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# Syllabus

PLNT 4330 - Intermediate Plant Genetics

(Fall - 2021/2022)



Faculty of

UNIVERSITY  
OF MANITOBA

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## COURSE DETAILS

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<b>Course Title &amp; Number:</b>	Intermediate Plant Genetics - PLNT4330
<b>Number of Credit Hours:</b>	3 credit hours
<b>Class Times &amp; Days of Week:</b>	Slot 6, 11:30 Mon, Wed, Fri; Synchronous – Webex.
<b>Location for classes/labs/tutorials:</b>	Online UMLearn, Webex, Tutorials Fri 230-320.
<b>Pre-Requisites:</b>	PLNT 2520 or BIOL 2500 or the former BOTN 2460 provide the basics for this course.

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## Instructor Contact Information

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<b>Instructor(s) Name &amp; Preferred Form of Address:</b>	Dr. Douglas J. Cattani, (Doug)
<b>Office Location:</b>	105 Agriculture
<b>Office Hours or Availability:</b>	as requested. <i>Note:</i> <a href="#">The Responsibilities of Academic Staff in Regards to Students - ROASS</a> requires that instructors must be available to students for consultation out of class or laboratory hours.
<b>Office Phone No.</b>	204 474-6071
<b>Email:</b>	All phone calls and emails will be returned within 48 hrs. <i>Note:</i> All email communication must conform to the <a href="#">Communicating with Students</a> university policy.
<b>Contact:</b>	Email is the preferred method of contact and online virtual meetings can be set up where applicable.

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## Course Description

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### U of M Course Calendar Description

A study of gene behaviour as related to genetic analyses of data from plant populations; multiple allelic systems and polygenic inheritance of quantitative traits; extra-chromosomal inheritance and the significance of cytoplasmic influence. Examples will be drawn from experimental data where available. Prerequisite: PLNT 2520 or BIOL 2500 or the former BOTN 2460.

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## General Course Description

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This course will cover genetic principles that apply to plant populations to enhance the general genetic principles learned in introductory courses. Plants are diverse and can offer divergent issues with respect to inheritance (Ploidy levels, mating systems). This course will advance the students knowledge and understanding of the variables that can influence the ability to study genetics in plants. Due to the maturity of plants and the ability of some to produce many progeny in a single generations, the importance of plants to the field of the study of genetics will be discussed.

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## Course Goals

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Provide students with the information required for advancement through the biotechnology option, to provide students with interests in breeding options at graduate level educational opportunities, to provide an understanding of genetic principles as related primarily to plants and the use of plants in genetic study. and to prepare the student for the consideration of plant related variables that impact their use in genetic studies.

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## Course Learning Objectives

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Learning outcomes will:

- i) Assist students to identify the knowledge, skills, attitudes and personal attributes expected of them to successfully complete their program of studies;
- ii) provide knowledge and background for the study of genetics in plants;
- iii) provide students with the background to describe and illustrate the components related to the complexity of reproductive systems with plants;
- iv) assist in the selection of appropriate assessment tools for study of plant genetics;
- v) develop assessment of implications of species specific reproductive systems on genetic study;
- vi) provide practical experience in the use of mathematics-based equations for determining genetic control of plant processes and structure;
- vii) aid students in determining further avenues of study in Plant Biotechnology..

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## Textbook, Readings, and Course Materials

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The following text is required for the tutorial portion of the course:

Elrod, S. and Stansfield, W. D. (2010) GENETICS 5th Edition. Schaum's Outlines Series. McGraw-Hill Inc. Toronto

**Supplementary readings** – as assigned.

**Recommended or required materials (e.g. lab equipment, art supplies, computers, etc.)** not applicable

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## Using Copyrighted Material

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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](mailto:um_copyright@umanitoba.ca).

## Course Technology

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UMlearn will provide primary access to course materials and for some testing. Please acquaint yourselves with the use of UMlearn. Cisco-Webex will be the software used for synchronous classes. Due to impacts on internet requirements, it is requested that students mute and turn off the video of their connection in order to assist those students that only have access to less secure or powerful connections to be able to fully participate in classes and discussions. Students will notify the instructor when they may interact and then be invited to unmute and verbally interact with the instructor and the class. Thank you for your consideration of your classmates.

## Expectations: I Expect You To

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I will treat you with respect and would appreciate the same courtesy in return. See [Respectful Work and Learning Environment Policy](#).

At the end of this section, the policies and services students are expected to follow/utilize need to be included ([Section 2.5 ROASS](#)).

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](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.

Where applicable:

- I. Group projects are subject to the rules of academic dishonesty;
- II. Group members must ensure that a group project adheres to the principles of academic integrity;
- III. Students should also be made aware of any specific instructions concerning study groups and individual assignments;
- IV. The limits of collaboration on assignments should be defined as explicitly as possible; and
- V. All work should be completed independently unless otherwise specified.

### 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 {Douglas Cattani}. Course materials (both paper and digital) are for the participant's private study and research. Synchronous classes will be recorded and may be accessed through UMlearn.

**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](mailto:Student_accessibility@umanitoba.ca)

**Expectations: You Can Expect Me To**

I will start class 5 minutes earlier and stay on for 5 minutes to allow for questions (synchronous classes).

I will attempt to answer email enquiries as soon as possible but always within 48 hours.

I will attempt to post an outline for synchronous lectures the morning of the lecture.

**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](#).

The schedule should include dates and times of classes, including missed classes due to holidays or other commitments of the instructor. It also includes dates of assignments/quizzes/exams and alternate forms of assessments, date for voluntary withdrawal, and dates when students can expect to receive their assignment or test grades.

<b>Evaluation Method:</b>	<b>% of final grade</b>	<b>Scheduled due date:</b>
Quiz I	10%	Wednesday, September 29, 2021
Assignment 1	10%	Friday, October 08, 2021
Tutorial Exam I	15%	Friday, October 22, 2021
Quiz II	10%	Monday, November 01, 2021
Assignment II	10%	Wednesday, November 17, 2021
Tutorial Exam II	15%	Friday, November 26, 2021
Final Lecture Exam	30%	Scheduled by Student Records in the December examination period.

It is anticipated that the student will have at least 45% of the course marks by November 23, 2021 for the assessment of performance for VW purposes.

**Lecture topics to be covered include:****I. Review of Mendelian Principles**

1. Introduction to plant reproductive morphology and function.
2. Introduction to genetics research, mitosis, meiosis and gametogenesis
3. Segregation, assortment, dominance relationships, multiple allelic series

## **II. Altered Segregation**

4. Altered segregation I
5. Altered segregation II
6. Gene interaction - epistasis

## **III. Statistics in Genetics**

7. Probability, chi-squared tests
8. Distributions and minimum family size

## **IV. Gene linkage, Recombination and Mapping**

9. Detection of linkage
10. Gene mapping in diploids I
  11. Gene mapping in diploids II
12. Linkage and mapping in fungi I
13. Linkage and mapping in fungi II
14. Linkage and mapping in bacteria

## **V. Large Changes in Genetic Material**

15. Variation in chromosome numbers
  16. Segregation and linkage in polyploids I
17. Segregation and linkage in polyploids II
  18. Changes in chromosome structure

## **VI. Genes in Populations**

19. Gene frequencies and equilibrium
20. Factors operating to direct change I
21. Factors operating to direct change II
22. Factors operating to direct change III
23. Factors operating to direct change IV
24. Inbreeding

## **VII. Quantitative Genetics**

25. Is part of continuous variation heritable?
26. Analysis of quantitative characters using means
27. Analysis of quantitative characters using variances
28. Analysis of quantitative trait loci using molecular markers

**VIII. Cytoplasmic Genetics**

29. Maternal effects and cytoplasmic inheritance
30. Mitochondria and plastid gene transmission and recombination
31. Cytoplasmic male sterility systems and plant breeding

**IX. Mutation, Genetic Engineering**

32. Gene mutation
33. Induced genetic changes
34. Genetic engineering and crop improvement I
35. Genetic engineering and crop improvement II

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**Lab Schedule and Expectations**


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**DATE    Tutorial Topics**

Sep. 17	1. Mendelian genetics	
Sep. 24	2. Altered segregation problems	
Oct. 01	3. Statistics in genetics problems	
Oct. 08	4. Linkage problems I	
Oct. 15	5. Linkage problems II	
Oct. 22	6. TUTORIAL EXAM #1	OCTOBER 22, 2021
Oct. 29	7. Population genetics problems I	
Nov. 05	8. Population genetics problems II	
Nov. 19	9. Population genetics problems III	
Nov. 26	10. TUTORIAL EXAM #2	NOVEMBER 26, 2021

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**Grading**

Based upon previous course performance, the following grade assignments will be followed unless marks fall below the long-term performances based upon long-term experience. Grades may be assigned lower percentage ranges if this should take place.

Letter Grade	Percentage out of 100	Grade Point Range	Final Grade Point
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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	72-79	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

## Voluntary Withdrawal

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**Voluntary withdrawal deadline is November 23, 2021.**

Please refer to the [Registrar's Office](#) web page for more information. I am willing to discuss with individual students their progress and attempt to provide strategies for improvement prior the withdrawal date.

### Other Important Dates:

National Day for Truth and Reconciliation – Thursday September 30, 2021 – no classes

Thanksgiving – Monday, October 11, 2021 – no classes.

Fall-Term Break – Monday, November 08 – Friday November 12, 2021 – no classes.

Voluntary withdrawal deadline is November 23, 2021.

Last day of Classes - December 10, 2021

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## ASSIGNMENT DESCRIPTIONS

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### Description of Assignments:

Assignment I: Reproductive systems in plant species.

Assignment II: Commentary on assigned readings.

### Assignment Due Dates:

Friday, October 08, 2021

Monday November 17, 2021

#### Assignment 1:

**TITLE:** Reproductive systems in plant species.

**GOAL:** To provide students with an appreciation of the complexity and the importance of reproductive systems in plants and the selection of appropriate genetic models. Course Objectives 2-6.

**PROCEDURE:** Students will use scientific literature to describe the reproductive considerations for specific species in order to study its genetic make-up. Length - 3 double space pages (excluding references).

**SUBMISSION GUIDELINES:** assignments should be emailed to course instructor by 11:59PM on the due date, October 08, 2021.

**EVALUATION CRITERIA:** Students will be evaluated on the content (7/10), organization and structure (2/10), spelling and grammar (1/10).

#### Assignment 2:

**TITLE:** Commentary on assigned readings.

**GOAL:** To challenge students to consider opinions and concerns regarding the use of methods available for genetic study.

**PROCEDURE:** Students will read assigned papers and prepare a paper on how they agree with and disagree with the opinion(s) of the authors of the assigned papers. Length two pages double spaced. Students will discuss at least two topics on which they both agree and disagree with the authors.

**SUBMISSION GUIDELINES:** assignments should be emailed to course instructor by 11:59PM on the due date, November 17, 2020.

**EVALUATION CRITERIA:** Students will be evaluated on the content (7/10), organization and structure (2/10), spelling and grammar (1/10).

Students who are unable to meet a course requirement due to medical circumstances are currently not required to submit medical notes. However, students are required to contact their instructor or academic advisor by email to inform of the missed work and to make arrangements for extensions, deferrals, or make-up assignments. Please follow these guidelines if you are unable to meet an academic requirement for your courses.

Contact your instructor for term work such as a class, quiz, midterm/test, assignment, lab;

- Contact an advisor in your faculty/college/school of registration for a missed final exam (scheduled in the final examination period);
- Inform your instructor/advisor as soon as possible do not delay. Note for final exams, students must contact within 48 hours of the date of the final exam; and

Email your instructor/advisor from a U of M email address, and include your full name, student number, course number, and academic work that was missed.

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### Referencing Style

Referencing for assignments should be in the style of Theoretical and Applied Genetics or the Journal of Genetics.

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### Assignment Feedback

Assignments will be graded as above and student feedback will be provided based upon the assessment criteria above.

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### Assignment Extension and Late Submission Policy

Late assignments are docked 10% per day for each day they are late (after 10 days – 0%). Assignments will be returned when all have been received or the 10 day period for late assignment submission has passed.

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### UNIVERSITY SUPPORT OFFICES & POLICIES

Instructors shall provide to every student the information on university support offices and policies in [Schedule "A"](#) within the first week of classes, either through a paper copy and/or via the university's student information system (i.e., Aurora, UM Learn, or such other university information system as may be approved by the university from time to time).

#### Schedule "A"

**A list of academic supports available to Students, such as the Academic Learning Centre, Libraries,****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](http://www.umanitoba.ca/libraries).

**Mental health referral information:**

**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 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* [Student health and wellness | University of Manitoba](#)

[Katie.Kutryk@umanitoba.ca](mailto:Katie.Kutryk@umanitoba.ca)

469 University Centre

(204) 295-9032

### **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>

### **A notice with respect to 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.

### **University and Unit policies, procedures, and supplemental information available on-line:**

#### **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) <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 to 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](http://umanitoba.ca/admin/governance/governing_documents/community/230.html)

#### **Student Discipline**

[http://umanitoba.ca/admin/governance/governing\\_documents/students/student\\_discipline.html](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](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](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 [University of Manitoba - University Governance - Governing Documents: University Community](#)

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](mailto:student_advocacy@umanitoba.ca)