

PLPA 5301 – Large Scale Omic Data in Plant Biology Fall 2017

Time and Location: Tue/Thu 1:30-2:45pm
144 McNeal Hall

Instructor: Cory Hirsch
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Office Hours: By appointment

Overview: Large Scale Omic Data in Plant Biology is a course for graduate and advanced undergraduate students interested in large scale datasets of plant research. Students will learn about new approaches and technologies researchers are using to advance plant biology, specifically focusing on different types of omic data. The topics to be covered in the course is not limited to but will include fundamentals, acquisition, and analyses of high-throughput DNA and RNA sequencing, functional and comparative genomics, proteomics, metabolomics, and phenomics (high-throughput plant phenotyping). The class will consist of lectures, discussions, group activities, and hands on analysis.

Student Learning Outcomes: *How Students Master the Principles of Large Scale Omic Data in Plant Biology.* Students master the fundamental principles of the highly advancing fields of multi-omic datasets in plant biology and how these are important individually and also connected together to understand plant growth and system processes. Students will begin by understanding the development of the specific omic field and the recent advances that have been made. The class will survey methods of how the different types of data are acquired and how the data is analyzed and interpreted. Each of the topics will be related back to previously discussed topics to illustrate the importance and necessity of contemporary researchers to have a working knowledge of these topics. Students will also have the opportunity to work hands-on with various data, describing the importance of the data, important research questions that can be addressed, and how to best visualization and present the data.

How Class Work Relates to Learning Outcomes. Early in the semester students will primarily focus on understanding sequence based techniques in plant biology. This section of the course will include active learning exercises where the students will explore real data to understand the fundamentals of a specific analysis technique. This will include describing how results are interpreted, what can be concluded, and the limitations of the technique as well. Their findings will form the basis of both in class discussions, forums managed through the class website, homework activities, and exam questions. In the later part of the course the students will focus more on the acquisition, analysis, and conclusions of ‘trait’ based omic data in plant biology. Again, the students’ findings and group work will form the basis of in class discussions, online forums, homework, and exam questions. The group work in the course will be completed in both small and larger group settings. The students will also develop a teaching module about a specific topic of choice covered in the course and present it to the class. This will allow the students to

fully synthesize the course material to a peer group audience, gain presentation feedback, and provide constructive criticism to others.

Prerequisites: Introductory course in genetics or consent of instructor.

Requirements: Everyone who attends class must formally enroll in the course. This includes students or others taking Large Scale Omic Data in Plant Biology for credit as well as those who plan to audit the course. As class participation is a formal part of the final grade, students must attend every class. If students are expecting to miss a class for a valid reason, please inform the instructor by email at least a day before the class is to be missed. This will allow a solution for receiving the material covered during the missed class period. As noted previously, active participation is expected during the class period. As such, assigned readings and homework should be completed before the start of the class period.

Readings: All required reading material for this course will be freely available to University of Minnesota students. The required readings will be posted and available to students through the class website.

Grading: Point totals for each graded output is only a projection. The instructor reserves the right to change point totals and add or remove elements as needed throughout the course with sufficient explanation to the students. There is no plan for extra credit assignments in the class.

200 points	Two in class exams (100 each)
50	Take home exam
100	In class projects
50	Class homework
50	Teaching project and presentation
50	Class participation

Exams: There will be two in class exams, each worth 100 points. Each exam will be preceded by a review session that will take place either during the class period immediately preceding the exam period or during scheduled office hours before the exam period. There will generally be no make-up exams, so in the case of absence for the exams students will need to schedule a time *before* the regular exam time to take the exam or in extreme cases the final semester grade may (at the discretion of the instructor) be based on the remaining exams, homework, projects, etc. In class exams can be a combination of multiple choice, matching, true/false, and short/medium length essay style questions. There will also be a take home exam worth 50 points that will be administered through the class website.

Class Activities and Homework: To provide practical, authentic experience with large scale omic data there will be a variety of in class activities, computer labs, problem sets, and homework. These activities will be relatively short and connected to specific class topics. Some of the class activities will require the use of a laptop or tablet and may involve access to the class website.

Teaching Project: The course is covering rich and diverse subject and topics that are all related to large scale omics in plant biology. As such, there isn't time to cover all the essential material.

Therefore, students will pursue a topic of their choice related to the course subject matter. This will ensure that student interested material will be covered in the class. The students will develop and present an approximately 10-minute teaching module. Further details will be provided throughout the course.

Class Projects: Students will work on in class projects throughout the course. The projects may consist of data analysis, interpretations, and presentation. Students are expected to turn in projects electronically to the instructor. Further details will be provided as the projects are assigned throughout the course.

Handouts: Most classes will be accompanied by lecture handouts. These will be in a student friendly format of the material presented in class. The handouts will be made available before the class period via the class website. For some classes, there may be videos or readings that should be completed before the class period. These material will also be provided to students through the class website.

Computer Labs: Several times during the semester classes will consist primarily of computer based activities. Therefore, student should make arrangements to have access and bring a laptop or tablet to class whenever possible. During class, electronic devices can only be used for class activities and phones can never be used during class and should be set to airplane mode before the start of class. If the classroom location needs to change due to a requirement for special facilities it will be announced ahead of time and the information will also be emailed to the class and posted on the class website.

Course Communication: Electronic communication throughout the semester will be conducted through students x500 email and the course website. Therefore, students are expected to read their x500 associated email account and visit the course website regularly (several times a week).

Late Assignments: In cases where an assignment or take home exam is submitted after the deadline, at 10% grade reduction will be assigned per day the assignment is late. For example, if an assignment is turned in 15 minutes late the grade will be reduced by 10%. Late assignments submitted more than three days late will only be accepted with instructor's approval, which generally requires documentation that justifies handing in the assignment late. Making arrangements with the instructor ahead of time is strongly encouraged.

Grade Disputes: Grade disputes for any assignment or exam should be submitted in writing or emailed to the instructor within one week of receiving the original grade. If the dispute cannot be resolved satisfactorily, the assignment will be given to an expert outside the class to provide input. Please remember that regraded exams and assignments can potentially be lowered as well as raised.

Students with Disabilities and Equal Access: All registered students, independent of race, gender, sexual preference, employment background, primary language, or disability, will receive equal treatment and equal access to class material. Students with a disability should contact the instructor or University Disability Services (612-624-4037).

Student Code, Scholastic Honesty, and Appropriate use of Course Materials: Students in Large

Scale Omic Data in Plant Biology are expected to conduct their own work and submit their own assignments (unless explicitly stated otherwise). Except when explicitly stated by the instructor or in the assignment instructions, students are prohibited from copying and pasting materials directly from the internet or other sources or copying material from another student. Collaboration and communication among students is encouraged in some cases and the instructor will make it clear when a graded activity can include collaboration and/or shared responses. Details about the University of Minnesota's student conduct code can be found at https://regents.umn.edu/sites/regents.umn.edu/files/policies/Student_Conduct_Code.pdf.

When working in groups and at all times during class, students should seek to share their unique experiences, values and beliefs, be open to the views of others, respect the contributions of the colleagues, appreciate the opportunity to learn from each other, value each other's opinions and communicate in a respectful manner, and keep confidential discussions when appropriate.

Available Campus Resources:

<p><u>Student Writing Support</u></p>	<p>Student writing support is available through the University of Minnesota Center for Writing and provides face-to-face and online collaborative consultations to help student develop productive writing habits and revision strategies. This is a free service to both undergraduate and graduate students.</p>
<p><u>Moodle</u></p>	<p>This course uses a Moodle site. Our Moodle site can be accessed through your myU "Courses" site. For assistance with Moodle visit You are responsible for checking the Moodle site regularly.</p>
<p>Nonnative Speakers of English</p>	<p>Non-Native Speakers (NNS) and professors who have questions about writing resources at the University of Minnesota can contact <u>Sheryl Holt</u>, the English Composition Coordinator for Non-Native Speakers. Additional resources can be found through the <u>Minnesota English Language Program</u> which helps international students prepare for academic work in an English-speaking college or university setting.</p>
<p><u>University Libraries</u></p>	<p>The University has a number of resources available to you. They include the <u>SMART Learning Commons</u>, peer research consultants and a 24/7 chat with a librarian service. As critical thinkers, an understanding of how to obtain the vast wealth of information available through the libraries is a must. For those new to this system, the University offers various consultation services and workshops that could be beneficial.</p>
<p><u>Counseling and Consulting Services</u></p>	<p>The University of Minnesota provides a range of counseling services through the Counseling and Consulting Services. The UCCS assists students with concerns and offers an opportunity to talk with an experienced counselor who can help students select and achieve goals for personal and career development. The center offers three types of counseling: personal counseling, academic counseling and career counseling. <u>The Student Academic Success Services</u> office offers classes, workshops, and individual assistance aimed at helping students achieve academic goals.</p>

University Policies

<p><u>Disability Accommodations</u></p>	<p>The Department of Plant Pathology is committed to providing all students equal access to learning opportunities. If you need different accommodations than what are provided, please let me know as soon as possible. I am happy to work with you to provide and/or arrange reasonable accommodations. All discussions will remain confidential. University policy is to provide, on a flexible and individualized basis, reasonable accommodations to students who have documented disability conditions (e.g., physical, learning, psychiatric, vision, hearing, or systemic) that may affect their ability to participate in course activities or to meet course requirements. Students with disabilities are encouraged to contact Disability Services and me to discuss their individual needs for accommodations.</p>
<p><u>Excused Absences</u></p>	<p>The U of M describes legitimate circumstances for absences as: illness of the student or his or her dependent, participation in intercollegiate athletic events, subpoenas, jury duty, military service, bereavement, and religious observances.</p>
<p><u>Mental Health Services</u></p>	<p>As a student, you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance and may reduce your ability to participate in daily activities. University of Minnesota services are available to assist you.</p>
<p><u>Sexual Harassment</u></p>	<p>University policy prohibits sexual harassment as defined in the University Policy Statement (link to left). Complaints about sexual harassment should be reported to the University Office of Equal Opportunity, 419 Morrill.</p>
<p><u>Academic Integrity</u></p>	<p>Students are expected to do their own assigned work. If it is determined that a student has engaged in any form of academic dishonesty, he or she may be given an "F" or an "N" for the course, and may face additional sanctions from the University.</p>
<p><u>Student Conduct</u></p>	<p>In the unfortunate event that participant behavior disrupts class or endangers participants, the instructor has the responsibility to ask that participant to moderate behaviors, and has the right to ask uncooperative students to leave a class session. Students whose behavior suggests the need for counseling or other assistance may be referred to their college office or University Counseling and Consulting Services. Students whose behavior may violate the University Student Conduct Code may be referred to the Office of Student Conduct and Academic Integrity. Every attempt will be made to deal with any conflicts in the most timely, direct, educative, and respectful manner.</p>

<p><u>Diversity</u></p>	<p>The U of M is committed to achieving excellence through equity and diversity. A diverse student body enhances the academic and social environment for all students and prepares students to thrive in an increasingly diverse workforce and society. Equal educational access is critical to preparing students for the responsibilities of citizenship and civic leadership in a heterogeneous society.</p>
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