COURSE TITLE **Plant Genomics**

Department Plant Science **Course Number PLNT 7162**

Academic Session Winter 2011 **Credit Hours 3**

Prerequisites and how they apply to this course
PLNT 2520 or BOTN 2460 and PLNT 2530 or consent of instructor.
Students should have background knowledge of conventional genetics and basic knowledge of molecular biology which are essential to fully understanding the material in this course.

Classroom Location Agric Bldg Rm 218

Meeting Days and Class Hours W and F 1:45 to 3:00 pm

Lab location no lab **Lab/ Hours**

Department Office location Agric Bldg Rm 222 **Phone Number** 474-8221

Course Web Page (if applicable) References and teaching notes posted on JUMP site

Instructor Information

Name & Title Dr. Genyi Li Associate Professor

Office Location Agric BLDG 307 **Office Phone Number** 474-7192

Office Hours 9:00-10:30 am, W and F or by appointment

Email Address g_li@umanitoba.ca

Teaching Assistant(s) (if applicable)

TA Office Hours and Location

Course Philosophy

Students' Learning Responsibilities Students should be ready and active to learn. They should have the relevant background of knowledge for fully understanding the content in this course. In classes and lab, they are supposed to respect themselves and others, be responsible for their actions, and follow the rules at the University of Manitoba.

Why this course is useful?
Plant genomics is a relatively new biological science and relevant to many conventional biological sciences such as plant physiology, genetics, biochemistry, pathology and breeding. In this field, many new technologies such as high throughput molecular marker detection, DNA and peptide sequencing, and protein and metabolite analysis have been developed. Plant genomics focuses on the whole genome as well as individual genes and their interaction and network. Functional genomics is the cornerstone in genomics and helps understanding reproduction, adaptation and evolution of living organisms.

Who should take this course?
Students who will pursue careers in biological sciences should take this course. They should have basic knowledge in genomics.

How this course fits into the curriculum
Plant genomics is an advanced plant science that focuses on the latest progress in plant science. To have the students in Agriculture Faculty catch up with the contemporary technologies in agriculture, plant genomics offers the opportunity to understand and extend new technologies in applied fields in agriculture.

Course Description/Objectives

Undergraduate Calendar Description
(As it appears in the calendar)

Instructional Methods
Lectures with in-class discussion and hands-on lab work will be used to deliver the content of the course. Lab experiments will focus on technical experience, data collection and analysis. Students will demonstrate their grasp of these hands-on technologies by writing lab reports for evaluation.

Course Objectives
Provide 5-10 objectives that outline the principal goals for the course.
Students will be able to understand the main aspects of plant genomics, to understand the principles of DNA sequencing, to describe the latest progress in genome sequencing, to describe the major methods for gene functional analysis, to describe the mechanism of RNA interference (RNAi) and its applications and to understand the importance of gene cloning and identification, to describe pathways and genes involved in the pathways, and to understand the principles of gene functional analysis in primary and secondary metabolites.

Learning outcomes
Learning outcomes assist: i) students to identify the knowledge, skills, attitudes and personal attributes expected of them to successfully complete their program of studies; ii) faculty to develop learning goals and objectives in their courses and programs, in prioritizing and focusing the learning experiences, and in the selection of

appropriate assessment tools and; iii) potential students and outside agencies to assess the quality of our academic programs.

These learning outcomes areas include:
Students will be able to use critical thinking skill 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.

Additional Comments:

Description of Examinations

Examinations
Mid term exam: multiple choice and short answer questions
Final exam: Multiple choice short answer and long answer questions

Assignment Due Dates
Lab report are due as indicate in the lab manual

Grade Evaluation

Presentation	20%
Mid term exam	20%
Students' facilitating discussion	15%
Research proposal writing	15%
Final Examination (Taking home)	30%

Important Dates (e.g., voluntary withdrawal date)

Mid term exam	Feb, 2011
Presentation and discussion	Feb and March, 2011
Voluntary withdrawal date	Mar 18, 2011
Final Examination	April, 2011

Texts, Readings, Materials

Textbook(s) – Authors, Titles, Edition
No adequate textbook is available for this course since the changes in plant genomics is so dramatic.

Supplementary Reading
The latest journal papers in different topics are selected for students to read.

Additional Materials
Students will give presentations during the course and for their presentation; additional journal papers will be included and available to all students.

Course Policies

Late Assignments
20 % of assignment grade deduction will be applied if assignments are not handed in on time.

Missed Assignments
Will receive a zero grade.

Missed Exams
There is NO make-up examination for a missed mid-term! If missed and student has a valid medical certificate or compassionate reason (e.g., death of an immediate family member), marks from mid-term will be added to marks for the final examination. Students who miss the examination without a valid reason will receive a grade of zero (0) for the mid-term examination.
In the case of a missed final examination, a student will be assigned an F no paper grade for the course unless an acceptable medical certificate or a confirmable compassionate reason is provided in which case a supplementary examination will be allowed.

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 Section 8, p. 27 in the University of Manitoba Undergraduate Calendar 10/11.

Additional Comments

Use of Third Party Detection and Submission Tools
Electronic detection tools may be used to screen assignments in cases of suspected plagiarism.

Group Work Policies

Course outline

Introduction

Genome science involves mapping, sequencing and analyzing genomes. Structural and functional genomics are the cores of genome science. Proteomics and metabolomics lead to the further understanding of gene functions. Bioinformatics offers tools to mine the fast-accumulated data in genome science.

Structural Genomics

1. Molecular markers and genetic mapping.
2. Genome sequencing
3. High throughput sequencing

Gene expression analysis

1. Microarray
2. SAGE and MPSS

Reverse genetics

1. Mutation and detection.
2. TILING (Targeting induced local lesions in genome).
3. RNAi (RNA interference).
4. VIGS (Virus induced gene silencing).

Gene cloning and functional analysis

1. Forward genetics
2. map-based gene cloning
3. QTL and cloning

Proteomics

1. Y2H and gene interaction
2. 2-D gel protein purification, MS and protein identification
3. Protein modification, detection and functional analysis