

Course Outline Form: Winter 2018

General Information

Course Title: ANSC*6480 Advanced Animal Nutrition – II Lipids, Vitamins and Minerals

Course Description:

The course will help students develop the skills to be able to continuously improve their understanding of the function, utilization, and effects of nutrients and other dietary compounds, and the complex cellular mechanisms involved in nutrient metabolism.

The course is not meant to be comprehensive and systematic. Rather, it will be topic-based and explore recent advances in our understanding of the roles and metabolism of nutrients, the cellular mechanisms involved in nutrient utilization and the regulatory roles that different nutrients can play.

The course will stimulate students to take their learning experience to a higher level. It will present challenging material. It will also foster in the students the notion that whole-body functions of animal can be explained by appealing to cellular metabolism.

Prerequisite(s): N/A

Equate(s): N/A

Credit Weight: 0.5

Academic Department (or campus): Dept. of Animal Biosciences

Campus: Guelph

Semester Offering: W18

Class Schedule and Location: ANNU 002 Tuesday 2:30 to 5:20PM

Instructor Information

Instructor Name: Dominique P Bureau

Instructor Email: dbureau@uoguelph.ca

Office location and office hours: T Th, 11:30 a.m. to 12:30 p. m. or by appointment

GTA Information

GTA Name: Not applicable

GTA Email: Not applicable

GTA office location and office hours: Not applicable

Course Content

Specific Learning Outcomes:

The course is designed to meet the following Learning Objectives of the University:

#1) Literacy: Students will be required to review scientific papers, comprehend and present ideas and research findings to the class orally, and write a concise review paper on their findings.

#2) Understanding of Forms of Inquiry: A major theme of this course will pertain to the process whereby worthwhile research questions are identified and tackled.

#3) Depth and Breadth of Understanding: This course will cross several conventional discipline boundaries within the broad areas of animal science, nutrition science and metabolism. Material pertinent to human nutrition or to biological chemistry may be presented as a mean to provide an expanded view of the field of nutritional sciences, the cellular and molecular mechanisms at play and the breath of techniques used. In addition, the students will be encouraged to go beyond material discussed in class.

#4) Independence of Thought: Emphasis will be placed on identifying and understanding the basis for current viewpoints. Inevitably, this results in challenges to orthodoxy.

#5) Love of Learning: This course will be aimed at helping students to distinguish between education and training, and to ascribe value to both.

Lecture Content:

The course will be comprised of lectures (short reviews) by the course instructor, presentations on cutting-edge research topics made by well-established scientists (guest lecturers), and discussion of published scientific papers on the structural, metabolic and regulatory roles of lipids, vitamins, and minerals, as well as, issues related to the dietary supplies of these different nutrients. The instructors will provide a small number of scientific papers to read prior to each class.

Schedule & Topics (Tentative, as of 9 January 2018)

Week	Theme
Week #1 9 Jan 2018	Introduction to the course. Presentation of the Evaluation Scheme (0.5h) Instructor Review #1: Lipids, Vitamins and Minerals: Chemical Structures Classification and Properties. Roles and Digestion (1.5h) Description of Individual Review Paper (general guidelines and expectations) (0.5h)
Week #2 16 Jan 2018	Instructor Review #2: Dietary Requirements for Lipids, Vitamins and Minerals : Concepts for Animal Nutritionists (1.5h) Description of Team Projects (General guidelines and expectations) (0.5h) Selection of Individual Review Paper Topics and Discussion (0.5h)
Week #3 23 Jan 2018	Instructor Review # 3: Lipids, Vitamins and Minerals as Structural Components (1.5h) Journal Club: What to look for in a scientific paper?: Review and discussion of a few original scientific articles led by instructor (1 h)
Week #4 30 Jan 2018	Instructor Review #4: Lipids and Fat-Soluble Vitamins as Regulatory Molecules (1.5h)
Week #5 6 Feb 2018	Journal Club: Review of original scientific articles led by students (2.5h)
Week #6 13 Feb 2018	Journal Club: Review of original scientific articles led by students (2.5h)
Week #7 20 Feb 2018	Reading week – No class

Week #8 27 Feb 2018	Guest Lecture: Calcium nutrition of poultry (Prof. Elija Kiarie, ABSc) 2.5h
Week #9 6 Mar 2018	Guest Lecture: Regulation of Lipid Deposition (Prof. A. Canovas, ABSc) (1.5h) Team Project Outline Presentations (1h)
Week #10 13 Mar 2018	Student Presentations on Individual Review Paper (4-6 students, 1.5h) Team Project Outline Presentations (1 h)
Week #11 20 Mar 2018	Guest Lecture: Evolution of dairy model (John Cant) (2.5h)
Week #12 27 Mar 2018	Student Presentations on Individual Review Paper (10-12 students, 2.5h)
Week #13 3 Apr 2018	Showcase of Team Projects (2.5h) – Location to be determined.

Course Assignments and Tests:

1) Individual Review Paper

Each student will be expected to write a review paper on a cutting-edge topic on a specific nutrient, which can either be a lipid, vitamin, mineral or related compound (e.g. nucleotides, choline, etc.). The topic has to be on a recently elucidated chemical, digestive, metabolic, cellular, or physiological mechanism or process related to this nutrient or molecule.

The preparation of the review will follow a series of step. Early in the semester, each student will submit a *short outline of the topic*, comprised of a tentative title and reference for three key scientific papers (preferably original research articles) and a short summary (300 words max) by the specified deadline. The students are required to consult with the instructor on the suitability of their topic in advance of the deadline. A list of suggested topics for individual research projects are provided in the Additional Course Information section of this course outline.

The student will select one of the original scientific articles and lead a review / critique of this article in class in a journal club format. The student will make it available to the other students at least one week in advance of journal club.

The student will be required to prepare a *seminar (7-8 min max.)* on the specific topic of their review. The seminar should provide a good overview of the topic but doesn't have to be exhaustive or fully representative of the entire review paper. The instructor and fellow students will provide feedback on the content and format of the seminar as well as on the presentation style of the student.

The student will prepare a *review paper (10 pages max.)* and submit at the end of the semester by the specified deadline. Guidelines on the format of the review will be provided by the instructor during the semester. The review should be as scientific and systematic as possible. The review should be written for a readership composed of your peers (i.e. graduate level animal nutritionists/ scientists).

2) Team Project

A small project will be assigned to teams made of three (3) to four (4) students. The instructor will provide general guidelines for the project in class. There are many different ways of approaching the project and it will be up to team of students to define their approach and carry out the project. The project could be the development of a model, a feeding regime, a calculation tool to support the use/sale of a novel feeds, ingredient or additive, a nutritional assessment tool, etc. A list of suggested topics for team projects are provided in the Additional Course Information section of this course outline.

The teams of students will submit a brief outline (200 words max.) of their project idea to the instructor for approval by the specified deadline. The teams of student will then present their project idea to the class in a short seminar (15 min max.) at around the mid-point of the semester and seek feedback from the class and the instructor. At the end of the semester, the students will prepare a showcase of their project for the department and industry stakeholders.

3) Participation

Participation is an important part of the course. The instructor will provide scientific papers to read and the students will be expected to have read them prior to class and actively participate in the discussion. In addition, the students are expected to actively participate in the planning of the showcase of team project that will be held at the end of the semester. The student will be asked by the instructor to provide an appreciation of their participation.

Labs: Not applicable

Seminars: Each student will be required to present two seminars (one presenting a team project and one on their individual research project).

Course Assignments and Tests:

Evaluation	Due date (Tentative)	Contribution to Final Mark (%)	Learning Outcomes Assessed
Individual Review Paper – Topic Selection, References and Outline	23 January 2018	10 %	#1, #2, #4
Team Project – Topic Selection and Outline	30 January 2018	10 %	#1, #2, #4
Team Project – Seminar	6 & 13 March 2018	10%	#1-5
Individual Review Paper – Seminar	13 & 27 March 2018	20 %	#1-5
Participation – Journal Club	End of semester	10%	#4-5
Team project – Showcase	3 April 2018	20 %	#1-5
Individual Review Paper – Final draft	13 April 2018	20%	#1-5

Additional Notes (if required): Not applicable

Final examination date and time: Not applicable

Final exam weighting: Not applicable

Course Resources

Required Texts: Not applicable

Recommended Texts: Not applicable

Lab Manual: Not applicable

Other Resources: Electronic copy of instructor's reviews (copies of the PPTslides) and other material will also be posted on a weekly basis on the course website.

Field Trips: Not applicable

Additional Costs: Not applicable

Course Policies

Grading Policies:

Outlines will be graded in a timely fashion (within 10 days). The students will received personalized feedback on their seminars to highlight some of the shortcomings in the students' work, presentation style, etc..

Papers, projects and proposals must be submitted by 5 PM on the due date. Assignments submitted late will be subjected to 10% penalty per day late.

Course Policy on Group Work: All individuals are expected to contribute equally to any team project.

Course Policy regarding use of electronic devices and recording of lectures:

Electronic recording of classes is allowed with the consent of the instructor. When recordings are permitted they are solely for the use of the authorized student and may not be reproduced, or transmitted to others, without the express written consent of the instructor.

University Policies

Academic Consideration:

The University of Guelph is committed to supporting students in their learning experiences and responding to their individual needs and is aware that a variety of situations or events beyond the student's control may affect academic performance. Support is provided to accommodate academic needs in the face of personal difficulties or unforeseen events in the form of Academic Consideration.

Information on regulations and procedures for Academic Consideration, Appeals and Petitions, including categories, grounds, timelines and appeals can be found in the graduate calendar.

Academic Misconduct:

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community, faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring.

University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Detailed information regarding the Academic Misconduct policy is available in the graduate calendar.

Accessibility:

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Student Accessibility Services (SAS), formerly Centre for Students with Disabilities (CSD), as soon as possible.

For more information, contact SAS at 519-824-4120 ext. 56208 or email sas@uoguelph.ca or visit the [Student Accessibility Services website \(http://www.uoguelph.ca/csd/\)](http://www.uoguelph.ca/csd/).

Course Evaluation Information:

End of semester course and instructor evaluations provide students the opportunity to have their comments and opinions used as an important component in the Faculty Tenure and Promotion process, and as valuable feedback to help instructors enhance the quality of their teaching effectiveness and course delivery.

While many course evaluations are conducted in class others are now conducted online. Please refer to the [Course and Instructor Evaluation Website](#) for more information.

Drop period:

The drop period for single semester courses starts at the beginning of the add period and extends to the Fortieth (40th) class day of the current semester (the last date to drop a single semester courses without academic penalty) which is listed in [Section III \(Schedule of Dates\) of the Graduate Calendar](#).

The drop period for two semester courses starts at the beginning of the add period in the first semester and extends to the last day of the add period in the second semester.

Information about Dropping Courses can be found in the Graduate Calendar.

Additional Course Information

Suggested Topic of Individual Research Projects

- 1) Basis of essentiality of phospholipids for early life stage of certain fish species
- 2) Regulation of phosphatidyl choline synthesis in the liver of mammals
- 3) The emerging roles of DHA (22:6 n-3) in modulation of inflammatory processes
- 4) The roles and effects of omega-3 fatty acids on neurotransmitters metabolism
- 5) The basis of essentiality of vitamin E : Beyond an antioxidant effect
- 6) Effect of Copper deficient or excel on neurological and circulatory systems
- 7) Interactions between folate and lipid metabolism
- 8) Effect of omega-3 and omega-6 fatty acids on carcinogenesis

- 9) Regulation of energy metabolism by long-chain fatty acids
- 10) Metabolic effects of free fatty acids in animals
- 11) Dairy lipids on cardiovascular risk in humans
- 12) Efficiency of elongation and desaturation of omega-3 fatty acids in different animal species
- 13) Comparison of the metabolic effect of feeding inorganic minerals and organic (chelated) mineral sources
- 14) Differential effects of different fatty acids on gastro-intestinal motility
- 15) Vitamin D and muscle development and metabolism
- 16) Effect of fatty acid composition of phospholipids on the cellular and mitochondrial metabolisms of poikilotherms
- 17) Effect of dietary potassium and anionic salts on acid–base balance in dairy cows
- 18) Effects of mineral ions and particles on gill epithelial cells of fish
- 19) Effects of selenium on immune and antioxidant responses during infections in poultry
- 20) Systemic effects of natural phenols
- 21) Hormonal and mineral regulation of the deposition and mobilization of medullary bone material in poultry

Suggested Topics for Team Projects

- 1) Calculator to predict required intake of certain food products to meet the daily recommended intakes for omega-3 fatty acids of humans
- 2) Model to estimate the fatty acid composition of animal food products (fish, pork, beef, egg, etc.) as a function of the fatty acid composition of the diet and duration of feeding of this (these) diet(s)
- 3) Weight loss program and calculator to assist with food selection and daily feeding recommendations for dogs or cats
- 4) Model to estimate the phosphorus wastes from fish culture operations
- 5) Model to estimate digestibility of calcium and phosphorus for poultry and/or swine

- 6) Feeding program and calculator to manipulate the fat yield and the fatty acid composition of milk of dairy cows as a function of changes of seasons and forage/feedstuffs availability and composition
- 7) Model to predict or manipulate the pigmentation of Atlantic salmon or rainbow trout fillets
- 8) Factorial nutrient requirement model for macro or micro mineral or fatty acid requirements for an animal species
- 9) Calculator to estimate the DHA production or accumulation of animals fed different lipid sources
- 10) Model to predict the digestibility of lipids in different fish species fed different combination of lipids
- 11) Model to predict the fat content of animals as a function of diet, age, growth rate, etc.
- 12) Model to predict the fat content, marbling and value of beef carcass as a function of breed, weight, age and feeding, changes of seasons and forage/feedstuffs availability and composition
- 13) Model to predict the optimal diet composition of sled dog as a function of breed, weight and performance/activity level and environmental temperatures
- 14) Model to compare the cost-effectiveness of different micro-mineral sources for poultry, swine or fish
- 15) Model of skeletal mass and composition for laying hen, broiler chicken, grower pig or beef animal
- 16) A petfood product line addressing a certain market segment and developed based on a solid scientific research effort