

TRAILBLAZER ADVENTURER  
INNOVATOR DEFENDER CHALLENGER  
ADVENTURER TRAILBLAZER DEFENDER VISIONARY  
VISIONARY ADVENTURER TRAILBLAZER CHALLENGER DEFENDER VISIONARY

# Syllabus

HNSC 3330: Ingredient Technology for Designed Foods

Winter 2024

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## COURSE DETAILS

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**Course Title & Number:** HNSC 3330

**Number of Credit Hours:** 3.0

**Class Times & Days of Week:** 1.30-2.20 pm Mon, Wed, Fri

**Location for classes:** Room 130 Agriculture Building

**Pre-Requisites:** CHEM 2780 and HNSC 2150 or CHEM 2200 and FOOD 2500

**Voluntary Withdrawal Date:** March 20, 2024

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## INSTRUCTOR CONTACT INFORMATION

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**Instructor(s) Name:** Dr. Rotimi Aluko

**Office Location:** Room 106, Richardson Centre for Functional Foods and Nutraceuticals, 196 Innovation Dr. (Smartpark)

**Office Hours or Availability:** Open, but please call or send email to arrange a mutually convenient time

**Office Phone No.:** 204-474-9555

**Email:** [rotimi.aluko@umanitoba.ca](mailto:rotimi.aluko@umanitoba.ca)

All email communication must conform to the [Communicating with Students](#) university policy.

## COURSE DESCRIPTION

Chemical and functional properties of ingredients and their application in designed foods: low fat, low calorie, high fibre, high energy and innovative food products.

## LEARNING OUTCOMES

1. Understand the properties of food components and their functions in food products.
2. Learn how to select ingredients to design physical and nutritional properties of food products.
3. Collect relevant information for health effect of specific food ingredients and apply to evaluate nutritional quality of food products and raw materials.

### Foundational Knowledge Content Areas for Dietetics Education:

This dietetic education program is an accredited program recognized by the Partnership for Dietetic Education and Practice (PDEP) and prepares students for eligibility for registration with a provincial dietetics regulatory body.

*Highest level achieved: 1= demonstrate broad knowledge; 2= demonstrate comprehension; 3 = analyze, interpret and apply knowledge*

Content Area	Foundational Knowledge	Cognitive Complexity Level
<b>Anatomy and Physiology</b>	Genetics and nutrigenomics	1
<b>Biochemistry</b>	Foundations of chemistry and biochemistry	3
	Major metabolic pathways	3
	Foundations of cellular and molecular biology	2
	Mechanisms of metabolic regulation	2
<b>Communication</b>	Opportunities for and barriers to communication	1
	Strategies for effective written communication	1
	Strategies for effective oral communication	1
	Medical and dietetics-related terminology	1
<b>Counselling</b>	Counselling strategies and techniques	1
<b>Food</b>	Physical properties and chemical composition of food	3
	Food preservation, storage and packaging	2
	The role of ingredients and their interaction in food preparation	3
	Household food preparation	2
	Application of dietary requirements, guidelines, and guidance tools to food planning	2
	Food modification to address therapeutic, textural or other needs	3
	Sensory evaluation of food	1
	Religious and cultural food practices	2

	Food labeling	2
	Food-borne illness	1
<b>Human Nutrition across the Lifespan</b>	Ingestion, digestion, absorption, metabolism and excretion of nutrients	1
	Biochemical utilization of nutrients and energy	2
	Nutrient and energy requirements	1
	Nutrition recommendations and guidelines	1
	Effect of deficiencies and toxicities of nutrients	1
	Food sources of nutrients and dietary supplements	3
	Role of nutrients and other food components in health	3
	Dietary practices	1
<b>Management</b>	Project management	1
	Regulations, policies and procedures	1
<b>Microbiology</b>	Microbes in food production including prebiotics and probiotics	2
<b>Nutrition Care</b>	Etiology and pathophysiology of nutrition-related diseases	1
<b>Process and Medical Nutrition Therapy</b>	Nutrition-related disease management strategies	1
	Oral, enteral, and parenteral nutrition support	1
	Complementary and alternative nutrition therapies	2
<b>Pharmacology</b>	Nutrients and nutraceuticals as pharmacological agents	2
	Natural health products	2
<b>Population Food Systems and Food Security</b>	Food production, preparation, processing, distribution and waste management	1
	Global and local food systems and factors affecting the supply of food	1
<b>Research and Evaluation</b>	Theoretical foundations of research	1
	Ethics in research	1
	Literature search strategies	3
	Systematic review and critical appraisal of literature	3
	Use of technology to seek and manage information	3

## **TEXTBOOK, READINGS, MATERIALS**

There is no available book that covers all aspects of food ingredients discussed in this course.

**Properties and types of food ingredients are covered in a book available in library:**

1. Functional properties of food components by Y. Pomeranz, Academic Press 1991.

**Functional and nutraceutical aspects of food components are discussed in:**

1. "Functional Foods and Nutraceuticals" by Rotimi Aluko. Springer, 2012. Electronic book.
2. "Essentials of Functional Foods" by Schmidl M.K. and Labuza T.L. Aspen Publication 2000.
3. Functional Foods: Designer Foods, Pharmafoods, Nutraceuticals by I. Golberg; Chapman and Hall 1994.

## COURSE TECHNOLOGY

### Databases

- Agricola
- Google Scholar

### Journals

- Food Chemistry
- Journal of Agricultural and Food Chemistry
- Journal of Food Biochemistry
- Journal of Functional Foods
- Food Research International
- Molecular Nutrition and Food Research
- Journal of Nutrition
- Nutrients
- Journal of Food Science
- Journal Human Nutrition and Dietetics
- Current Topics in Nutraceutical Research
- Food and Nutrition Research
- Critical Reviews in Food Science and Nutrition
- Annual Reviews in Food Science and Technology
- Trend in Food Science & Technology
- Journal of Nutritional Biochemistry
- Nutrition Bulletin

## POLICY ON CLASS COMMUNICATION

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The University requires all students to activate an official University email account. For full details of the Electronic Communication with Students please visit:

[http://umanitoba.ca/admin/governance/media/Electronic Communication with Students Policy - 2014 06 05.pdf](http://umanitoba.ca/admin/governance/media/Electronic_Communication_with_Students_Policy_-_2014_06_05.pdf)

Please note that all communication between me and you as a student 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)). You are required to obtain and use your U of M email account for all communication between yourself and the university.

## RECORDING CLASS LECTURES

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Dr. Rotimi Aluko and the University of Manitoba hold copyright over the course materials, presentations and lectures which form part of this course. 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. Aluko. Course materials (both paper and digital) are for the participant's private study and research.

## 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).

## PLAGIARISM AND CHEATING

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Plagiarism or any other form of cheating in examinations, term tests or academic work is subject to serious academic penalty (e.g. suspension or expulsion from the faculty or university). Cheating in examinations or tests may take the form of copying from another student or bringing unauthorized materials into the exam room (e.g., crib notes, pagers or cell phones). Exam cheating can also include exam personation. (Please see [Exam Personation](#), found in the Examination Regulations section of the General Academic Regulations). A student found guilty of contributing to cheating in examinations or term assignments is also subject to serious academic penalty.

To plagiarize is to take ideas or words of another person and pass them off as one's own. In short, it is stealing something intangible rather than an object. Plagiarism applies to any written work, in traditional or electronic format, as well as orally or verbally presented work. Obviously it is not necessary to state the source of well-known or easily verifiable facts, but students are expected to appropriately acknowledge the sources 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 to written material, and materials or information from Internet sources. To provide adequate and correct documentation is not only an indication of academic honesty but is also a courtesy which enables the reader to consult these sources with ease. Failure to provide appropriate citations constitutes plagiarism. 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 him/ herself, or copies the answer or answers of another student in any test, examination, or take-home assignment.

Working with other students on assignments, laboratory work, take-home tests, or on-line tests, when this is not permitted by the instructor, can constitute Inappropriate Collaboration and may be subject to penalty under the Student Discipline By-Law.

An assignment which is prepared and submitted for one course should not be used for a different course. This is called "duplicate submission" and represents a form of cheating because course requirements are expected to be fulfilled through original work for each course.

When in doubt about any practice, ask your professor or instructor.

The Student Advocacy Office, 519 University Centre, 474-7423, is a resource available to students dealing with Academic Integrity matters.

## STUDENTS ACCESSIBILITY SERVICES

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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* <http://umanitoba.ca/student/saa/accessibility/>

520 University Centre

204 474 7423

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

## OTHER STUDENT SERVICES

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### **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 201 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).

### **Student Counselling Centre (SCC):**

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

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

**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* <http://umanitoba.ca/student/health-wellness/welcome.html>

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>

**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:

#### **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 [http://umanitoba.ca/admin/governance/media/Intellectual\\_Property\\_Policy\\_-\\_2013\\_10\\_01.pdf](http://umanitoba.ca/admin/governance/media/Intellectual_Property_Policy_-_2013_10_01.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

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### Expectations: I Expect You To

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- Treat me with respect and you will get same courtesy in return. See [Respectful Work and Learning Environment Policy](#).
- Avoid use of cell phones, tablets or other electronic devices, except with my prior approval.
- Respect your peers by avoiding chatting and noise-making during classes.
- Respect the input of your peers during group assignments and group members must treat each other with respect. Abusive language or conduct will not be tolerated.
- Take notes in the class as they will be provided only during the teaching period. If you will be absent from a class please arrange to get notes with one of your peers. Do not send me a request for notes if you miss a class.

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### Expectations: You Can Expect Me To

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- Use questions in class as part of my teaching practice. I expect students to respond but I do not expect perfection.
- Illustrate my teaching as drawings and notes on the overhead electronic board in addition to the powerpoint slides.
- Answer your questions to the best of my ability but do not expect perfection.

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### Class Schedule

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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).

#### Lecture Topics:

1. **Functions of food components (Carbohydrates, Lipids, & Proteins):**
  - a) Nutritional/health aspects;
  - b) Physical/textural/sensory aspects of food components.
  - c) Flavour properties.
2. **Designed/specialty foods - formulations, food ingredients and their functions:**
  - a) **Low fat** - formulation, ingredients, fat replacers; fat reduction - nutritional and food properties changes;
  - b) **Low calories** - bulking agents and their function, health and nutritional aspects; replacers of fat, proteins and carbohydrates; utilization of resistant starch; sugar alcohols - their functions and nutritional properties;
  - c) **Low protein/hypoallergenic foods** - specialty ingredients with specific proteins; gluten; allergens in oilseeds and grains; amino acids, peptides, peptones and proteins - nutritional and functional properties;
  - d) **High fibre foods** - fibre definition, types and source of fibre; function of fibre; additives/supplementation;
  - e) **Pro- and Prebiotics** - their function in digestive tract; products produced; health promotion; foods with Lactic acid bacteria and/or with their products;
  - f) **Phytochemicals and antioxidants** - function in food and metabolic system; types of known components and their possible functions; food products/ingredients with health functionality; health related components/ingredients; health claims;

3. **Medical foods** - specialized ingredients and technologies involved in formulation of food for metabolic defects.
4. **Introduction to Nutrigenomics**- relationships between diet and gene functions.

### **Laboratory Expectations**

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This course does not have a laboratory component

### **Course Evaluation Methods**

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Due Date:	Assessment Tool	Value of Final Grade
11:59 pm, Sun, Jan 28, 2024*	Assignment I	10%
11:59 pm, Sun, Feb 18, 2024*	Assignment II	10%
11:59 pm, Sun, Mar 03, 2024*	Assignment III	20%
11:59 pm, Sun, Mar 24, 2024*	Assignment IV	30%
Per Exam time-table	Final Examination (cumulative)**; 2 hrs	30%

\*ALL assignments must be submitted through UMLearn by the stipulated deadlines

\*\*Final Exam: multiple choice, true or false, jeopardy-style, short answers; total of 200 points

### **Grading**

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Letter Grade	Percentage out of 100	Grade Point Range	Final Grade Point
A+	90-100		4.5
A	80-89		4.0
B+	70-79		3.5
B	65-69		3.0
C+	60-64		2.5
C	55-59		2.0
D	50-54		1.0
F	Less than 50		0

### **Assignment Descriptions**

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Each submission must have a cover page with assignment title, student name and number, as well as course name, number, instructor. The maximum number of pages for each assignment does not include the cover page. All assignments must be submitted through UMLearn only.

### **Assignment I**

Discuss the effects of food processing methods on the quality and quantity of nutrients. (10 marks)

*Note: Maximum of 2 pages, single spaced (no references required).*

### **Assignment II**

Describe the structural differences between raw starch and gelatinized starch. (10 marks)

*Note: Maximum of 2 pages, single spaced (no references required).*

### **Assignment III**

Describe the functional role of gelatin as an ingredient for the following food systems (20 marks):

- a. Salad dressing: **5 marks**
- b. Gel (jello): **5 marks**
- c. Cake: **5 marks**
- d. Whipped cream: **5 marks**

*Note: Maximum of 4 pages, single spaced (no references required).*

### **Assignment IV**

Describe the catalytic activities of three (3) types of lipases (**10 marks each**) and show how each one can be used to make specific types of structured lipids. In addition to your text, please use diagrams to illustrate your answers. (30 marks)

*Note: Maximum of 3 pages, single spaced (no references required).*

## **Assignment Grading Times**

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- Graded assignments will be returned approx. 10-14 days after submission.

## **Assignment Extension and Late Submission Policy**

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Papers received after 11:59 pm on the due date will attract 10% deduction per day from the earned marks. No submission will be accepted 3 days after the deadline and a score of zero will be entered. All assignments **MUST** be submitted online through UMLearn. **Assignments will NOT be accepted as email attachments.**