Academic dishonesty is prohibited in the City University of New York and is punishable by penalties ranging from a grade of F on a given test, research paper, or assignment, to an F in the course or suspension or expulsion from the College. Academic dishonesty includes cheating, plagiarism, Internet plagiarism, obtaining unfair advantages, falsification of records and official documents, and misconduct in internship or group assignments. If it is found that you have used online sources inappropriately by copying and pasting in part or in whole from previously written essays, texts, or web pages, you will be reported in accordance with LaGCC’s Academic Integrity Policies. It is better to err on the side of caution than risk a failing grade. Simply forgetting to cite your sources still counts as plagiarism.

It is acceptable to work on homework assignments with other students. However, all homework assignments must be written individually. Homework assignments that are very similar and/or differ only in stylistic changes or wordings are UNACCEPTABLE. Students with even part of one homework assignment that is very similar to another’s will receive a ZERO for the ENTIRE recitation grade (i.e., for 30% of your grade). DO NOT EVEN THINK ABOUT EMAILING YOUR HOMEWORK ASSIGNMENT TO SOMEONE ELSE OR LETTING SOMEONE COPY YOUR HOMEWORK.

No late assignment is accepted. If you are absent from the class, you need to hand in or email your assignment prior to class start time.

**Access and Accommodations:**

To ensure that students with disabilities have equal access to its programs and services, if you have a disability of any form, please contact the Office for Students with Disabilities (OSD: (M-102; <http://www.lagcc.cuny.edu/osd/>; tel: 718.482.5279; email: OSD@lagcc.cuny.edu.)). They provide advocacy to ensure access to all college programs and will work with me to make sure you have every tool you need to succeed.

\*\*If you have any other special circumstances such as religious or military obligations that could impact your participation in this course at any time throughout the semester, please bring it to my attention during the first week of class. All requests are confidential.

***VIII: Course Calendar***

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| Week 1  | The Human Genome Project; Introduction to Bioinfromatics database, including, but not limited to, BLAST, FlyBase, Genome Browser, GenMapp, and Galaxy. |
| Week 2  | Mapping, Sequencing, Annotation, and Databases; Introduce Project One: formulate research hypothesis and methods; Quiz 1.  |
| Week 3 | Genomes of Prokaryotes and Viruses; Project One continued; Quiz 2. |
| Week 4 | Genomes of Eukaryotes; Promoter, splicing intron‐exon boundaries; Begin Project Two: topics include, but are not limited to, comparative Genomics; formulate research hypothesis and methods; Exam 1; Project One due. |
| Week 5 | Comparative Genomics; Project Two continued; Quiz 3. |
| Week 6  | The central dogma of biology, promoter/enhancer organization in the regulatory regions of eukaryotic genes, isolating total RNA and polyA RNA, nature of data in the database; Project Two continued; Quiz 4. |
| Week 7  | Impact of Genomics on Human Health and Disease; Begin Project Three: topics include, but are not limited to, genetic and protein interactions, interaction map using bioinformatics database; Quiz 5; Project Two due. |
| Week 8  | Affymetrix technology to measure and compare gene expression data; Project Three continued; Exam 2. |
| Week 9  | How to make biological sense of microarray data: analysis of individual genes and groups of genes; Genomics and pathways; Project Three continued; Quiz 6. |
| Week 10 |  Transcriptomics and Proteomics; Project Three continued; Quiz 7. |
| Week 11  | Metabolomics; Begin working on assay discussing the impact of genomics and technology on human health and disease; Exam 3; Project Three due. |
| Week 12 | Systems Biology; Current technology in Bioinformatics; Quiz 8 |
| Final Week  | Final Exam Final assay is due. |

*Please note the instructor reserves the right to revise this syllabus in any way, at any time.*