

Syllabus

Food 2500: FOOD CHEMISTRY

(Winter 2024)

Logo

Description automatically generated**Faculty of Agricultural & Food Sciences**

**Table of Contents**

[**FOOD 2500 FOOD CHEMISTRY 4**](#_Toc124091812)

[**COURSE DETAILS 4**](#_Toc124091813)

[**Credits: (3-L:0-0)3 4**](#_Toc124091814)

[**Description: 4**](#_Toc124091815)

[**Prerequisites: 4**](#_Toc124091816)

[**Instructor: 4**](#_Toc124091817)

[**Teaching assistant: 4**](#_Toc124091818)

[**Grader / Marker: 4**](#_Toc124091819)

[**Classes: 4**](#_Toc124091820)

[**FOOD 2500 Labs: 4**](#_Toc124091821)

[**Consultations, Email Communications, Use of UM Learn & iClicker 4**](#_Toc124091822)

[**Texts/References/Topics 5**](#_Toc124091823)

[**Recommended textbooks 5**](#_Toc124091824)

[**Topics covered 5**](#_Toc124091825)

[**Laboratory exercises 6**](#_Toc124091826)

[**Overall Objectives 7**](#_Toc124091827)

[**Grading 7**](#_Toc124091828)

[**Grades: 7**](#_Toc124091829)

[**Course Policies on Missed Labs, Missed Exams, Missed Assignments, Late Assignments & Class Participation 8**](#_Toc124091830)

[**Course Technology 8**](#_Toc124091831)

[**Recording Class Lectures 8**](#_Toc124091832)

[**Academic Integrity 8**](#_Toc124091833)

[**Policy on Plagiarism and Cheating, and generative AI technology 8**](#_Toc124091834)

[**Using Copyrighted Material 9**](#_Toc124091835)

[**Student Accessibility Services 9**](#_Toc124091836)

[**Instructional objectives 10**](#_Toc124091837)

[**Laboratory schedule 12**](#_Toc124091838)

[**FOOD 2500 Calendar 13**](#_Toc124091839)

[**UNIVERSITY SUPPORT OFFICES & POLICIES 15**](#_Toc124091840)

[**Schedule “A” 15**](#_Toc124091841)

[**Writing and Learning Support 15**](#_Toc124091842)

[**University of Manitoba Libraries (UML) 15**](#_Toc124091843)

[**For 24/7 mental health support, contact the Mobile Crisis Service at 204-940-1781. 15**](#_Toc124091844)

[**Student Support Case Management 16**](#_Toc124091845)

[**University Health Service 16**](#_Toc124091846)

[**Health and Wellness 16**](#_Toc124091847)

[**Live Well @ UofM 16**](#_Toc124091848)

[**Your rights and responsibilities 17**](#_Toc124091849)

[**Respectful Work and Learning Environment 17**](#_Toc124091850)

[**Violent or Threatening Behaviour 17**](#_Toc124091851)

[**Student Advocacy 18**](#_Toc124091852)

# FOOD 2500 FOOD CHEMISTRY

# COURSE DETAILS

## Credits: (3-L:0-0)3

## Description:

Structure and chemistry of food components. Physical and chemical changes in food commodities.

## Prerequisites:

CHEM 2770 or MBIO 2770 or CHEM 2360 or MBIO 2360

## Instructor:

**Dr. Trust Beta**

Department Office Location: 226 Ellis Building E-mail: [Trust.Beta@umanitoba.ca](mailto:Trust.Beta@umanitoba.ca)

Phone: (204)474-8214

Teaching assistant: Francis Adjetey

Grader / Marker: Mayuri Bane

Classes: 343 Agriculture Building (Tuesdays & Thursdays 10:00 –11:15 am)

FOOD 2500 Labs: 241 Ellis Building (Thursdays & Fridays 2:30 - 5:25 pm)

# Consultations, Email Communications, Use of UM Learn & iClicker

Individual consultation meetings can be scheduled on Tuesdays and Thursdays between 11:30 am to 12:30 pm. UM Learn will be used for posting lecture notes, lab data, lab reports, term paper assignments, exams / quizzes, discussions and announcements for the FOOD 2500 course. iClicker will also be used for quizzes. 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\_communica](http://umanitoba.ca/admin/governance/governing_documents/community/electronic_communication_with_students_policy.html) [tion\_with\_students\_policy.html.](http://umanitoba.ca/admin/governance/governing_documents/community/electronic_communication_with_students_policy.html)

# Texts/References/Topics

## **Recommended textbooks**

Y. H. Hui. 2012. Food Chemistry: Principles and Applications, 3rd edition. Science Technology System, West Sacramento, CA. TX 545 F591 2012

S. Damodaran, K. L. Parkin, 2017. Fennema’s Food Chemistry, 5th edition, CRC, Boca Raton, FL. TX 541 F65 2017

Online access: Fennema's Food Chemistry (5th Edition) - Knovel (oclc.org)

J. M. deMan, J. W. Finley, W. J. Hurst, C. Y. Lee. 2018. Principles of Food Chemistry, 4th edition. Springer. TX 531 D43 2018

Online access: [Principles of Food Chemistry | SpringerLink (oclc.org)](https://link-springer-com.uml.idm.oclc.org/book/10.1007%2F978-3-319-63607-8)

H. D. Belitz. 2009. Food Chemistry, 4th edition, Springer Verlag, Berlin, Heidelberg. Online access: <http://dx.doi.org/10.1007/978-3-540-69934-7>

T. P. Coultate. 2016. Food: the chemistry of its components, 6th edition, Royal Society of Chemistry, Cambridge. TX 531 C68 2016

T. P. Coultate. 2009. Food: the chemistry of its components, 5th edition, Royal Society of Chemistry, Cambridge. TX 531 C68 2009

Online access: Food - The Chemistry of its Components (5th Edition) - Knovel

M. Eskin, F. Shahidi 2012. Biochemistry of Foods, 3rd Edition

Online access: Biochemistry of Foods (3rd Edition) - Knovel (oclc.org)

AOAC International. 2005. Official Methods of Analysis of the Association of Official Analytical Chemists (AOAC) International, 18th ed., W. Horwits (ed), AOAC International), Gaithersburg, Maryland.

## **Topics covered**

Introduction: an overview of food chemistry.

Water, acids, bases and buffers: water structure, water activity, sorption isotherms; food acidity.

Lipids: nomenclature, structure, classification of lipids and fatty acids; functional properties of lipids; production of edible oils and fats including refining, hydrogenation, interesterification; rancidity in fats; emulsions.

Carbohydrates: nomenclature, structures, conformations, projections; monosaccharides, disaccharides, oligosaccharides, starch, glycogen, cellulose, modified starches, gums; functional properties of mono- and disaccharides, polysaccharides, gums.

Proteins: amino acids, protein structure; functional properties of proteins; animal and plant proteins.

Enzymes: nomenclature, kinetics; enzymes in the food and beverage industry. Vitamins and minerals: fat soluble and water soluble vitamins; minerals in foods. Additives: types of additives and their functions.

Colorants: food colours, food pigments; measurement of food colour. Flavours: taste, odour, classes, flavour enhancers.

Overview of food composition and food composition databases – TERM PAPER ASSIGNMENT

# Laboratory exercises

Basic techniques Acid content of foods Lipid properties

Sugar and starch properties Protein properties Enzymatic browning

Basic tastes

\*All reports will be uploaded on UM Learn and detailed instructions on reporting are found in the laboratory manual. Grading will be completed within 10 days of submission. Food Chemistry journal referencing style is to be followed.

# Overall Objectives

At the end of the course, students are able to:

1. Discuss the relationship between chemical and physical composition and function of major and minor components in food
2. Describe physicochemical changes that food components undergo during processing and storage
3. Apply basic principles of food chemistry to discuss the effects of processing and storage on food composition and quality

# Grading

|  |  |  |  |
| --- | --- | --- | --- |
| **Evaluation Tool** | **Points** | **% of Grade** | **Date Due** |
| FOOD Labs | 100 | 20 | 1 week after lab exercise |
| Class quizzes | 100 | 5 | During lectures (bonus points) |
| Mid-term Exam | 100 | 35 | February 15 |
| Term Paper Assignment\* | 100 | 10 | March 28 |
| Final Exam | 100 | 35 | April 12-26 |

\*All term paper reports using Food Chemistry style of referencing, will be uploaded on UM Learn and grading will be completed within 2 weeks of submission.

## Grades:

|  |
| --- |
| **A+ 90 - 100%** |
| **A 80 - 89%** |
| **B+ 75 - 79%** |
| **B 67 - 74%** |
| **C+ 61 - 66%** |
| **C 56 - 60%** |
| **D 50 - 55%** |
| **F Under 50%** |

# Course Policies on Missed Labs, Missed Exams, Missed Assignments, Late Assignments & Class Participation

Missed Labs, Missed Exams or Missed Assignments: No marks will be earned. Accommodation will only be provided for medical reasons or other emergency upon submission of satisfactory documentation. Whenever possible, give prior notification.

Late Assignments: Late assignments attract a penalty of 5% of total marks per business day.

\*Class participation: Bonus points of up to 5% can be earned through participation in quizzes given in class as part of discussions relevant to enhancement of understanding of food chemistry concepts.

# Course Technology

Regarding student use of technology (i.e., tablets, cellphones, laptops, etc.) in the classroom - It is the general University of Manitoba policy that all technology resources are to be used in a responsible, efficient, ethical and legal manner.

## 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 {from DR. TRUST BETA.} Course materials (both paper and digital) are for the participant’s private study and research.

# Academic Integrity

Each student in this course is expected to abide by the University of Manitoba [Academic Integrity](http://crscalprod1.cc.umanitoba.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&catalogid=300&chapterid=3762&topicgroupid=20190&loaduseredits=False) [principles.](http://crscalprod1.cc.umanitoba.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&catalogid=300&chapterid=3762&topicgroupid=20190&loaduseredits=False) 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](https://umanitoba.ca/sites/default/files/2020-02/um-ai-minimum-penalties-definitions.pdf). Visit the [Academic Calendar](http://crscalprod1.cc.umanitoba.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&catalogid=300&chapterid=3755&topicgroupid=20145&loaduseredits=False), [Student Advocacy,](http://umanitoba.ca/student/resource/student_advocacy/cheating_plagiarism_fraud.html) and [Academic Integrity](http://umanitoba.ca/academicintegrity/) web pages for more information and support.

Policy on Plagiarism and Cheating(quote from university calendar):

“To plagiarize is to take ideas or words of another person and pass them off as one’s own. Obviously, it is not necessary to state the source of well-known or easily verifiable facts, but students are expected to acknowledge the source of ideas and expressions they use in their written work, whether quoted directly or paraphrased. This applies to diagrams, statistical tables and the like, as well as written material.

It will also be considered plagiarism and/or cheating if a student submits a term paper written in whole or in part by someone other than himself or herself, or copies the answer or answers of a fellow student in any test, examinations or take-home assignments. Plagiarism or any other form of cheating in examinations or term tests is subject to serious academic penalty.”

Policy on **Generative Artificial Intelligence (genAI) technology**

Students may choose to use generative artificial intelligence (genAI) tools as they work through the assignments in this course carefully. This use must be documented in an appendix for each assignment. The documentation should include what tool(s) was/were used, how the tool(s) was/were used, and how the result(s) from the genAI was/were incorporated into the submitted work.

# 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.](mailto:um_copyright@umanitoba.ca)

# Student Accessibility Services

The University of Manitoba is committed to providing an accessible academic community. [Students](https://umanitoba.ca/student-supports/accessibility) [Accessibility Services (SAS)](https://umanitoba.ca/student-supports/accessibility) 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.

StudentAccessibility Services 520 University Centre

Phone: (204) 474-7423

Email: [Student\_accessibility@umanitoba.ca](mailto:Student_accessibility@umanitoba.ca)

# Instructional objectives

* 1. Concerning **Water and acids**, student
* Discusses how the chemical structure of water explains water’s unique properties
* Explains the phase changes water undergoes as related to chemical structure
* States the effects of solutes on boiling point, melting point, osmotic pressure, and surface tension
* Differentiates the characteristics of bound water versus free water in a food
* Relates the different types of water in foods to water activity
* Describes the effect of storage condition, temperature, and ingredient interaction on water activity, and moisture sorption isotherm
* Identifies whether compound is acid or base based on Bronsted and Lowry definition
* Differentiates between the titration curves of strong acids versus weak acids
* States the functions of acids, bases and buffers in foods
* Describes composition of buffer systems and how the composition is affected by the addition of acid or base
  1. Concerning **Lipids**, student
* Distinguishes among the classes of lipid molecules
* Identifies the major fatty acids present in food lipids
* Explains the physical and chemical properties of fatty acids
* Describes the physical and chemical properties of lipids
* States the major functional properties of lipids that are important in foods
* Discusses the relationship between lipid type, processing and functionality
* Describes how oil is processed and refined
  1. Concerning **Carbohydrates**, student
* Distinguishes the different classes of food carbohydrates and explains the basis of classification
* Describes the structures of important monosaccharides and disaccharides and the reactions they undergo
* States the major functional properties of monosaccharides and disaccharides
* Describes the structures of important polysaccharides and gums and the reactions they undergo
* States the major functional properties of polysaccharides and gums
* Discusses the effects of pH, heat, and salts on functional properties of carbohydrates
  1. Concerning **Proteins**, student
* Describes how the structure and properties of amino acids affect the structure and functional properties of proteins
* Explains the role of different types of bonds in stabilizing the four levels of protein structure
* Discusses the effects of processing treatments on protein structure
* States the major functional properties of proteins that are important in foods
* Discusses the relationship between protein structure, processing and functionality of proteins
* Discusses the effects of pH, heat, and salts on functional properties of proteins
  1. Concerning **Enzymes**, student
* Explains the functions of enzymes in foods and the effects of enzyme on food quality
* Applies enzyme kinetics to calculate the rates of enzyme reactions
* Describes how environmental and other factors (substrate and enzyme concentration, pH, temperature, water activity, inhibitors) affect enzyme reactions
  1. Concerning **Vitamins and minerals**, student
* Identifies the chemical structures and forms of fat-soluble and water-soluble vitamins found in foods
* States the functional roles of individual vitamins
* Explains the effects of processing on vitamin content and stability
* Distinguishes the terms element, mineral, salt, complex and ash
* Describes the chemical & physical properties of elements & their salts
* Discusses the multiple functions of elements and salts in food systems
  1. Concerning **Food flavours**, student
* Defines the terms flavour, taste, pungency and odour
* Explains the effects of food processing on flavour perception
* Differentiates the four basic tastes and identify compounds associated with each taste
* Identifies primary flavour contributors
  1. Concerning **Food colorants**, student
* Explains colour theory
* Describes methods of measuring colour using Munsell, CIE, and tristimulus colorimeters
* Identifies important natural pigments in foods
* Identifies certified colour additives used in foods
  1. Concerning FOOD2500 **Labs**, student
* Demonstrates skills/abilities for conducting lab experiments in a team environment
* Describes the principles involved in the analysis
* Identifies food samples analyzed
* Describes the experimental procedure used in the analysis
* Applies simple statistical methods of data evaluation
* Discusses results on food acidity, lipids, proteins, carbohydrates, and enzymes

FOOD 2500 Food Chemistry

# Laboratory schedule

241 Ellis Building

Thursdays (B01) 2:30-5:25 pm & Fridays (B02) 2:30-5:25 pm (dates in brackets) Title Date

Introduction Jan 18 (19)

Safety review, lab reporting, basic techniques\*

Food acidity Jan 25 (26)

Lipid characterization Feb 01 (02)

Carbohydrate properties Feb 08/09 (Feb 15/16)

Protein chemistry Feb 29/ Mar 01 (Mar 07/08)

Enzymatic browning Mar 14/15 (Mar 21/22)

Students will work in groups but each student submits his or her own independent report. See laboratory manual on detailed lab expectations.

\*The sessions familiarize students with lab safety features and basic techniques of weighing, pipetting, and good laboratory practices.

(Note: Winter term is from January 08 to April 10, 2024) (Note: Good Friday is March 29, 2024)

(Note: Winter term exam period is from April 12-26, 2024) Note also that:

* January 19 is the last date to DROP a course with refund
* The Winter term break is February 19-23
* March 20 is the Voluntary Withdrawal Deadline
* All important dates and deadlines are listed here: <https://umanitoba.ca/registrar/important-dates-deadlines>

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| --- | --- | --- | --- | --- |
|  |  |  | FOOD 2500 Calendar |  |
| **Month** | **Day** | **Lecture #** | **Topic** | **Hui Chapter #** |
| **January** | 09 | 1 | What is Food Chemistry? | 1 |
|  | 11 | 2 | Water | 2 & 3 |
|  | 16 | 3 | Water | 2 & 3 |
|  | 18 | 4 | Acid Base pH TA |  |
|  | 23 | 5 | Lipids | 6 & 7 |
|  | 24 | 6 | Lipids | 6 & 7 |
|  | 25 | 7 | Carbohydrates | 4 & 5 |
|  | 30 | 8 | Carbohydrates | 4 & 5 |
| **February** | 01 | 9 | Carbohydrates | 4 & 5 |
|  | 06 | 10 | Carbohydrates | 4 & 5 |
|  | 08 | 11 | Proteins | 8 & 9 |
|  | 13 | 12 | Proteins | 8 & 9 |
|  | 15 |  | MID-TERM EXAM: L1-10 | 8 & 9 |
|  | 20-23 |  | READING WEEK |  |
|  | 27 | 13 | Proteins | 8 & 9 |
|  | 29 | 14 | Enzymes | 13 |
| **March** | 05 | 15 | Enzymes | 13 |
|  | 07 | 16 | Vitamins | 10 |
|  | 12 | 17 | Vitamins | 10 |
|  | 14 | 18 | Minerals | 11 |
|  | 19 | 19 | Food Additives | 17 |
|  | 21 | 20 | Flavors | 14 |
|  | 26 | 21 | Colorants | 15 |
|  | 28 |  | TERM PAPER ASSIGNMENT DUE |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **April** | 02 | 22 | Food Composition (Term Papers) | G1 Presents |
|  | 04 | 21 | Food Composition (Term Papers) | G2 Presents |
|  | 09 | 23 | Food Composition (Term Papers) | G3 Presents |
|  | 12-26 |  | FINAL EXAMS: L11-21 |  |

# UNIVERSITY SUPPORT OFFICES & POLICIES

For information on university support offices and policies, see [Schedule “A”](http://umanitoba.ca/admin/governance/governing_documents/students/278.html)

### Schedule “A”

**Section (a)**: A list of academic supports available to Students, such as the Academic Learning Centre, Libraries, and other supports as may be appropriate:

### 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).

**Section (b):** A statement regarding mental health that includes 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 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-](https://umanitoba.ca/student/health-wellness/welcome-about.html) [about.html](https://umanitoba.ca/student/health-wellness/welcome-about.html)

[britt.harvey@umanitoba.ca](mailto: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>

**Section (c):** 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.

**Section (d):** A statement directing the student to 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 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\_discipli](http://umanitoba.ca/admin/governance/governing_documents/students/student_discipline.html) [ne.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>

* 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](https://umanitoba.ca/governance/sites/governance/files/2021-06/Intellectual%20Property%20Policy%20-%202013_10_01%20RF.pdf) [Property Policy - 2013\_10\_01 RF.pdf](https://umanitoba.ca/governance/sites/governance/files/2021-06/Intellectual%20Property%20Policy%20-%202013_10_01%20RF.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](mailto:student_advocacy@umanitoba.ca)