University of Manitoba
Faculty of Agricultural and Food Sciences
Department of Plant Science

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COURSE DETAILS

Course Title & Number:	Introductory Plant Genomics PLNT4310
Number of Credit Hours:	3
Class Times & Days of Week:	11:30 am-12:20 pm, Mondays, Wednesdays and Fridays
Location for classes/labs/tutorials:	Online UM Learn Webex
Pre-Requisites:	N/A.

Instructor Contact Information

Instructor(s) Name:	Genyi Li
Preferred Form of Address:	Genyi or Dr. Li
Office Location:	No in-person contact
Hours Availability:	9:00-10:30 am, Thursdays or by appointment
Cell Phone No.	204-9301092
Email:	Genyi.li@umanitoba.ca
Contact:	Email or Phone

Course Description

An introduction to basic technologies in plant genomics. Topics include DNA sequencing, molecular marker detection, genome sequencing, gene expression analysis, gene mapping and functional analysis. A laboratory will provide hands-on experience with several genomic techniques through online demonstration.

General Course Information

Plant genomics is a relatively new biological science and relevant to many conventional biological sciences such as physiology, genetics, biochemistry, biology, pathology and plant breeding. In this field, many new technologies such as high throughput molecular marker detection, DNA sequencing, RNA and protein analysis have been developed. Plant genomics focuses on the structure, function and evolution of whole genomes of plant species. Plant genomics deals with the whole genome as well as individual genes, their interaction and network. Functional genomics is the cornerstone in genomics and helps understanding reproduction, adaptation and evolution of living organisms.
Plant genomics offers the advanced technologies in plant science and is applied in a dozen of related fields such as plant physiology, genetics, pathology, and plant breeding. Plant genomics focuses on the latest progress in plant science. To have the students catches up with the contemporary technologies in agriculture, plant genomics offers the opportunity to understand and extend new technologies in applied fields in agriculture.

Course Goals

Students who will pursue careers in biological sciences and have interests in plant genomics or related research topics should take this course.
Lectures, presentations and discussions allow students to learn the new technologies in molecular marker development, detection and applications; to update the latest progress in genome science, especially genome sequencing, genome feature and evolution; to know the major tools in gene functional analysis; and to understand the gene functions in plant development, reproduction and various metabolite pathways; to describe the mechanism of RNA interference (RNAi) and CRISPR-CAS9 technology and their applications; to understand the importance of gene cloning and identification.

Intended Learning Outcomes

These learning outcomes areas include:
Students will be able to use critical thinking skills
to understand the advance technology in plant genomics, to create hypotheses and describe the approaches to test these hypotheses in genomics, to understand the knowledge of plant genomics that promotes agriculture and benefits the society.

Students will become competent by learning relevant knowledge, experience and skills in plant genomics. Their knowledge in plant genomics will help them engage in solving social problems and understand social concerns about new technology.
Students will improve their communication and language skills that help them extend new technology to agriculture and agri-food business and industry.
Students will gain skills in time managements and organization, improve their ability to work together and respect their peers, showing their positive attitudes to themselves and others, to be eager to serve the society and make contributions by using their knowledge in plant genomics and agriculture.

Using Copyrighted Material

Please respect copyright. We will use copyrighted content in this course. I have ensured that the content I use is appropriately acknowledged and is copied in accordance with copyright laws and University guidelines. Copyrighted works, including those created by me, are made available for private study and research and must not be distributed in any format without permission. Do not upload copyrighted works to a learning management system (such as UM Learn), or any website, unless an exception to the *Copyright Act* applies or written permission has been confirmed. For more information, see the University's Copyright Office website at http://umanitoba.ca/copyright/ or contact um_copyright@umanitoba.ca.

Textbook, Readings, Materials

There is no selected textbook for this course. A list of reference book chapters and journal articles is available and all references can be accessed through UM library links.

Be aware of copyright laws when using readings.

Note: In your presentation and term paper, proper citation format (e.g., APA, MLA, Chicago, IEEE, etc.) should be used.

Course Technology

It is the general University of Manitoba policy that all technology resources are to be used in a responsible, efficient, ethical and legal manner. The student can use all technology only for educational purposes approved by instructor and/or the University of Manitoba Student Accessibility Services. (©S Kondrashov. Used with permission)

Class Communication

The University requires all students to activate an official University email account. For full details of the Electronic Communication with Students please visit:
University of Manitoba - University Governance - Governing Documents: University Community (umanitoba.ca)

Please note that all communication between myself and you as a student must comply with the electronic communication with student policy. You are required to obtain and use your U of M email account for all communication between yourself and the university.

Expectations: I Expect You To

Students should be ready and active to learn. They should have the relevant background of knowledge for fully understanding the content in this course. Students are supposed to join the lectures, presentations and discussions in time. They are encouraged to do more reading of selected publications in plant genomics. They are supposed to prepare their presentations and discussions and hand in their lab reports and written essays in time.

I will treat you with respect and would appreciate the same courtesy in return.

Academic Integrity:

Plagiarism or any other form of cheating in examinations, term tests or academic work is subject to serious academic penalty. Cheating in examinations or tests may take the form of copying from another student or bringing unauthorized materials into the exam room. Exam cheating can also include exam impersonation. A student found guilty of contributing to cheating in examinations or term assignments is also subject to serious academic penalty. Students should acquaint themselves with the University's policy on plagiarism, cheating, exam impersonation and duplicate submission (see the information on website of the University of Manitoba, Online Academic Calendar, Undergraduate and Graduate).

Students Accessibility Services

Student Accessibility Services
If you are a student with a disability, please contact SAS for academic accommodation supports and services such as note-taking, interpreting, assistive technology and exam accommodations. Students who have, or think they may have, a disability (e.g. mental illness, learning, medical, hearing, injury-related, visual) are invited to contact SAS to arrange a confidential consultation.
Student Accessibility Services Accessibility | University of Manitoba (umanitoba.ca)
520 University Centre
204 474 7423
Student_accessibility@umanitoba.ca

Expectations: You Can Expect Me To

A large part of my teaching practice includes the use of questions in class. I expect students to respond but I do not expect perfection.

Class Schedule

This schedule is subject to change at the discretion of the instructor and/or based on the learning needs of the students but such changes are subject to Section 2.8 of the – ROASS- Procedure).

Date	Class Content	Required Readings or any Pre-class Preparation	Evaluation
Jan. 18	DNA, chromosome and genome	Read relevant information in molecular biology	
Jan. 20	Mendelian Laws	Read relevant content in genetics	
Jan. 22	Molecular markers	Read relevant content in genetics	
Jan. 25	Enzymes, cloning vectors	Read relevant content in genetics	
Jan. 29	Molecular marker detection	Read articles and book chapters	
Feb. 1	SNP markers and detection	Read articles and book chapters	In class questions
Feb. 3	SNP markers and detection	Read articles and book chapters	In class questions
Feb. 5	Genetic map and construction	Read articles and book chapters	In class questions
Feb. 8	Genome science	Read articles and book chapters	
Feb. 10	Sanger sequencing	Read articles and book chapters	
Feb. 12	Illumina sequencing	Read articles and book chapters	
Feb. 15	Genome library and sequencing	Read articles and book chapters	
Feb. 22	Arabidopsis genome	Read articles and book chapters	In class questions
Feb. 24	Arabidopsis genome	Read articles and book chapters	In class questions
Feb. 26	Gene expression profiling	Read articles and book chapters	In class questions
Mar.1	Plant transformation	Read articles and book chapters	
Mar3	RNA sequencing (RNA-seq)	Review teaching notes	

Mar. 5	Reverse genetics	Read articles and book chapters	
Mar. 8	TILLING		
Mar. 10	RNA interference (RNAi)	Read articles and book chapters	
Mar. 12	RNA interference (RNAi)	Read papers for presentation	In class questions
Mar. 15	VIGS	Read papers for presentation	In class questions
Mar. 17	CRISPR-cas9 technology	Read papers for presentation	In class questions
Mar. 19	Student presentation Marker assisted selection	Read papers for presentation	
Mar. 22	Student presentation Genetic analysis in corn	Read papers for presentation	
Mar. 24	Student presentation Gene analysis in rice	Read papers for presentation	
Mar. 26	Student presentation Wheat genome sequencing	Read papers for presentation	Marks for presentations to you in 3 days
Mar. 29	Genetically modified (GM) crops	Read articles and book chapters	
Mar. 31	CRISPR-cas9 technology	Read articles and book chapters	Voluntary Withdrawal (VW) deadline
Apr. 5	CRISPR-cas9 technology	Read articles and book chapters	Term paper due today
Mar. 7	Gene mapping	Read articles and book chapters	
Mar. 9	Map-based gene cloning	Read articles and book chapters	
Mar. 12	Map-based gene cloning	Read articles and book chapters	
Apr. 14	QTL mapping	Read articles and book chapters	
Apr. 16	Genome wide association analysis (GWAS)	Read articles and book chapters	
TBA	Final discussions		

Laboratory Expectations

The TA will discuss the expectations for student's behaviour in the lab, with the equipment in the lab, their communications with the lab TA, etc. Also you are required to have any safety training before they use the lab (e.g., WHMIS) and where they can obtain the training.

Lab work will be arranged by the TA, and all relevant information will be given in time.

Course Evaluation Methods

Activities	Assessment Tool	Value of Final Grade
In class quiz	In class questions after finishing each chapter	20%
In class discussion	Actively involvement in class discussion	10%
Individual presentation	Following the guideline	15%
Class participation	Missing classes without permission (1/4 deduction for each missing class)	10%
Online lab work	Questions in Lab work	15%
Term paper	Following the guideline	15%
Face-to-face questions and discussions as the final exam	Face-to-face individual online final exam	15%
Final grade		100%

Class participation

All students need to join all session and actively involve discussions. When you have some critical reasons such as doctor appointments or illness, you need to ask permission for absence in advance.

Online interaction discussion

Final interaction discussion will be performed through online person by person approach which will be considered the final exam. The instructor will interact with one individual student one time. The contents will cover all topics in this course.

Grading

Letter Grade	Percentage out of 100	Grade Point Range	Final Grade Point
A+	95-100	4.25-4.5	4.5
A	86-94	3.75-4.24	4.0
B+	80-85	3.25-3.74	3.5
B	72-29	2.75-3.24	3.0
C+	65-71	2.25-2.74	2.5
C	60-64	2.0-2.24	2.0

D	50-59	Less than 2.0	1.0
F	Less than 50		0

Referencing Style

Assignments should use the APA reference style as outlined in the text:
American Psychological Association. (2009). Publication manual of the American Psychological Association (6th ed.). Washington, DC: Author.

Assignment Descriptions

TITLE and guideline for the scholarly paper will be given in Feb., 2021.
GOAL-This assignment is going to evaluate how you understand the course content and synthesize the relevant information in a scientific manner.
PROCEDURE-Requirements will be given with the title.
SUBMISSION GUIDELINES –Electronic copy of term paper is submitted by email.
EVALUATION CRITERIA-Based on the requirements.

Assignment Grading Times

Grades for in class questions and presentation will be given before the voluntary withdraw date.

Assignment Extension and Late Submission Policy

Any assignment extension should be requested. Without extension permission, late submission will result in deduced grade.