



University of Manitoba  
Faculty of Agricultural and Food Sciences  
Department of Animal Science

# ANSC 7540 / ANSC 4570 ADVANCED APPLIED ANIMAL NUTRITION

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## COURSE DETAILS

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**Course Title & Number:** ANSC 7540 /ANSC 4570 Syllabus

**Number of Credit Hours:** 3.0 / 3.0

**Class Times & Days of Week:** 11:30 am – 12:45 pm on Tuesday and Thursday

**Location for classes** 343 Agriculture Building  
**Location for labs/tutorials:** /No fixed time and TBD between students and Mr. Prakash Sharma ([P.Sharma@umanitoba.ca](mailto:P.Sharma@umanitoba.ca))

**Pre-Requisites:** None

### Instructor Contact Information

Instructor(s) Name:	Dr. C.M. Nyachoti	Dr. J.C. Plaizier	Dr. Chengbo Yang
Preferred Form of Address	Dr. Nyachoti	Dr. Plaizier	Dr. Yang
Office Location:	224 Animal Sci. Bldg	232A Animal Sci. Bldg	227 Animal Sci. Bldg
Office Phone No.	204 474-7323	204 474-9500	204 474-8188
Email	<a href="mailto:Martin.Nyachoti@umanitoba.ca">Martin.Nyachoti@umanitoba.ca</a>	<a href="mailto:Kees.Plaizier@umanitoba.ca">Kees.Plaizier@umanitoba.ca</a>	<a href="mailto:chengbo.yang@umanitoba.ca">chengbo.yang@umanitoba.ca</a>
	All email communication must conform to the <a href="#">Communicating with Students</a> university policy. (Please familiarize yourself with the policy). Use the subject line to state the reason for your e-mail and add the course number. This will help to expeditiously determine which e-mails may need a quick response. Please avoid salutations such as 'Hey You' or 'Hi There'. Dear Dr. Nyachoti, Dear Dr. Plaizier, or Dear Dr. Yang will be fine. Email response may take up to 36 hours. If you send an email on Friday afternoon or over the weekend you will most likely get a response no earlier than the following Monday.		
Office Hours or	Generally, open door policy but best to schedule an appointment		

<b>Availability:</b>	
<b>Contact:</b>	Students are encouraged to come to the office, or approach the instructors immediately before or after the lecture. Use email communication only when absolutely necessary. Students are also welcome to phone the office.

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## **Course Description**

An advanced study of the theoretical and applied aspects of monogastric and ruminant nutrition. A laboratory component will provide training in current techniques in feed analyses and computer modeling.

## **General Course Information**

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The livestock industry is not only an important contributor to the economy but it also responsible for the production of high quality protein food products for human consumption. Feed, which supplies the nutrients required by animal for maintenance and production, is the single most expensive input in commercial livestock production. Furthermore, excess nutrients excreted in manure are a major risk factor for environmental pollution. Thus, for efficient production systems, it is critical to carefully manage dietary nutrient supply and to understand factors that influence nutrient utilization by animals. Students in the course will be introduced to various concepts used in practical animal nutrition.

## **Course Goals**

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The objectives of the courses are:

- a) To provide students with a detailed understanding of the theoretical and applied aspects of animal nutrition.
- b) To introduce students to nutritional regulation of oxidative stress and interactions between nutrients and health.
- c) To expose students to the techniques used in advanced animal nutrition research.

## **Intended Learning Outcomes**

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At the end of the course, students will be able to:

- a) Understand the concepts of bioavailability and digestibility of nutrients.
- b) Understand the various nutritional concepts used in practical diet formulation.
- c) Understand the role of nutrition in the maintenance of health.
- d) Understand the basic techniques used in assessing nutritional value of feedstuffs.
- e) Apply the skills and knowledge gained from this course to evaluate application of different technologies to the science of applied animal nutrition.

## **Using Copyrighted Material**

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Please respect copyright. The content used in this course is appropriately acknowledged and is copied in accordance with copyright laws and University guidelines. Copyrighted works, including those created by the instructors, are made available for private study and research and must not be distributed in any format without permission.

## **Recording Class Lectures**

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The instructors of the course allow no audio or video recording of lectures or presentations in any format, openly or surreptitiously, in whole or in part without permission. Course materials (both paper and digital) are for the participants' private study and research.

## **Textbook, Readings, Materials**

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### **Course Materials**

There are no required texts for the course. However, students are encouraged to consult recent books on animal nutrition. The following are good examples:

1. Nutrient Requirements of Swine (2012), 11<sup>th</sup> ed., Natl Acad. Sci., Washington, DC
2. Farm Animal Metabolism and Nutrition, J. P. F. D'Mello (Ed.).
3. Amino Acids – Biochemistry and Nutrition, G. Wu, CRC Press, Boca Raton, FL, USA.
4. Feed Evaluation Science, P. J. Moughan and W.H. Hendricks (Eds.); Wageningen University Press.
5. Feeding Systems and Feed Evaluation Models, M.K. Theodorou and J. France, CABI Publishing, Wallingford, UK.
6. Swine Nutrition, A. J. Austin and L. L. Southern (Eds.).
7. Scott's Nutrition of the Chicken, S. Leeson and J. D. Summers
8. Recent Developments in Pig Nutrition
9. Recent Developments in Ruminant Nutrition
10. Recent Advances in Animal Nutrition, P.C. Garnsworthy and J. Wiseman, Context Products Ltd, Packington, UK
11. Sustainable Swine Nutrition, L.I. Chiba, John Wiley and Sons, Inc., Ames, IA USA
12. The Science & Practice of Pig Production 2006. 2nd Ed., Kyriazakis, I. & Whittemore, C.T. Ames, Iowa Blackwell Pub.
13. Feed efficiency in swine, 2012, Patience, J. F. Ed, ISBN: 978-90-8686-756-1 (Online)
14. Applied nutrition for young pigs, 2006, Mavromichalis, I, Wallingford, UK Cambridge, MA CABI
15. Principles of Animal Nutrition, 2017, 1st Edition, G. Wu, CRC Press, Boca Raton, FL, USA.

## Course Technology

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Student should not participate in personal direct electronic messaging / posting activities (e-mail, texting, video or voice chat, wikis, blogs, social networking (e.g. Facebook) online and offline “gaming” during scheduled class time. If you are expecting to receive an important call (emergency) switch your cell phone onto vibrate mode and leave the classroom before using it.

## 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 you as a student and the instructors of the course 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.

## Expectations: We expect you to:

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I expect you to:

- a) Attend class on time so we start on time.
- b) Ask for help when you need assistance.
- c) Submit your own work for individual assignments and to work together in a team for group assigned projects.
- d) To act in a civil, respectful, and responsible manner toward all members of the U of M community.
- e) We will treat you with respect and would appreciate the same courtesy in return. See [Respectful Work and Learning Environment Policy](#).

### Academic Integrity:

Group and individual assignments are expected as part of fulfilling the requirements of this course.

- (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) Group assignments are meant to help develop an appreciation of team work in addition to academic knowledge and skills, therefore, complaints from other group members for not cooperating or doing the assigned tasks may result in dismissal

from a group. In such a situation the student will not be awarded any marks nor offered to do an individual project.

- (iv) For individual assignments, while students can discuss the assignment with their colleagues, they should complete the assignment independently.

## **Students Accessibility Services**

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### **Student Accessibility Services**

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)

## **Expectations: You Can Expect Us To**

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A large part of teaching practice includes the use of PowerPoint lectures in class. The PowerPoint lectures provide a summary of key points. However, students are expected to attend class as discussions during lectures form part of the examinable material. Students are expected to be engaged and to give their best effort in class discussions but perfection is not expected.

## Class Schedule

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](#)). If you miss lecture(s), it is your responsibility to obtain any information announced in class.

PERIOD	INSTRUCTOR	TOPIC
Sep 05	ALL	Introductions, Course Outline, Schedules
Sep 10	C.M. Nyachoti	Current Status of Applied Animal Nutrition – monogastrics
Sep 12	C.M. Nyachoti	Dietary nutrient supply and requirements
Sep 17	C.M. Nyachoti	Nutrient bioavailability measurements
Sep 19	Students	Self-Study
Sep 24	C.M. Nyachoti	Nutrition and gut health and function
Sep 26	Students	Literature Review – Student Presentations
Oct 01	B.A. Slominski	Dietary Carbohydrate Analysis and Utilization Literature
Oct 03	Students	Review – Student Presentations
Oct 8	C. Yang	Dietary Phytonutrients as Alternatives-to-Antibiotics in Agricultural Animals
Oct 10	Students	Self-Study
Oct 15	C. Yang	Organic Acids as Antibiotic Alternatives in Monogastric Animals
Oct 17	Students	Literature Review – Student Presentations
Oct 22	Karmin O	Nutritional regulation of oxidative stress and inflammatory response
Oct 24	Students	Literature Review – Student Presentations
Oct 29	C. Yang	Understanding gut chemosensing to improve gut health and development for sustainable animal production
Oct 31	Students	Self-Study
Nov 05	J.C. Plaizier	Current Status of Applied Animal Nutrition – The Ruminant
Nov 07	Students	Self-Study
Nov 19	J.C. Plaizier	Digestibility Markers and Mathematical Calculations
Nov 21	Students	Literature Review – Student Presentations
Nov 26	J.C. Plaizier	Digestibility Markers and Mathematical Calculations
Nov 28	Students	Literature Review – Student Presentations
Dec 3	J.C. Plaizier	In vitro and In Sacco Techniques and NIR
Dec 5	ALL	Literature Review – Student Presentations Last Day of Class – Course Review and Discussion on Final Exam
Dec 09-20		Final Exam



## Laboratory Exercise

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Each student will be provided with an unmarked sample to use in this exercise.

### Required Tasks:

- Review the literature on feed and feed ingredient evaluations methods.
- Based on your review, decide on the type of analyzes you need to conduct to positively identify the sample assigned to you.
- Arrange with the laboratory manager, Mr. Prakash Sharma, to complete the analyses you have picked.
- Prepare a report detailing the methods you used in each analysis, the results obtained and identification of the sample analyzed.
- Be sure to provide a detailed justification for the methods you choose and your final determinations.
- Formulate a diet for either swine, poultry or ruminants based on your feed ingredient and those analyzed by other students in the course or from NRC databases.

**Mark:** 15%;

**Due date:** November 24, 2019

## CLASS PRESENTATIONS

1. Each student will make three presentations on a topic selected with the instructors' approval.
2. An abstract of the presentation plus a copy of the main paper on which the presentation is based should be provided to the class one week prior to the presentation date.
3. Each presentation will last 20 minutes plus 5 minutes for questions and discussion.
4. The instructors and students in the course will evaluate class presentations.
5. Each presentation is worth **10 marks**, 7.5 marks awarded by the instructor and 2.5 marks by the students.

6. Each student MUST make a contribution to the discussions following the presentation.  
*This may include asking questions and/or making appropriate comments.*

## TERM PROJECT

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**Background:** There continues to be increased interest in the application of “new” and “not-so-new” concepts and/or analytical techniques from other disciplines of science to animal nutrition to better understand how livestock respond to different nutritional manipulations.

**Objective:** To provide the students with an opportunity to become familiar with techniques and concepts that otherwise are not traditionally used in nutritional sciences but have potential to enhance nutritional knowledge and the development of technologies for applied animal nutrition.

**Approach:** Each student will be assigned a topic to work on. You will be expected to conduct a detailed review of the literature on the concept/technique as it relates to animal nutrition. On the basis of this review, you are to prepare a 25 to 30-minute PowerPoint presentation to be made in class. Your presentation should clearly address the following questions, among others:

- Why the concept or technique has gained in interest in animal nutrition;
- How is it done or what does it involve?
- What are the underlying principles?
- How is it or can it be applied to animal nutrition;
- How can you design an experiment in which the concept / technique is used? Be sure to include all the key elements of experimental design.
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**Suggested Topics:**

- 1) Real Time PCR
- 2) Digital PCR
- 3) Nuclear Magnetic Resonance
- 4) Nutrigenomics
- 5) Proteomics
- 6) Near Infrared Spectroscopy
- 7) Gnotobiotic models and intestinal microbiota
- 8) Knock out animal models
- 9) Dual Emission X-ray Absorptiometry (DEXA)
- 10) Ussing Chambers
- 11) Radioisotopes
- 12) Indirect calorimetry and energy metabolism

**Mark:** 20%; **Presentation dates:** November 28 & December 05, 2019

## Course Evaluation Methods

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Course Evaluation: Exam, Presentation, Class discussions, and Laboratory reports

Assessment Tool	Value of Final Grade
Final Exam	30%
Class Presentations	30%
Term Project	20%
Laboratory Exercise	15%
Class Participation	10%
<b>Total</b>	<b>100%</b>

## Grading

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The grading scale for the course is given below:

Letter Grade	%	Grade Point Range	Final Grade Point
A+	91-100	4.25-4.5	4.5
A	84-90	3.75-4.24	4.0
B+	77-83	3.25-3.74	3.5
B	70-76	2.75-3.24	3.0
C+	65-69	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

## University Support Office & Policies

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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”

**Section (a) sample re:** 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) sample:** re: 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 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>

[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>

**Section (c) sample:** re: 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) sample:** re: 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](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

[student\\_advocacy@umanitoba.ca](mailto:student_advocacy@umanitoba.ca)