# Syllabus

PLNT 7164: Genetic Mapping in Plants

(Fall Term 2022)

**Faculty of Agricultural and**

**Food Sciences**

University of Manitoba

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## COURSE DETAILS

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| **Course Title & Number:** | Genetic Mapping in Plants, PLNT 7164 |
| **Number of Credit Hours:** | 3 |
| **Class Times & Days of Week:** | 9:00 am – 12:00 pm, Thursday |
| **Location for classes/labs/tutorials:** | Lectures:        218 Agriculture Building |
| **Pre-Requisites:** | PLNT 4330, or consent of instructor |

## Instructor and Teaching Assistant Contact Information

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| **Instructor's Name & Preferred Form of Address:** | Dr. Curt McCartney<br>Curt or Dr. McCartney |
| **Office Location:** | 328 Agriculture Building (September)<br>247A Agriculture Building (October to December) |
| **Office Hours or Availability:** | By appointment, 8:30 am – 4:30 pm Monday to Friday |
| **Office Phone No.** | (204) 698-7234 |
| **Email:** | curt.mccartney@umanitoba.ca<br>Emails should be professional, but do not have to be formal. I will generally return emails and phone calls within 24 hours. |
| **Contact:** | Please contact me by email or in-person before/after class.<br>Feel free to contact me if anything is unclear about course content, expectations, etc. |

## Course Description

### U of M Course Calendar Description

Application of genetic mapping analyses for the dissection of traits in plant species. Linkage mapping, quantitative trait locus (QTL) mapping, association mapping, and related analyses will be reviewed in detail. Emphasis will be placed on practical applications in genetic studies. The analysis and interpretation of real data will be conducted in computer tutorial sessions.

### General Course Description

PLNT 7164 Genetic Mapping in Plants provides students with the theoretical basis background for genetic mapping in plants. The theory is then applied to conduct assignments focusing on linkage analysis, QTL mapping in bi-parental mapping population, and association mapping. Finally, students will summarize and present recent genetic research papers.

## Course Goals

To understand and implement modern analysis techniques to study the genetic control of traits in plants.

## Course Learning Objectives

To acquire knowledge needed to conduct various genetic mapping analyses:
1) Linkage mapping
   a. Determining linkage groups
   b. Marker ordering methods
   c. Error detection
2) QTL mapping
   a. Mapping algorithms
   b. Key statistics, significance thresholds for LOD scores
3) Association mapping
   a. Population structure
   b. Kinship
   c. LD decay
4) Ability to design experiments with a working knowledge of different genetic analyses and their strengths and weaknesses.

## Textbook, Readings, and Course Materials

No textbook.

Supplementary Reading: as assigned.

## 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, uncles 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.

## Course Technology

Course notes and assignments will be posted on UM Learn.

Bring a laptop to class. We will be utilizing software during the lecture periods. Below are the software packages that will be used in the course.

MapDisto (http://mapdisto.free.fr/Download_Soft/), linkage analysis, robust features for refining linkage maps.
QGene (http://www.qgene.org/qgene/download.php), QTL mapping, user-friendly
QTL IciMapping (https://isbreedingen.caas.cn/software/qtllcimapping/index.htm), placing markers into linkage bins to remove redundant markers (critical step of linkage analysis), linkage analysis (limited features), QTL mapping (includes epistatic QTL analysis)
TASSEL (http://www.maizegenetics.net/tassel), Genome Wide Association Study
CIMMYT Software (https://data.cimmyt.org/dataverse/cimmytswdvn), useful but not needed.
    GEA-R (Genotype x Environment Analysis with R for Windows)
    META-R (Multi Environment Trail Analysis with R for Windows)

## Expectations: I Expect You To

I will treat you with respect and would appreciate the same courtesy in return. See Respectful Work and Learning Environment Policy. I expect you to follow these policies around Class Communication, Academic Integrity, and Recording Class Lectures.

**Class Communication:**
You are required to obtain and use your University of Manitoba email account for all communication between yourself and the university. All communication must comply with the Electronic Communication with Student Policy:
http://umanitoba.ca/admin/governance/governing_documents/community/electronic_communication_with_students_policy.html.

**Academic Integrity:**
Each student in this course is expected to abide by the University of Manitoba Academic Integrity principles. Always remember to reference the work of others that you have used. Also be advised that you are required to complete your assignments independently unless otherwise specified. If you are encouraged to work in a team, ensure that your project complies with the academic integrity regulations. You must do your own work during exams. Inappropriate collaborative behavior and violation of other Academic Integrity principles, will lead to the serious disciplinary action. Visit the Academic Calendar, Student Advocacy, and Academic Integrity web pages for more information and support.

**Recording Class Lectures:**
No audio or video recording of lectures or presentations is allowed in any format, openly or surreptitiously, in whole or in part without permission of Dr. Curt McCartney. Course materials (both paper and digital) are for the participant's private study and research.

**Student Accessibility Services:**
The University of Manitoba is committed to providing an accessible academic community. Students Accessibility Services (SAS) offers 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
> 520 University Centre
> Phone: (204) 474-7423
> Email: Student_accessibility@umanitoba.ca

## Expectations: You Can Expect Me To

I will be in class for 10 minutes prior to and after the class time to discuss any questions or comments you may have. Assignments will be marked within 14 days of their due date with feedback provided. Presentations will graded within 7 days with feedback provided.

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## CLASS SCHEDULE AND COURSE EVALUATION

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 ROASS.

**Class Schedule:**

| Date | Description |
|------|-------------|
| Sep. 15, 2022 | Introduction to course |
| Sep. 22, 2022 | Linkage analysis |
| Sep. 29, 2022 | Linkage analysis |
| Oct. 6, 2022 | Linkage analysis |
| Oct. 13, 2022 | QTL analysis |
| Oct. 20, 2022 | QTL analysis |
| Oct. 27, 2022 | QTL analysis |
| Nov. 3, 2022 | QTL analysis |
| Nov. 10, 2022 | ***No Class (Fall Term Break)*** |
| Nov. 17, 2022 | Association mapping |
| Nov. 24, 2022 | Association mapping |
| Dec. 1, 2022 | Association mapping |
| Dec. 8, 2022 | Class wrap-up, review, Q & A |

**Course Evaluation Schedule:**

| Date | Evaluation Method | Grade % |
|------|-------------------|---------|
| Oct. 13, 2022 | Assignment #1 | 20% |
| Nov. 17, 2022 | Assignment #2 | 20% |
| Dec. 8, 2022 | Assignment #3 | 20% |
| TBA[1] | Presentation #1 | 15% |
| TBA[1] | Presentation #2 | 15% |
| TBA[2] | Discussion / Participation | 10% |

[1] Presentation schedule will be provided in first lecture.

[2] Based on participation in the class discussions, asking questions following student presentations, etc.

# Grading

The following grading scale will be applied to this course.

| Letter Grade | Percentage out of 100 | Grade Point Range | Final Grade Point |
|--------------|----------------------|-------------------|-------------------|
| A+ | 93-100 | 4.25-4.5 | 4.5 |
| A | 85-92 | 3.75-4.24 | 4.0 |
| B+ | 78-84 | 3.25-3.74 | 3.5 |
| B | 72-77 | 2.75-3.24 | 3.0 |
| C+ | 66-71 | 2.25-2.74 | 2.5 |
| C | 60-65 | 2.0-2.24 | 2.0 |
| D | 50-59 | Less than 2.0 | 1.0 |
| F | Less than 50 | | 0 |

# Voluntary Withdrawal

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|---|---|
| Sep. 20, 2022 | Last date to DROP Fall term courses with 100% refund |
| Nov. 22, 2022 | Voluntary Withdrawal (VW) deadline (no refund) |

Students who did not drop the course by these deadlines will be assigned a final grade. Voluntary Withdrawal courses will be recorded on official transcripts. Please refer to the Registrar's Office web page for more information. I am willing to discuss student's progress and strategies for improvement prior the withdrawal date.

# Other Important Dates

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|---|---|
| Sep. 30, 2022 | National Truth and Reconciliation Day – no classes. |
| Oct. 10, 2022 | Thanksgiving – no classes. |
| Nov. 7, 2022 - Nov. 10, 2022 | Fall term break – no classes. |
| Nov. 11, 2022 | Remembrance Day (Holiday) |
| Dec. 12, 2022 | Last day of classes |

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# ASSIGNMENT AND PRESENTATION DESCRIPTIONS

**Assignments** are intended to provide students with hands-on experience utilizing genetic mapping software. Students are expected to work on their own, so that they become completely familiar with each piece of software and can interpret the obtained results. Each assignment will come with a complete set of instructions.

**Presentations** are intended to provide students with practice summarizing genetic research and presenting the material in an engaging and information fashion. Each student will be assigned two research papers to present to the class. The presentation schedule will be determined at the beginning of the term. Presentations will be 15 minutes in length, with 5 minutes for discussion. Presentations will include a brief introduction, key results, and a summary/conclusions. Students must read all papers and have 1 to 2 questions prepared for discussion. Students will participate in the evaluation of their peers.

## Referencing Style

Not applicable.

## Assignment Feedback

Students will receive formative (i.e., comments) or summative (i.e., grade) feedback on their assignments and presentations. This feedback will be on paper and/or electronically. Grades will be provided with 14 days for the assignments. Evaluative feedback will be given to the students prior to the voluntary withdrawal deadline.

## Assignment Extension and Late Submission Policy

The due dates for the assignments are flexible and can be changed if the class is struggling with a particular deadline. All changes to assignment due dates will be applied to all students to ensure everyone is treated equally. In general, assignments that are submitted after the due date will be reduced by 10% of the value of the assignment per day late.

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## UNIVERSITY SUPPORT OFFICES & POLICIES

**Writing and Learning Support**
The Academic Learning Centre (ALC) offers services that may be helpful to you throughout your academic program. Through the ALC, you can meet with a learning specialist to discuss concerns such as time management, learning strategies, and test-taking strategies. The ALC also offers peer supported study groups called Supplemental Instruction (SI) for certain courses that students have typically found difficult. In these study groups, students have opportunities to ask questions, compare notes, discuss content, solve practice problems, and develop new study strategies in a group-learning format.

You can also meet one-to-one with a writing tutor who can give you feedback at any stage of the writing process, whether you are just beginning to work on a written assignment or already have a draft. If you are interested in meeting with a writing tutor, reserve your appointment two to three days in advance of the time you would like to meet. Also, plan to meet with a writing tutor a few days before your paper is due so that you have time to work with the tutor's feedback.

These Academic Learning Centre services are free for U of M students. For more information, please visit the Academic Learning Centre website at: http://umanitoba.ca/student/academiclearning/

You can also contact the Academic Learning Centre by calling 204-480-1481 or by visiting 205 Tier Building.

**University of Manitoba Libraries (UML)**
As the primary contact for all research needs, your liaison librarian can play a vital role when completing academic papers and assignments. Liaisons can answer questions about managing citations, or locating appropriate resources, and will address any other concerns you may have, regarding the research process. Liaisons can be contacted by email or phone, and are also available to meet with you in-person. A complete list of liaison librarians can be found by subject: http://bit.ly/WcEbA1 or name: http://bit.ly/1tJ0bB4. In addition, general library assistance is provided in person at 19 University Libraries, located on both the Fort Garry and Bannatyne campuses, as well as in many Winnipeg hospitals. For a listing of all libraries, please consult the following: http://bit.ly/1sXe6RA. When working remotely, students can also receive help online, via the Ask-a-Librarian chat found on the Libraries' homepage:www.umanitoba.ca/libraries.

**For 24/7 mental health support, contact the Mobile Crisis Service at 204-940-1781.**

**Student Counselling Centre**
Contact SCC if you are concerned about any aspect of your mental health, including anxiety, stress, or depression, or for help with relationships or other life concerns. SCC offers crisis services as well as individual, couple, and group counselling. *Student Counselling Centre:*
http://umanitoba.ca/student/counselling/index.html
474 University Centre or S207 Medical Services
(204) 474-8592

**Student Support Case Management**
Contact the Student Support Case Management team if you are concerned about yourself or another student and don't know where to turn. SSCM helps connect students with on and off campus resources, provides safety planning, and offers other supports, including consultation, educational workshops, and referral to the STATIS threat assessment team.
*Student Support Intake Assistant* http://umanitoba.ca/student/case-manager/index.html
520 University Centre
(204) 474-7423

**University Health Service**
Contact UHS for any medical concerns, including mental health problems. UHS offers a full range of medical services to students, including psychiatric consultation.
*University Health Service* http://umanitoba.ca/student/health/
104 University Centre, Fort Garry Campus
(204) 474-8411 (Business hours or after hours/urgent calls)

**Health and Wellness**
Contact our Health and Wellness Educator if you are interested in peer support from *Healthy U* or information on a broad range of health topics, including physical and mental health concerns, alcohol and substance use harms, and sexual assault.
*Health and Wellness Educator* https://umanitoba.ca/student/health-wellness/welcome-about.html
britt.harvey@umanitoba.ca

**Live Well @ UofM**
For comprehensive information about the full range of health and wellness resources available on campus, visit the Live Well @ UofM site:
http://umanitoba.ca/student/livewell/index.html

**Copyright**
All students are required to respect copyright as per Canada's *Copyright Act*. Staff and students play a key role in the University's copyright compliance as we balance user rights for educational purposes with the rights of content creators from around the world. The Copyright Office provides copyright resources and support for all members of the University of Manitoba community. Visit http://umanitoba.ca/copyright  for more information.

**Your rights and responsibilities**
As a student of the University of Manitoba you have rights and responsibilities. It is important for you to know what you can expect from the University as a student and to understand what the University expects from you.  Become familiar with the policies and procedures of the University and the regulations that are specific to your faculty, college or school.

The Academic Calendar http://umanitoba.ca/student/records/academiccalendar.html is one important source of information. View the sections *University Policies and Procedures* and *General Academic Regulations*.

While all of the information contained in these two sections is important, the following information is highlighted.

- If you have questions about your grades, talk to your instructor. There is a process for term work and final **grade appeals**. Note that you have the right to access your final examination scripts. See the Registrar's Office website for more information including appeal deadline dates and the appeal form http://umanitoba.ca/registrar/

- You are expected to view the General Academic Regulation section within the Academic Calendar and specifically read the **Academic Integrity** regulation. Consult the course syllabus or ask your instructor for additional information about demonstrating academic integrity in your academic work. Visit the Academic Integrity Site for tools and support http://umanitoba.ca/academicintegrity/ View the **Student Academic Misconduct** procedure for more information.

- The University is committed to a respectful work and learning environment. You have the right to be treated with respect and you are expected conduct yourself in an appropriate respectful manner. Policies governing behavior include the:

  **Respectful Work and Learning Environment**
  http://umanitoba.ca/admin/governance/governing_documents/community/230.html

  **Student Discipline**
  http://umanitoba.ca/admin/governance/governing_documents/students/student_discipline.html and,

  **Violent or Threatening Behaviour**
  http://umanitoba.ca/admin/governance/governing_documents/community/669.html

- If you experience **Sexual Assault** or know a member of the University community who has, it is important to know there is a policy that provides information about the supports available to those who disclose and outlines a process for reporting. The **Sexual Assault** policy may be found at:
  http://umanitoba.ca/admin/governance/governing_documents/community/230.html More information and resources can be found by reviewing the Sexual Assault site http://umanitoba.ca/student/sexual-assault/

- For information about rights and responsibilities regarding **Intellectual Property** view the policy https://umanitoba.ca/governance/sites/governance/files/2021-06/Intellectual Property Policy - 2013_10_01 RF.pdf


For information on regulations that are specific to your academic program, read the section in the Academic Calendar and on the respective faculty/college/school web site http://umanitoba.ca/faculties/

Contact an **Academic Advisor** within our faculty/college or school for questions about your academic program and regulations http://umanitoba.ca/academic-advisors/

**Student Advocacy**

Contact Student Advocacy if you want to know more about your rights and responsibilities as a student, have questions about policies and procedures, and/or want support in dealing with academic or discipline concerns.

http://umanitoba.ca/student/advocacy/

520 University Centre

204 474 7423

student_advocacy@umanitoba.ca