ANSC*4560 - Pet Nutrition

Winter 2026 Course Outline
Section: 01
Credits: 0.50
Edited and improved using AI tools to enhance student understanding.

Land Acknowledgement: Guelph
The University of Guelph resides on the ancestral lands of the Attawandaron people and the treaty lands and territory of the Mississaugas of the Credit. We recognize the significance of the Dish with One Spoon Covenant to this land and offer respect to our Anishinaabe, Haudenosaunee and Métis neighbours. Today, this gathering place is home to many First Nations, Inuit, and Métis peoples and acknowledging them reminds us of our important connection to this land where we work and learn.

Land acknowledgement of Professor Shoveller: I acknowledge that I completed a BSc in Animal Biology, a Post Doctoral Fellowship in Companion Animal Nutrition and currently live and work in the City of Guelph which resides on the treaty lands and territory of the Mississauga of the Credit. I grew up in Cayuga on the banks of the Grand River and home to the Six Nations of the Grand River which unifies all Haudenosuanee peoples under the Great Tree of Peace. Every summer I spend time at our camp on the traditional lands of the Atikameksheng Anishnawbek and the Wahnapitae First Nation. I attended the University of Alberta in Edmonton which resides on the Treaty 6 Territory and respects the history, languages, and cultures of the First Nations, Metis, Inuit and all First Peoples of Canada. I offer my ongoing commitment to meaningful reconciliation work to the First Nations, Inuit and Metis peoples whose lived relationships with the land are time honoured.

Calendar Description

This course covers nutrient requirements, feed formulation and nutritional idiosyncrasies for dogs, cats, and exotic pets. Prerequisite(s): NUTR*3210 Department(s): Department of Animal Biosciences

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Course Description

This course covers nutrient requirements, feed formulation, and nutritional idiosyncrasies of dogs and cats.

Course Fit Within Program/Curriculum

An unrestricted elective that provides 32 hours of lecture material on dogs and cats accompanied by active learning and application live during lecture time and is focused on

providing a deep understanding of the unique approach to formulating and marketing dog and cat foods. In addition to lecture material, students will spend out of class time understanding a commercial product, attempting to formulate that product, and thinking about ingredient selection. In addition, students will take these learnings to work together to teach the rest of the class, through a 5-minute recording, about a digestive or metabolic idiosyncrasy of an exotic animal, which will be peer evaluated in the last two lectures of class.

Lecture Schedule

Tues/Thurs 10:00am-11:20am MCKN 117

BLENDED FORMAT.

This class will be a "flipped classroom" where recorded lectures will be available prior to the lecture period for viewing at your convenience and throughout the course. For the best learning opportunities, asynchronous lectures should be viewed prior to the active lecture portion.

Lecture periods will be spent answering questions you may have had from the recorded lecture, summarizing information, and showing you how to apply that information to your assignments and to real world applications of feeding dogs and cats. In person classes may also include guest presenters to provide a different perspective or challenge thinking. To participate meaningfully in the in-class applied activities, students are expected to watch the asynchronous lecture prior to class. In-class activities build directly on the recorded content and will not be repeated.

A simple summary of the lecture schedule is:

Weeks 1–6: Regulatory + ingredient fundamentals

Weeks 6–10: Metabolism blocks (energy → macros → vitamins → minerals → water)

Weeks 10–12: Behaviour + application + projects

Note: Everything in green means that students MUST attend lecture time for the in-class activity.

Week	Theme/Topic	In person or asynchronously	Author of lecture	Out of class learning/preparation	In class activities
06-Jan	Introduction	IN PERSON	Shoveller	Students to consider a commercial diet that personally interests them to complete their Product Review and Food Formulation assignments. Each student will be asked to write a rationale for why they chose that food and what they hope to learn from critically and reviewing that food.	Introduction to instructor, teaching assistants, and the learning objectives and activities of the course. Discussion on what you want to learn and how that desire should drive your commercial diet selection.
08-Jan	Senior dog and cat nutrition and management, what do we know?	Asynchronous	Banton	Asynchronous lecture Podcast- Caitlyn Dudas, The Good Company, on sustainability considerations for the pet food industry. https://www.youtube.com/watch?v=R7IrRpNAYME	Review of key points and opportunities to self assess your knowledge retrieval and application as it pertains to making claims on pet food.

13-15 Jan	Regulations in the pet food industry from food to supplements	Asynchronous	Wei	Asynchronous lecture Podcast: Scott Hawks on Pet Food Safety https://www.youtube.com/watch?v=VtzV9Ks9zE4	Review of key points and opportunities to self assess your knowledge retrieval and application as it pertains to making claims on pet food. Put key calculations and build your own Excel spreadsheet
15-Jan	Regulations in the pet food industry from food to supplements Supplement approval through the Low-Risk Veterinary Health Products	Asynchronous Asynchronous	Wei Ghandi	Asynchronous lecture	
20-Jan	Pet food ingredients	Asynchronous	Shoveller	Asynchronous lecture Podcast: Carolyn Kennedy on Functional Ingredients in Pet Food	Review of key points and opportunities to self assess your knowledge retrieval and application.

22-Jan	Manufacturing pet food: Ingredient quality and processing techniques	Asynchronous	Shoveller	Asynchronous lecture	Thursday in class guest: Learn about RAW feeding from Dr. James Templeman, Director of R&D at Primal Pet. Discuss alternative formats to dry and wet and work through some problems encountered in manufacturing raw foods.
27-Jan	Gastrointestinal anatomy and physiology	Asynchronous	Shoveller	Asynchronous lecture	No in person component
29-Jan	The role of the microbiome in digestion, metabolism and behaviour physiology of the dog and cat (PhD candidate, Lindsey Rummel)	Asynchronous	Rummel	Asynchronous lecture Podcast- Dr. George Fahey on the benefit of feeding different fibers. https://www.youtube.com/watch?v=lGOVHmYP1Eg	Thursday in class guest, PhD candidate Lindsey Rummel to discuss supporting the microbiome in dogs and cats.

03-Feb	Energy metabolism and requirements	Asynchronous	Anan	Asynchronous lecture	Review of key points and opportunities to self assess your knowledge retrieval and application. Put key calculations and build your own Excel spreadsheet
05-Feb	Weight loss strategies in dogs and cats	Asynchronous	Verbrugghe	Asynchronous lecture	Thursday in class guest: Dr. Adronie Verbrugghe to discuss weight loss strategies in dogs and cats
10-Feb	Protein and amino acid metabolism and requirements	Asynchronous	Shoveller	Asynchronous lecture Podcast- Dr. Kate Shoveller and Sydney Banton on formulation considerations of the sulfur amino acids https://www.youtube.com/watch?v=_7QXMTOhukg	Review of key points and opportunities to self assess your knowledge retrieval and application. Put key calculations and build your own
12-Feb	Protein and amino acid metabolism and requirements	Asynchronous	Shoveller		

					Excel spreadsheet
17 and 19 Feb	READING WEEK/NO CLASSES/NO LAB				
24-Feb	Lipid metabolism and fatty acid requirements	Asynchronous	Shoveller	Asynchronous lecture Reviewing material for midterm exam	Review of key points and opportunities to self assess your knowledge retrieval and application.
26-Feb	MIDTERM IN CLASS				Midterm exam IN CLASS
03 and 05 Mar	Carbohydrate metabolism, from starch to fiber	Asynchronous	Rankovic	Asynchronous lecture	Review of key points and opportunities to self assess your knowledge retrieval and application. Put key calculations and build your own Excel spreadsheet
10-Mar	Fat soluble vitamin metabolism and requirements	Asynchronous	Shoveller	Asynchronous lecture Podcast- Dr. Sara Cutler on how antioxidants protect petfood. https://www.youtube.com/watch?v=5xfBUsze8VU	Review of key points and opportunities to self assess your knowledge

					retrieval and application.
12-Mar	Water metabolism and requirements	Asynchronous	Shoveller	Asynchronous lecture Product overview due	Review of key points and opportunities to self assess your knowledge retrieval and application.
17-Mar	Water soluble vitamin metabolism and requirements	Asynchronous	Shoveller	Asynchronous lecture	Review of key points and opportunities to self assess your knowledge retrieval and application.
19-Mar	Mineral metabolism and requirements	Asynchronous	Shoveller	Asynchronous lecture	Review of key points and opportunities to self assess your knowledge retrieval and application.
24-Mar	Mineral metabolism and requirements	IN PERSON	Boerboom	Virtual lecture, in person attendance or by request for MS Teams.	Tuesday lecture: Dr. Gavin Boerboom from Selko, A Nutreco Company to

					discuss different forms of minerals.
26-Mar	Feeding behaviour of dogs and cats, the importance of managing feeding and the environment	Asynchronous	Shoveller	Asynchronous lecture Blog: https://whatyourcatwants.com/does-warming-your-cats-food-increase-its-appeal	Review of key points and opportunities to self assess your knowledge retrieval and application.
31-Mar 2-Apr	Viewing and marking final group project, MANDATORY IN CLASS	IN PERSON	NA	Group Project DUE Monday Formulation assignment due	Viewing and marking final group project, MANDATORY IN CLASS

Instructor Information

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Additional Support

Sanjana Anan, PhD candidate
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Learning Resources

Canine and Feline Nutrition, 3rd Edition, Mosby, Inc., St. Louis, MO. (Textbook)https://ebookcentral-proquestcom.subzero.lib.uoguelph.ca/lib/uoguelph/detail.action?docID=1429559

The Mark Morris Institute (MMI). Small Animal Clinical Nutrition, 5th Edition (Textbook) http://www.markmorrisinstitute.org/sacn5_chapters.html

Campus Resources

If you are concerned about any aspect of your academic program: Make an appointment with a Program Counsellor (https://www.uoguelph.ca/uaic/programcounsellors/) in your degree program. If you are struggling to succeed academically: There are numerous academic resources offered by the Learning Commons (https://www.lib.uoguelph.ca/using-library/spaces/learning-commons/) including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills.

Cost of Textbooks and Learning Resources= $0

Course Level Learning Outcomes

By the end of this course, you should be able to: Building on your fundamental nutrition knowledge, develop an understanding of the different needs of dogs and cats.

1. Develop an understanding of the basic digestive, physiological and metabolic processes of dogs and cats as they relate to nutrition.
2. Be aware about the relationship between companion animal nutrition, environment, welfare and health.
3. Compare approaches for establishing nutrient requirements, nutritional specifications, and feed formulation guidelines and be able to discuss some of the limitations and implications of these approaches. Learn about some of the methods and protocols commonly used in pet nutrition research.
4. Learn about feed ingredients, their origin, and the factors affecting their quality and nutritive value.
5. Learn about formulation and manufacturing pet foods (pet feeds) and the regulatory issues related to pet foods.
6. Be exposed to current and emerging issues in the pet food industry.
7. Learn about available commercial and unconventional pet foods Acquire some of the skills needed to be able to effectively gather, integrate and analyze scientific information to make informed decisions related to the nutrition and health of companion animals and be able to develop a critical view of nutritional claims and statements found in technical and commercial pet food documentation and advertising.
8. Understand that optimal feeding of healthy companion animals is important for the prevention of disease

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Assessment Details

Assessment Breakdown

Description	Weighting (%)	Due Date
Group contract and personal learning objectives to revisit for personal reflection	0%	NA
Midterm IN CLASS * Please book SAS if applicable	35%	Thursday, February 26
Product overview assignment	25%	Friday, March 20, but no late marks deducted until Monday, March 23rd
Formulation assignment	25%	Friday, April 3rd, but no late marks deducted until Monday, April 6th
Group Video- Metabolic idiosyncrasy and its implications for feeding	15%	Monday, March 30th by midnight.

Assignments handed in late will receive a 10% per day of the week reduction in total marks available.

Midterm examination (35%)

In person on Thursday, February 26th.

Course Learning Outcomes Assessed: 3, 4, 5, 6, 7, 8, 9, 10

The exam will cover key information covered in the first part of the course and meant to help students identify areas where they need to learn more deeply for their subsequent assignments. Questions will include: calculations, short answer, and case examples.

Commercial product evaluation (25%) and food formulation assignment (25%)

This two-part capstone project challenges you to critically evaluate a commercial pet food product and then reconstruct or improve its formulation using scientific reasoning, formulation tools, and sustainability principles. You'll apply course concepts in real-world contexts, much like professionals working in the companion animal nutrition industry.

Overview: This project includes two major components, each worth 25% of your final grade:

Component	Weight	Due Date
Commercial Diet Evaluation	25%	March 20th but no marks will be deducted until 9am, March 23rd
Diet Formulation & Innovation	25%	April 3rd but no marks will be deducted until 9am on April 6th

Part 1: Commercial Diet Evaluation

Due: March 20th | Worth: 25%

Course Learning Outcomes Assessed: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Your Task:

You will choose your own commercial pet food product to analyze. To start: list of products for sign-up can be found

You must provide:

- A clear rationale for selecting the product
- A brief personal learning goal (e.g., gaining insight into novel ingredients, understanding regulatory labeling, etc.)
- This must be uploaded into your dropbox for Commercial Diet Evaluation no later than January 16th.

Your Report Should Include:

1. Nutrient Composition & Analysis
    - Evaluate the guaranteed analysis in relation to standards (AAFCO, NRC).
    - Assess nutrient adequacy for the intended species and life stage.
2. Ingredient Evaluation
    - Examine the ingredient list in terms of function, origin, quality, and contribution to the nutrient profile.
    - Consider the effects of processing and formulation strategy.
3. Claims & Labeling
    - Identify and categorize all product claims (nutritional, structure/function, therapeutic, marketing).
    - Address regulatory implications and labeling standards.
    - Assess the scientific evidence supporting the claims.
4. Scientific Support
    - Integrate peer-reviewed literature to support or question the product's formulation and claims.
    - Highlight data gaps or inconsistencies in support.
5. Use of Formulation Tools
    - Demonstrate comprehension of how ingredient inputs contribute to nutrient targets using the formulation spreadsheet.
6. Higher-Level Thinking (Required for >80%)
    - Move beyond description and show critical engagement:
        - How feeding guidelines are derived and the rationale
        - Strategic decisions in nutrient balance
        - Regulatory vs. marketing tension in product design

<u>Part 2: Diet Formulation & Innovation</u>

Due: April 3rd | Worth: 25%

Course Learning Outcomes Assessed: 1, 5, 6, 7, 8, 9, 10

Using custom formulation software (developed by past students and faculty at Guelph and Kansas State), you will attempt to replicate and improve the commercial diet analyzed in Part 1.

Formulation Requirements:

- Use the software to:
    - Match the nutrient profile as closely as possible
    - Calculate moisture, metabolizable energy (ME), and feeding guidelines
    - Prepare a draft guaranteed analysis panel
    - Identify target species and life stage

Innovation Component – “Tell Your Story”:

Select one ingredient substitution that improves the diet’s sustainability. Sustainability may include:

- Environmental aspects (e.g., carbon footprint, land or water use)
- Social aspects (e.g., ethical sourcing, community impact, affordability)

You must:

- Justify your ingredient change using peer-reviewed scientific literature or patents
- Clearly explain how the change improves the product and aligns with your values or objectives
- “Tell the story” of your product as if you were presenting it in an industry or stakeholder setting

Stretch Goals that would bring assignments towards “exceptional” which is required to achieve a grade over 85%:

- Apply quantitative sustainability metrics
- Use novel or underutilized ingredients with proven efficacy
- Discuss regulatory, marketing, or consumer adoption implications of your innovation

Grading Criteria

Each part will be graded on:

- Depth and accuracy of analysis
- Critical thinking and application of course content
- Integration of scientific literature
- Technical execution of formulation and calculations
- Quality, clarity, and professionalism of writing
- Innovation and sustainability insight

Rubrics for both parts will be posted on CourseLink.

Group Video- Metabolic idiosyncrasy and its implications for feeding (15%)

Due: March 30th by midnight | Worth: 15%

Course Learning Outcomes Assessed: 4, 5, 6, 7, 9, 10

Purpose: In this assignment, your group will create a 5-minute educational video that explains a unique metabolic feature (an idiosyncrasy) of any terrestrial animal species and demonstrates how this feature directly influences the way the species must be fed in nature or in managed care. The goal is to challenge you to connect physiology, metabolism, and nutrition in a clear, engaging, and scientifically rigorous way.

Your video will be evaluated based on your ability to clearly and accurately describe the following five components:

1. Identification of the Metabolic Idiosyncrasy

Describe the metabolic or physiological feature that makes your chosen species distinct.
Examples might include (but are not limited to):

- Hindgut vs foregut fermentation
- Coprophagy
- Obligate carnivory
- Unique nitrogen metabolism
- Inability to synthesize specific amino acids or vitamins
- Specialized detoxification pathways
  Explain what makes it unusual relative to closely related species or general mammalian physiology.

2. Mechanistic Explanation of the Physiology/Metabolism

Provide a succinct but accurate overview of the underlying biological mechanisms.
This should include:

- Relevant organ systems
- Key metabolic pathways
- Enzymatic or hormonal controls
- Evolutionary or ecological context
  Aim for the depth expected of a senior undergraduate biology course: clear, correct, and backed by primary literature.

3. Nutritional Consequences of the Idiosyncrasy

Explicitly link the metabolic feature to concrete nutritional requirements.
Examples:

- Why this species must consume high-quality protein
- Why specific fatty acids, amino acids, or vitamins must be supplied
- Energy density requirements
- Digestive constraints (e.g., fibre tolerance, carbohydrate handling)
- Detoxification needs or dietary limitations
  This is the “so what?” of the project.

4. Feeding Strategy Derived From Metabolism

Demonstrate how the idiosyncrasy defines or constrains real-world feeding decisions.
This can include:

- Diet formulation principles
- Foraging ecology and natural diet alignment

- Feeding frequency or pattern
- Ingredient selection
- Food processing needs (e.g., grinding, fermenting, cooking)
  Make sure the link between physiology → metabolism → feeding strategy is explicit.

5. Evidence-Based Communication and Creativity

Your explanation must be:

- Scientifically accurate and supported by peer-reviewed references
- Communicated clearly for an upper-year biology audience
- Visually engaging (diagrams, animations, demonstrations, or footage encouraged)
- Well-organized and within the 5-minute limit
  Creativity is welcome as long as scientific rigour is maintained.

Evaluation Criteria (Overview)

Your group's mark will reflect your performance in the following areas:

1. Scientific accuracy and depth (30%)
2. Clarity of explanation of the metabolic idiosyncrasy (20%)
3. Strength of the link between metabolism and nutrition/feeding (30%)
4. Quality of communication, visuals, and video coherence (15%)
5. Referencing and professionalism (5%)

Deliverables

- A 5-minute video (±10%)
- A reference list in APA or journal-style formatting
- A brief (1-page) group contribution statement listing each member's role

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Last Day to Drop Course

The final day to drop Winter 2026 courses without academic penalty is the last day of classes: April 6th. After this date, a mark will be recorded whether course work is completed or not (a zero is assigned for missed tests/assignments). This mark will show on the students transcript and will be calculated into their average.

Course Standard Statements

Email Communication

As per university regulations, all students are required to check their <mail.uoguelph.ca> e- mail account regularly: e-mail is the official route of communication between the University and its students.

Grading Policies

Assignments will be graded in a timely fashion (within 10 days) and they will be returned to the students with personalized feedback and/or general feedback in class to highlight some of the shortcomings in the students' work or understanding of the concepts.

Group Work

Assignments are expected to be unique work. All group members will receive the same grade for group work assignment unless otherwise approved by the Instructor(s). Any problems associated with group work should be brought to the attention of the instructor as soon as possible.

Dropbox Submissions

Assignments should be submitted electronically via the online Dropbox tool. When submitting your assignments using the Dropbox tool, do not leave the page until your assignment has successfully uploaded. To verify that your submission was complete, you can view the submission history immediately after the upload to see which files uploaded successfully. The system will also email you a receipt. Save this email receipt as proof of submission.

Be sure to keep a back-up copy of all of your assignments in the event that they are lost in transition. In order to avoid any last-minute computer problems, your instructors strongly recommend you save your assignments to a cloud-based file storage (e.g., OneDrive), or send to your email account, so that should something happen to your computer, the assignment could still be submitted on time or re-submitted.

It is your responsibility to submit your assignments on time as specified on the Schedule. Be sure to check the technical requirements and make sure you have the proper computer, that you have a supported browser, and that you have reliable Internet access. Remember that technical difficulty is not an excuse not to turn in your assignment on time. Don't wait until the last minute as you may get behind in your work.

If, for some reason, you have a technical difficulty when submitting your assignment electronically, please contact your instructor or CourseLink Support. (http://spaces.uoguelph.ca/ed/contact-us/)

Academic Integrity

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.
The Academic Misconduct Policy (https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/academic-misconduct/) is outlined in the Undergraduate Calendar.

Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway. Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability. Use of the SAS Exam Centre requires students to make a booking at least 10 days in advance, and no later than the first business day in November, March or July as appropriate for the semester. Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time. For students at the Guelph campus, information can be found on the SAS website. (https://www.uoguelph.ca/sas/)

Accommodation of Religious Obligations

If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor within two weeks of the start of the semester to make alternate arrangements. See the Academic calendar for information on regulations and procedures for Academic Accommodations of Religious Obligations (https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/academic-accommodation-religious-obligations/).

Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

Health and Wellbeing

The University of Guelph provides a wide range of health and wellbeing services at the Vaccarino Centre for Student Wellness (https://wellness.uoguelph.ca/). If you are concerned about your mental health and not sure where to start, connect with a Student Wellness Navigator

(https://wellness.uoguelph.ca/navigators/) who can help develop a plan to manage and support your mental health or check out our mental well-being resources (https://wellness.uoguelph.ca/shine-this-year/). The Student Wellness team are here to help and welcome the opportunity to connect with you.