



ANSC*6460 Lactation Biology

Fall 2021

Section(s): C01

Department of Animal Biosciences

Credit Weight: 0.50

Version 1.00 - September 29, 2021

1 Course Details

1.1 Calendar Description

An in-depth systems analysis of lactation, comparing the cow, pig, rat, human and seal. Mammary development from conception through to lactogenesis, lactation and involution will be covered. Hypotheses of regulation of the biochemical pathways of milk synthesis will be tested in relation to experimental observations.

1.2 Course Description

An in-depth systems analysis of lactation, comparing the cow, pig, rat, human and seal. Mammary anatomy and development from conception through to lactogenesis, lactation and involution will be covered. Hypotheses of hormonal and nutritional regulation of the biochemical pathways of milk synthesis will be tested in relation to experimental observations. Current areas of research activity will be presented by discussion of cutting-edge and classic publications. Each week will consist of 2 lectures and 1 session for discussion of a scientific paper, including history of the research topic and methodology.

Students will write a term paper in which a hypothesis to explain some phenomenon of lactation is proposed.

1.3 Timetable

Timetable is subject to change. Please see WebAdvisor for the latest information.

COVID-19 Disclaimer: please be aware that the information on course delivery, accessibility

and examinations presented in this outline were developed based on current University guidelines. However, due to the continuously evolving situation and resulting changes in public health recommendations, the format and delivery of this course may be revised with limited notice.

1.4 Final Exam

Exam time and location is subject to change. Please see WebAdvisor for the latest information.

2 Instructional Support

2.1 Instructional Support Team

Instructor:	Michael Steele
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Telephone:	+1-519-824-4120 x52209
Office:	ANNU 235

3 Learning Resources

4 Learning Outcomes

4.1 Course Learning Outcomes

By the end of this course, you should be able to:

1. Be able to interpret and communicate the latest topics related to lactation biology in livestock production.
 2. Be able to effectively communicate their thoughts, arguments, and decision-making outcomes in an effective professional manner to a multitude of clientele including stakeholders, academics, government and primary producers. This will be demonstrated through the review and discussion of recent publications in the field of lactation biology.
 3. To develop and support hypotheses of a scientific phenomenon.
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5 Teaching and Learning Activities

5.1 Lecture

Week 1

- Topics:**
- mammary anatomy
 - mammary development

Week 2

- Topics:**
- lactogenesis

References: Suggested search strings for Web of Science:
<https://subzero.lib.uoguelph.ca/login?url=http://isi-knowledge.com>

- “onset of lactation” mammary
- lactogen* mammary
- casein expression mammary

Week 3

- Topics:**
- lactation
 - curve
 - involution

References: Suggested search strings for Web of Science:
<https://subzero.lib.uoguelph.ca/login?url=http://isi-knowledge.com>

- involuti* mammary
- persistenc* lactati*
- “extended lactation”
- serotonin
- mammary
- mammary proliferati* apopto* milk

Week 4

- Topics:**
- milk synthetic pathways and methodology

References:

Suggested search strings for Web of Science:
<https://subzero.lib.uoguelph.ca/login?url=http://isi-knowledge.com>

- transport mammary
- mammary 13c

Week 5

Topics:

- milk secretion and osmotics

References:

Suggested search strings for Web of Science:
<https://subzero.lib.uoguelph.ca/login?url=http://isi-knowledge.com>

- milk fat secretion
- butyrophilin mammary
- golgi mammary
- secret*

Week 6

Topics:

- regulation of milk
 - synthesis nutrition

References:

Suggested search strings for Web of Science:
<https://subzero.lib.uoguelph.ca/login?url=http://isi-knowledge.com>

- diet* milk composition
- infus* milk composition
- "mammary blood flow"

Week 7

Topics:

- regulation of milk

- synthesis nutrition

References:

Suggested search strings for Web of Science:
<https://subzero.lib.uoguelph.ca/login?url=http://isi-knowledge.com>

- “milk fat depress*”
- “conjugated linoleic acid” milk
- “conjugated linoleic acid” mammary
- trans fatty acids milk

Week 8**Topics:**

- regulation of milk
 - synthesis
 - hormones

References:

Suggested search strings for Web of Science:
<https://subzero.lib.uoguelph.ca/login?url=http://isi-knowledge.com>

- mechanistic model* lactati*
- mammary (rapamycin or mTOR)

Week 9**Topics:**

- gut function

References:

Suggested search strings for Web of Science:
<https://subzero.lib.uoguelph.ca/login?url=http://isi-knowledge.com>

- “portal drained viscera” lactati*
- “food intake” lactati*

Week 10

Topics: • adipose function

References: Suggested search strings for Web of Science:
<https://subzero.lib.uoguelph.ca/login?url=http://isi.knowledge.com>

• adipose lactati*

Week 11

Topics: • muscle function

References: Suggested search strings for Web of Science:
<https://subzero.lib.uoguelph.ca/login?url=http://isi.knowledge.com>

• "skeletal muscle" lactati*

Week 12

Topics: • transgenics
• breast
• cancer

6 Assessments

6.1 Marking Schemes & Distributions

Marking scheme:

Journal Article Presentation: 30%

Participation in class: 20%

Term Paper: 50%

Name	Scheme A (%)
Journal Article Presentation	30
Participation in Discussion	20
Term Paper	50
Total	100

6.2 Assessment Details

Journal Article Presentation (30%)

Learning Outcome: 1, 2

One person will be chosen to lead the discussion at the end of each week. The paper to be discussed will be chosen in consultation with me, the instructor, and made available to the rest of the class on CourseLink at the beginning of the week. Everybody should read the paper before class. The discussion leader should be prepared to go over the paper in detail but each person in class will need to bring one question of their own for discussion. It would be a good idea for the leader to bring a few questions as backup in case the others fizzle out early. It is not the job of the leader to answer the questions but to turn them back on the group as a whole and perpetuate the discussion. Furthermore, the discussion points should not be critiques of the paper, trying to find fault. Remember that the authors of the papers are experienced scientists and if there is an aspect that seems wrong to you, it is more than likely a fault of your own, not of the paper. The papers have been peer-reviewed prior to publication. If there are any mysterious aspects to the paper, let them provide you with your discussion points. Things to consider might be: why did they do things in a certain way, as opposed to alternatives? what did they find out from doing the experiment? what did you find out from reading about it? what are (or were) the consequences of this new knowledge? what would you like to know more about? The participation mark will be based on the questions brought to class each week and the contributions made in finding answers to the other questions. The presentation mark for the leaders will be based on the knowledgability of the presenter about the paper, the quality of the questions posed, and the elaboration of discussion.

Participation in Discussion (20%)

Learning Outcome: 1, 2

Term Paper (50%)

Date: Wed, Dec 15

Learning Outcome: 1, 2, 3

The purpose of the term paper is to give you practice with integrating experimental results together to invent an explanation of some well-known phenomenon of lactation. The particular phenomenon to be explained will be chosen by you in consultation with me, the instructor. It might be some effect of diet or nutrient infusion or hormone injection or lighting, season, transgenics, sound, etc. on milk production, composition, mammary function, or lactational performance of cows, pigs, humans, dogs, rats, etc. Something that

has been repeatedly observed and recorded in the scientific literature but about which there is no established hypothesis to explain it. A hypothesis is a tentative explanation of the cause of something. Let's take the stimulatory effect of growth hormone on milk production in cows as our example phenomenon. A hypothesis might be that growth hormone hits the mammary receptor, which stimulates expression of such-and-such genes in the secretory cell that lead to a speeding up of the cell cycle and greater numbers of cells accumulating in the udder so that more milk is synthesized per day. The paper would then be a presentation of what the phenomenon is, followed by descriptions of what changes have been observed in the metabolism of cows, or rats or cells during growth hormone administration and how these might explain the effect observed on milk yield. The paper will be marked based on clarity of the presentation, degree of characterization of the phenomenon with citations, the logical sense of the hypothesis, and the strength of the supporting evidence for the hypothesis (i.e. citations).

7 University Statements

7.1 Email Communication

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

7.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Graduate Calendar - Grounds for Academic Consideration

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions

<https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml>

7.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>

Graduate Calendar - Registration Changes

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml>

Associate Diploma Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml>

7.4 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.

7.5 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 book their exams at least 7 days in advance and not later than the 40th Class Day.

For Guelph students, information can be found on the SAS website

<https://www.uoguelph.ca/sas>

For Ridgetown students, information can be found on the Ridgetown SAS website

<https://www.ridgetownc.com/services/accessibilityservices.cfm>

7.6 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 encourages academic integrity. 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.

Undergraduate Calendar - Academic Misconduct

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

Graduate Calendar - Academic Misconduct

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

7.7 Recording of Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

7.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars

<https://www.uoguelph.ca/academics/calendars>

7.9 Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings, changes in classroom protocols, and academic schedules. Any such changes will be announced via CourseLink and/or class email.

This includes on-campus scheduling during the semester, mid-terms and final examination schedules. All University-wide decisions will be posted on the COVID-19 website (<https://news.uoguelph.ca/2019-novel-coronavirus-information/>) and circulated by email.

7.10 Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g.. final exam or major assignment).

7.11 Covid-19 Safety Protocols

For information on current safety protocols, follow these links:

- <https://news.uoguelph.ca/return-to-campus/how-u-of-g-is-preparing-for-your-safe-return/>
- <https://news.uoguelph.ca/return-to-campus/spaces/#ClassroomSpaces>

Please note, these guidelines may be updated as required in response to evolving University, Public Health or government directives.
