

GENO 8231 – Introduction to Genomics, Proteomics and Bioinformatics

COURSE AND CONTACT INFORMATION

Course: Department of Genomics and Precision Medicine, Introduction to Genomics Proteomics and Bioinformatics, GENO 8231

Semester: Spring, 2019

Time: [REDACTED]

Location: WebEx Meeting

INSTRUCTORS

Name: Ljubica Caldovic, Ph.D., Hiroki Morizono, Ph.D.

Campus Address: Children's National Medical Center, 111 Michigan Ave, NW, Genetic Medicine Center (5th floor Research) Suite 5700, Washington, DC 20010

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Office hours: **Wednesdays 3-5 pm** via WebEx

COURSE DESCRIPTION

The goal of these classes is to teach students how to implement genomics, proteomics and bioinformatics approaches to answer specific questions about a biological system. Methods and applications in genomics, proteomics and bioinformatics will be introduced and discussed with students. Emphasis will be placed on quantitative proteomics, interpretation of next-generation sequencing results, and bioinformatic tools and approaches that are used for genomic and proteomic analyses. Finally, applications to study human disease (e.g. metabolic disorders, neurodegenerative diseases, cancer, and infectious diseases) will be also covered.

COURSE PREREQUISITE(S)

Biochemistry and Molecular Biology

LEARNING OUTCOMES:

As a result of completing this course, students will be able to:

1. Become familiar with the principles of genomics and proteomics methods.
2. Test hypotheses using genomics and proteomics approaches.
3. Know where to obtain bioinformatic tools and how to evaluate genomics and proteomics data.

TEXTS

Much of the material presented will be prepared from existing literature. The following text book: Practical Computing for Biologists, by Steven H.D. Haddock, Casey W. Dunn, Sinuauer Associates Inc, Sunderland, 2011, ISBN 978-0-87893-391-4 will be useful for understanding bioinformatics concepts covered in lectures.

Other resources: Students are encouraged to visit the NIH Proteomics Interest Group website and choose topics of interest. Several interesting videocasts on proteomic related topics are continuously archived in this web site (<http://proteome.nih.gov/archives.html>). NIH has an archived BD2K lectures on Data Science. Additional resources will be added to the Blackboard site for this course.

AVERAGE MINIMUM AMOUNT OF OUT-OF-CLASS INDEPENDENT LEARNING EXPECTED PER WEEK

This is a 3-credit graduate level course. Required reading for the meetings and written response papers or projects are expected to take up, on average, 7 hours (350 minutes) per week.

WEEK-BY-WEEK SCHEDULE OF TOPICS TO BE PRESENTED

1. Jan 14, 2021 – Introduction, syllabus, DNA sequencing, class project; HW1; Caldovic
2. Jan 21, 2021 – Databases: NCBI, UniProt, UCSC Genome Browser...; HW2; Morizono
3. Jan 28, 2021 – DNA sequence analysis; HW3; Morizono
4. Feb 4, 2021 – Protein sequence analysis; Midterm; Morizono
5. Feb 11, 2021 – Regular Expressions; Morizono
6. Feb 18, 2021 – Genomics: genome sequencing; Caldovic
7. Feb 25, 2021 – Comparative genomics; Caldovic
8. March 4, 2021 – Gene expression; Caldovic
9. March 11, 2021 – Functional genomics; Midterm due; Final assignment; Caldovic
- March 18, 2021 – Spring Break
10. March 25, 2021 – Microbiomes; Caldovic
11. April 1, 2021 – Introduction to proteomics; Caldovic
12. April 8, 2021 – Quantitative proteomics; Caldovic
13. April 15, 2021 – Proteomics: post-translational modifications; Caldovic
14. April 22, 2021 – Proteomics: protein-protein interactions; Discussion of the class project; Caldovic
- May 7, 2019 – Final exam due at 5 pm

ASSIGNMENTS

Students complete a project that consists of database searches, retrieval of data from databases, analysis of the data, visualization of results and writing materials and methods and results sections for a publication. Assignments include three homework assignments, a midterm and a final exam.

GRADING

Final grade is based on a combination of assignments (50%) and in class discussion of assigned papers (50%).

CLASS POLICIES

Attendance policy: Mandatory

Please inform instructors if you cannot attend the class and arrange for a make-up assignment

University policies:

University policy on observance of religious holidays

In accordance with University policy, students should notify faculty during the first week of the semester of their intention to be absent from class on their day(s) of religious observance. For details and policy, see: students.gwu.edu/accommodations-religious-holidays. Academic integrity code

Academic Integrity

Academic Integrity is an integral part of the educational process, and GW takes these matters very seriously. Violations of academic integrity occur when students fail to cite research sources properly, engage in unauthorized collaboration, falsify data, and in other ways outlined in the Code of Academic Integrity. Students accused of academic integrity violations should contact the Office of Academic Integrity to learn more about their rights and options in the process. Outcomes can range from failure of assignment to expulsion from the University, including a transcript notation. The Office of Academic Integrity maintains a permanent record of the violation.

More information is available from the Office of Academic Integrity at studentconduct.gwu.edu/academic-integrity. The University's "Guide of Academic Integrity in Online Learning Environments" is available at studentconduct.gwu.edu/guide-academic-integrity-online-learning-environments. Contact information: rights@gwu.edu or 202-994-6757.

Use of Electronic Course Materials and Class Recordings

Students are encouraged to use electronic course materials, including recorded class sessions, for private personal use in connection with their academic program of study. Electronic course materials and recorded class sessions should not be shared or used for non-course related purposes unless express permission has been granted by the instructor. Students who impermissibly share any electronic course materials are subject to discipline under the Student Code of Conduct. Please contact the instructor if you have questions regarding what constitutes permissible or impermissible use of electronic course materials and/or recorded class sessions. Please contact Disability Support Services at disabilitysupport.gwu.edu if you have questions or need assistance in accessing electronic course materials.

Support for students outside the classroom

Virtual academic support

A full range of academic support is offered virtually in the spring 2021. See coronavirus.gwu.edu/top-faqs for updates.

Tutoring and course review sessions are offered through Academic Commons in an online format. See academiccommons.gwu.edu/tutoring

Writing and research consultations are available online. See academiccommons.gwu.edu/writing-research-help

Coaching, offered through the Office of Student Success, is available in a virtual format. See studentsuccess.gwu.edu/academic-program-support

Academic Commons offers several short videos addressing different virtual learning strategies for the unique circumstances of the fall 2020 semester. See academiccommons.gwu.edu/study-skills. They also offer a variety of live virtual workshops to equip students with the tools they need to succeed in a virtual environment. See tinyurl.com/gw-virtual-learning

Writing Center

GW's Writing Center cultivates confident writers in the University community by facilitating collaborative, critical, and inclusive conversations at all stages of the writing process. Working alongside peer mentors, writers develop strategies to write independently in academic and public settings. Appointments can be booked online. See gwu.mywconline.

Academic Commons

Academic Commons provides tutoring and other academic support resources to students in many courses. Students can schedule virtual one-on-one appointments or attend virtual drop-in sessions. Students may schedule an appointment, review the tutoring schedule, access other academic support resources, or obtain assistance at academiccommons.gwu.edu.

Disability Support Services (DSS) 202-994-8250

Any student who may need an accommodation based on the potential impact of a disability should contact Disability Support Services to establish eligibility and to coordinate reasonable accommodations. disabilitysupport.gwu.edu

Counseling and Psychological Services 202-994-5300

GW's Colonial Health Center offers counseling and psychological services, supporting mental health and personal development by collaborating directly with students to overcome challenges and difficulties that may interfere with academic, emotional, and personal success. healthcenter.gwu.edu/counseling-and-psychological-services

Safety and Security

In an emergency: call GWPD 202-994-6111 or 911

- For situation-specific actions: review the Emergency Response Handbook at safety.gwu.edu/emergency-response-handbook
- In an active violence situation: Get Out, Hide Out, or Take Out. See go.gwu.edu/shooterpret

Stay informed: safety.gwu.edu/stay-informed