



UNIVERSITY  
OF MANITOBA

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

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| <b>Course Title &amp; Number:</b>  | ANSC 3520 Animal Reproduction   |
| <b>Number of Credit Hours:</b>   | 3 credit hours  |
| <b>Class Times &amp; Days of Week:</b><br><b>Lab Times &amp; Days of Week:</b> | Tues & Thurs, 11:30 a.m. - 12:45 p.m.<br>Mondays 2:30 - 5:15 p.m.   |
| <b>Location for classes:</b><br><b>Location for labs:</b>                      | Virtual<br>Virtual  |
| <b>Pre-Requisites:</b>   | ANSC 2510 Anatomy and Physiology 1: Control Systems. Students are expected to have completed this course prior to enrolling in ANSC 3520. The course deals with the structure, functions and interactions of the coordinating or regulatory systems in the animal body; including the nervous, muscular, cardiovascular, respiratory, renal and endocrine systems. An appreciation of these systems is important in understanding the basic concepts of reproduction and their practical applications.<br><b>Co requisites:</b><br>CHEM2770, or MBIO 2270 or CHEM 2360 or MBIO 2360 |

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| <b>Instructor(s) Name:</b>           | Dr. J.C. Plaizier  |
| <b>Office Location:</b>              | N.A.   |
| <b>Office Hours or Availability:</b> | As the course will be given virtually, there will be no office hours. However, if you want to talk to me individually or as a group, you can email me, and we will set up a video conference |
| <b>Office Phone No.</b>              | N.A.   |
| <b>Email:</b>                        | plaizier@umanitoba.ca  |

### **1.1 Course Description**

The comparative anatomy and physiology of reproduction of farmed animals will be emphasized. Focus will be on the natural synchronization of reproductive processes and the potential to regulate and improve reproductive efficiency

### **1.2 . General Information**

In order to understand animal reproduction, students are expected to have some sound background in anatomy, physiology, endocrinology, embryology, histology, cytology, microbiology and nutrition. The

student's own initiative in reading the reference material and related publications is required for maximum benefit.

Course instruction will include two 75-minute lectures each week and 3 hours per week of laboratory practicum. Labs may not always be possible to get specimen for use during laboratory practicum and lab sessions will take the form of tutorials/ lectures using PowerPoint presentations and video clips.

Students are expected to take the initiative to read and understand the concepts covered and the listed reference text would be able to assist them achieve this.

Students will visit the dairy and swine units at Glenlea Research Farm virtually during the laboratory period, during which where demonstrations on artificial breeding in dairy cows and sows will be given. Artificial breeding in other farm animal species will be described during lectures or tutorials. Students will be expected to be engaged in all these learning activities and are reminded that the materials covered in tutorials complement the lectures and are designed to give students an opportunity to observe or participate in a relevant practical exercise. Material covered in the labs may still form part of the tests.

### **1.3 Course Goals**

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The course objective is to provide adequate fundamental knowledge of reproductive physiology in farm animals to senior undergraduate students. Comparing functional anatomy, basic physiology and endocrinology related to reproduction makes the basic principles of male and female reproduction among livestock and other domestic animals.

### **1.4 Behavioural Learning Objectives**

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At the completion of this course, the student should be able to:

- a) Outline the functions and sources of hormones of reproduction
- b) Describe the interactions and or relationships of hypothalamus, pituitary and gonads and how they regulate reproductive functions
- c) Describe basic mechanisms of action of hormones of reproduction
- d) Describe the development of the reproductive system from conception to sexual maturity and relate the various parts of the system to function
- e) Illustrate how an understanding of reproductive physiology in terms of endocrine function and behaviour during sexual receptivity can be used to improve reproductive efficiency
- f) Formulate strategies to improve reproductive performance in farm animals
- g) Describe the various reproductive biotechnologies used in farm animals and determine the most appropriate to employ in different practical situations

### **1.5 Textbook, Readings, Materials**

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**Senger, P.L. 2005. *Pathways to Pregnancy and Parturition*. 3rd Edition. (Herein referred to as Senger L) Current Conceptions, Inc. Washington State University, Pullman, Washington.**

This text is designed to give students an understanding of the principles of reproductive physiology. It contains very good images and illustrations of anatomical structures and physiological processes and is written in a manner that makes it easy to understand. It also features illustrations that allow you to make anatomical comparisons among farm animals. **This is a required text and you will be required to read some sections of the book ahead of class.**

**Bearden, H.J., J.W. Fuquay, and S.T. Willard. 2004** (6th ed). *Applied Animal Reproduction*. Pearson Prentice Hall, New Jersey. (*Herein referred to as BFW*)

According to the authors, the textbook is intended to give the undergraduate student majoring in animal or dairy science a complete overview of the reproductive process.

**Hafez, E.S.E. and B. Hafez. 2000.** *Reproduction in Farm Animals*. Lea & Febiger, Philadelphia. (*Herein referred to as Hafez & Hafez*)

The book is divided into six major sections and these in turn, are arranged into aspects that deal with components of the reproductive system and the regulation of the reproductive process, from the control of ovulation to the initiation of parturition. The 7<sup>th</sup> edition has been updated to take into account significant advances in the role of biotechnology in animal reproduction such as the use of gonadotropin releasing hormones and their analogs.

## 1.6 Course Technology

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- Students will need to use Webex for the classes and laboratory sessions. Make sure that your computer and internet connection are sufficient for Webex classes. During these classes please mute your microphone. If you want to ask a question, then please let me know that via a chat, and I will ask you to unmute your microphone and ask me the question
- Lecture and tutorial notes will be posted on UMLearn and students are expected to print the notes before class and bring them for the lecture. I will make every effort to post these notes in advance.

## 1.7 I Expect You To

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- Fully participate in class, make an effort to consult recommended textbooks on issues that may not be clear to you, pay attention in class and contribute to class discussions.
- Complement the notes that I provide with your own notes that you take during lectures. The notes that I provide are sometimes incomplete and you will be expected to attend lectures in order to complete your notes. You will also be evaluated based on your comprehension of material covered in the lectures, handouts and any relevant discussions during class.
- Produce university-level quality writing: legible and proofread. I encourage you to type and submit hard copies of assignments. If there are a significant number of errors or if it is difficult to read, the assignment will be returned to you prior to grading for changes. In most cases, your assignment will then be late and docked points.

## 1.8 You can expect me to

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- Treat you with respect and I would appreciate the same courtesy in return. See Respectful Work and Learning Environment Policy.
- Change the course plan outlined herein in response to genuine concerns or events that may be beyond my or your control. Thus where necessary class topics or laboratory exercises may be changed.
- Give you feedback – particularly for tests and laboratory exercises. I expect that comments, corrections and suggestions that I make are taken seriously because that feedback is an important way to learn.
- Provide clarity when you face difficulties understanding some of the concepts for the course
- Treat you, as adult learners, with the related style of respect.

## 1.9 Course Syllabus

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1. **Course Description:** Assignments, tests, and grading. Overview of reproductive processes/ functional anatomy of reproductive systems
2. **Natural Synchronization Processes:** *Fundamentals of endocrinology & neuro-endocrinology related to reproduction.* [Elements of the endocrine system, neural reflexes, neuroendocrine reflexes. Role of the hypothalamus and pituitary gland in the control of reproduction processes. The relationship between the hypothalamus and pituitary gland. Classification and characteristics of hormones of reproduction. Mode of hormone action. Patterns of hormone secretion and how hormones are metabolized and excreted.] *Senger L. Ch 5*
3. **Reproductive Cycles:** Estrous cycles, seasonality of reproduction. [Hormonal patterns in the fetus, neonate, prepuberal and sexually mature female. Hormonal control of the estrous cycle. Factors that affect onset of puberty and ovarian activity. Descriptions and characteristics of different types of estrous cycles.] *Senger L. Ch 6 Ch 7*
4. **Folliculogenesis /Ovogenesis:** [Formation and maturation of ova. Hormonal changes and follicular development during the follicular phase. *Senger L. Ch 8*
5. **Avian Reproduction:** [Gross Anatomy of the hen and rooster's reproductive tracts. Endocrine control of reproduction in poultry.]
6. **Semen Production:** *Spermatogenesis, sperm maturation tract secretions and seminal plasma* [Review of histological structures of the testes. Description of semen components and why semen from different species has different characteristics. Hormonal and non-hormonal control of spermatogenesis. Description of components of seminal plasma.] *Senger L. Ch 10*  
**Test 1: [October 8, 2019]**
7. **Ovulation and Synchronization of Estrus:** *Ovulation and manipulation of the estrous cycle* [Ovulation and formation of the corpus luteum. Mechanism of progesterone synthesis. Utero-ovarian vascular countercurrent transport system. CL regression. Principles and the rationale for synchronization of estrus. Estrus synchronization protocols in farm animals.] *Senger L. Ch 9*
8. **Gestation:** *From Conception to Onset of Parturition* [Transport, capacitation of spermatozoa in the female tract, and fertilization. Maternal recognition of pregnancy. Early embryonic development. Placentation and fetal growth and development.] *Senger L. Ch 12, 13 & 14*
9. **Parturition and Postpartum Recovery:** [Endocrine control of parturition. Physical and physiological changes associated with parturition. Chemical agents that induce parturition. Uterine involution and resumption of ovarian activity] *Senger L. Ch 14 (page 306-311) & Ch 15*  
**Test 2: [November 7, 2019]**
10. **Reproductive Failure:** [Anatomical, congenital causes and endocrine disruptors in reproductive failure] *BFW Ch 24, 25 & 26*
11. **Environmental and Nutritional Effects on Reproduction:** [How farm animals respond to environmental and nutritional stress vis a vis reproductive processes] *BFW Ch 22 & 23*
12. **Improving Reproductive Efficiency:** [Measures of reproductive efficiency and the factors that can affect these measures.]

**Final examination: [TBA]****Class Schedule**

| <b>Date</b>     | <b>Class Content</b>  | <b>Recommended pre-class preparation</b>                                     | <b>Evaluation</b> |
|-----------------|---|--|-------------------|
| Sept 10         | Introduction: Course content and methods of student evaluation, grading scale and deadlines |  |                   |
| Sept 15         | Natural synchronization processes   | <i>Senger L. Ch 5<br/>or BFW Ch 4</i>  |                   |
| Sept 17         | Natural synchronization processes   |  |                   |
| Sept 22         | Natural synchronization processes   |  |                   |
| Sept 24         | Reproductive cycles – Onset of puberty  | <i>Senger L. Ch 6,7 8<br/>BFW Ch 5</i>                                       |                   |
| Sept 29         | Reproductive cycles – Reproductive cyclicity  |  |                   |
| Oct 1           | Folliculogenesis  | <i>Senger L. Ch 8 /BFW<br/>Ch 8</i>  |                   |
| Oct 6           | Semen production  |  |                   |
| Oct 8           | Semen production  |  |                   |
| Oct 13          | <b>Test 1 – Material covered from Sept 10 - Oct 8</b>                                       |  | Test 1 (25%)      |
| Oct 15          | Ovulation and synchronization of estrus   | <i>Senger L. Ch 9, BFW<br/>Ch. 18</i>  |                   |
| Oct 20          | Ovulation and synchronization of estrus   |  |                   |
| Oct 12          | Gestation: Conception to Onset of Parturition   | <i>Senger L. Ch 12, 13<br/>&amp; 14 (pages 292-305)<br/>BFW Ch 8 &amp; 9</i> |                   |
| Oct 27          | Gestation: Conception to Onset of Parturition   |  |                   |
| Oct 29          | Gestation: Conception to Onset of Parturition   |  |                   |
| Oct 29          | Gestation: Conception to Onset of Parturition   |  |                   |
| Nov 3           | Parturition and Postpartum Recovery   | <i>Senger L Ch 14<br/>(pages 306-311) Ch 15</i>                              |                   |
| Nov 5           | Parturition and Postpartum Recovery   |  |                   |
| Nov 10          | <b>Test – 2 Material covered from Oct 15 - Nov 5</b>  |  | Test 2 (25%)      |
| <b>Nov 9-13</b> | <b>Fall Break</b>   |  |                   |
| Nov 17          | Reproductive Failure:   | <i>BFW Ch 24, 25 &amp; 26</i>  |                   |
| Nov 19          | Reproductive Failure:   | <i>BFW Ch 24, 25 &amp; 26</i>  |                   |
| Nov 24          | Environment and Nutritional Effects on Reproduction   | <i>BFW Ch 22 &amp; 23</i>  |                   |
| Nov 26          | Environment and Nutritional Effects on Reproduction   | <i>BFW Ch 22 &amp; 23</i>  |                   |
| Dec 1           | Improving Reproductive Efficiency   |  |                   |
| Dec 3           | Improving Reproductive Efficiency   |  |                   |
| Dec 8           | Monitoring Fertility and Reproduction   |  |                   |
| Dec 10          | Review  |  |                   |

**1.10 Tutorial Schedule**

| <b>Date</b> |  |
|-------------|--|
| Sep 14      | <b>No lab</b>  |
| Sep 21      | <i>Lecture/Tutorial The Female Reproductive System</i> |

|        |  |
|--------|--|
| Sep 28 | <i>Lecture /Tutorial The Male Reproductive System</i>  |
| Oct 5  | <i>Avian Reproductive System</i>   |
| Oct 12 | <b><i>Thanksgiving No classes</i></b>  |
| Oct 19 | <b><i>Student Seminar Presentations: Estrus Detection and Mating Behaviour</i></b>                 |
| Oct 26 | <i>Lecture /Tutorial Semen Collection and Evaluation</i>   |
| Nov 2  | <i>Lecture /Tutorial/ Video on Embryo Transfer &amp; Trans cervical Insemination</i>               |
| Nov 9  | <b><i>Fall Break</i></b>   |
| Nov 16 | <b><i>Student Seminar Presentations: Estrus Detection and Mating Behaviour</i></b>                 |
| Nov 23 | <b><i>Virtual Farm Visit: Artificial Insemination and Pregnancy Diagnosis in Swine / Dairy</i></b> |
| Nov 30 | <i>Lecture /Tutorial Improving Reproductive Efficiency</i>   |
| Dec 7  | <b><i>Student Seminar Presentations: Improving Reproductive Efficiency</i></b>                     |

### 1.11 Course Evaluation Methods

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| <b>Due Date:</b> | <b>Assessment Tool</b> | <b>Value of Final Grade</b> |
|------------------|------------------------|-----------------------------|
| October 13       | Term test 1            | 25%                         |
| November 5       | Term test 2            | 25%                         |
| TBA              | Final Exam             | 35%                         |
| See section 1.10 | Seminar presentations  | 15%                         |

### 1.12 Grading

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All of your assignments and tests will be calculated as a percentage and converted into a letter grade. Your total mark, adjusted for the proportion contributed from each assignment or test will be used to determine the letter grade.

| <b>Letter Grade</b> | <b>Marks</b>  |
|---------------------|---------------|
| A+                  | 92-100%       |
| A                   | 85-91.9%      |
| B+                  | 78-84.9%      |
| B                   | 70-77.9%      |
| C+                  | 62-69.9%      |
| C                   | 55-61.9%      |
| D                   | 50-54.9%      |
| F                   | Less than 50% |

### 1.13 Seminar Assignment Descriptions

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#### ***Seminar 1: Estrus Detection and Sexual Behaviour***

You must select a species on which to make your presentation. This is a group presentation and groups can be made up to a maximum of three members. You must submit electronic copies of the PowerPoint presentation and a report.

The primary purpose of mating behaviour is copulation and this is designed to bring the male and female gametes together for fertilization, which if successful, results in development of an embryo culminating in a new member of the species at parturition. Thus this ensures the propagation of the species. For successful mating to take place, a fertile female that is sexually receptive or is in estrus must be mated to a male that is capable of producing fertile gametes. Sexual behaviours of courtship, copulation and post-copulatory activities have evolved to bring male and female gametes together to ensure fertilization, pregnancy and perpetuation of the species. Domestication and intensive management practices have in many cases abbreviated some of the natural behaviours such as courtship. Precopulatory rituals, however, can increase the sperm count of some males and serve to identify females in estrus.

Males and females respond to stimuli associated with the opposite sex. Visual, auditory and olfactory stimuli can have an effect on sexual behaviour. Olfactory stimuli in the form of pheromones are produced and can be detected by both sexes. Pheromones have been isolated in vaginal secretions and urine of estrus females and in the urine and saliva of some males.

The nuzzling and sniffing, which is common courtship behaviour, is most likely associated with detection of pheromones. Some pheromones, however, are not detected by regular olfaction but rather by the vomeronasal organ. The non-volatile pheromones are directed into the organ by the "Flehman" behaviour, which is displayed by male cattle, sheep, goats and horses.

In many current animal breeding facilities it is the responsibility of the herdsman or animal caretakers to determine the optimum time for breeding or for artificial insemination and to oversee natural mating. Therefore it is essential to have a thorough understanding of normal sexual behaviour and signs of estrus in species being dealt with.

This laboratory period will be conducted primarily as a seminar session with students making presentations on assigned topics. One seminar presentation will be given for each species. Presentations will be on estrus detection in **cattle, swine, sheep, and horses**; but students may get permission to work on presentations on dogs, cats, and laboratory species (e.g. rabbits, rats) or other (e.g. elk, ferrets) group choice. However, students are encouraged to consider the first 4 animal species prior to considering the rest of the animal species. The expectation in terms of detailed information is the same regardless of which species you choose. Presentations should be at least 15 minutes long with substantive detail.

**For the seminar, address A and B below:**

- A. Describe the natural sexual behaviour (mating behaviour) for your assigned species. Include courtship behaviour, copulatory and postcopulatory behaviour, and duration where applicable.
- B. What signs or indicators can be used by an animal manager to detect estrus and the correct time to inseminate in the female of the species you described in A?

**Suggested initial references:**

**Bearden, H.J., J.W. Fuquay, and S.T. Willard. 2004** (6th ed). Applied Animal Reproduction. Pearson Prentice Hall, New Jersey. *Chapters 5, 7, and 20.*

**Senger, P.L. 2003.** Pathways to Pregnancy and Parturition. Current Conceptions, Inc. Washington State University, Pullman, Washington. *Chapter 11*

**Hafez, E.S.E. and B. Hafez. 2000. Reproduction in Farm Animals. Lea & Febiger, Philadelphia. *Species chapter for your assigned topic.***

**Seminar 2: Case Study on Improving Reproductive Efficiency**

This is the second group assignment, which will be completed and presented to the class during the final laboratory period of the semester. Evaluations will be based on the content of the presentation as well as on the group’s ability to respond to questions. Topics will be made available at a later stage. This is a group presentation and groups can have up to 3 members. Presentations will be on December 3, 2018. You must submit electronic copies of the PowerPoint presentation

**1.14 Seminar Submission Guidelines**

In addition to presentation, the group must submit a written report (no more than 15 double spaced typed pages) of the assignment and a copy of their power-point presentation. Submissions must be made no later than the end of day on the day of presentation. These assignments must not be handed in to the instructor during class.

**Peer Evaluation Rubric**

Students will be asked to determine the quality of the presentation, presenters’ understanding of the subject and the ability to stimulate discussion.

| Criteria  | Group members |           |           |
|---|---------------|-----------|-----------|
|   | Student A     | Student B | Student C |
| <b>Quality of presentation</b><br>Organization of ideas /4<br>Delivery of presentation /3<br>Quality of slides /2 |               |           |           |
| <b>Understanding of subject matter</b><br>Depth and breadth of coverage /5<br>Ability to answer questions /5      |               |           |           |
| <b>Ability to stimulate discussion</b><br>Interest generated /1   |               |           |           |
| <b>Total marks /20</b>  |               |           |           |

***Evaluation Criteria for Seminar Topic 1: Estrus Detection and Sexual Behaviour***

| Introduction  | Sexual behaviour  | Right time to breed/mate  | Resource material  |
|---|---|---|--|
| Why is estrus detection important in reproductive performance of your assigned species? | Give clear and accurate descriptions of courtship, copulatory, postcopulatory behavior for males and females in your assigned species | Described correct signs that show when it is the correct time to inseminate. What is this time relative to ovulation and why do you think this is important | There must be clear evidence that you read and understood the assigned material as well as that you consulted other research sources for the project |
| <b>10 marks</b>   | <b>30 marks</b>   | <b>25 marks</b>   | <b>35 marks</b>  |

### **1.15 Assignment Grading Times**

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Your marks will be available about 1 week after the submission of your assignment or test. Final grades will be posted in Aurora 7 days after you write the final examination.

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

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- All assignments should be submitted by the due date listed in the course schedule. If an extension is required all group members must come and see me and present the reason they need the extension.
- Groups that fail to submit work on time and do not ask for an extension are subject to the late assignment penalty. The penalty is an 8% per working day reduction in the value of the project's grade for up to five working days. After that point, the work is worth zero percent. Students who are not able to contribute to group work and who may otherwise hold everyone back due to health or other compassionate reasons need to submit a written explanation ahead of time or, if that is not possible, after the missed due date. However, group members are expected to complete the assignment on time.
- If an extension is granted to a group, the penalty will be 2% for each working day. Only in extreme circumstances (medical note is required) will an extension be granted with no late deductions.
- We all live and work in an environment that requires us to balance among many demanding tasks and to that end, excuses such as; computer failure, employment responsibility and routine financial support needs, social activities and commitments and stress will not be acceptable grounds for turning in your work late.

### **1.17 Laboratory Assignment Descriptions**

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#### **Tutorial /Lecture: The Female Reproductive System**

This laboratory may be a combination of a lecture and demonstration/ identification exercises to correctly identify the various structures of the female reproductive tract of farm animals such as the pig, horse and cow. Some of the gross anatomy and functional histology detail will be given in the accompanying lecture. Comparisons among different farm animal species will be made.

#### **References:**

Ch 2\* in 'Pathways to Pregnancy and Parturition' by P.L. Senger

Ch 2\* in 'Applied Animal Reproduction by Bearden', Fuquay and Willard

*Both these chapters have got good illustrations of the female reproductive tract in colour.*

Ch 2 in 'Reproduction in Farm Animals' by Hafez, E.S.E. and B. Hafez

#### **Tutorial /Lecture: The Male Reproductive System**

This laboratory exercise will most likely take the form of a lecture because it has been difficult to get male reproductive systems in the past. The tutorial will give a detailed account of blood supply to the testes, cooling mechanisms and site of spermatogenesis and sperm maturation as well as the role of accessory glands in influencing seminal fluid. Gross anatomy and functional histology of the male reproductive system will be described. Every effort will be made to compare the reproductive systems of difference animal species. Students will be expected to be familiar with the various structures of the male reproductive system and their functions.

#### **References:**

Ch 3\* in 'Pathways to Pregnancy and Parturition' by P.L. Senger

Ch 3\* in 'Applied Animal Reproduction' by Bearden, Fuquay and Willard

*Both these chapters have got good illustrations of the female reproductive tract in colour.*

Ch 1 'Reproduction in Farm Animals' by E.S.E. Hafez and B. Hafez

### **Student Seminar: Estrus Detection and Mating Behaviour**

Students are expected to work on this assignment in small groups and make oral presentations during the lab period as indicated in the laboratory schedule.

#### **References:**

*See section following the assignment topics mentioned above.*

### **Glenlea Farm Visit: Artificial Insemination and Pregnancy Diagnosis in Cattle**

The class will visit the Dairy Research Unit at Glenlea Research Farm. The lab will start off with a detailed description of the signs of estrus. A few dairy cows that will be in heat will be used to reinforce these descriptions. A demonstration of artificial insemination in cattle will then be made. Farm staff will demonstrate how to palpate for the cervix through the rectum in order to guide the AI gun through the cervix during insemination. Dairy unit staff will show and describe the various components of the insemination gun. The methods for pregnancy diagnosis and the period following breeding that should elapse before diagnosis can be made will also be discussed.

#### **References:**

Ch 28 in 'Reproduction in Farm Animals' by Hafez, E.S.E. and B. Hafez

### **Glenlea Farm Visit: Artificial Insemination and Pregnancy Diagnosis in Swine**

Prior the visit to Glenlea Swine Research Unit, students will be shown a video on heat detection in the sow using intact or vasectomized boar as well as the backpressure test. During the demonstration on artificial breeding farm staff will illustrate some of these procedures. The students will be shown the correct method of inserting the spirette or catheter during insemination in order to avoid entry into the bladder in swine breeding. They will also be shown how to determine when the spirette has reached the cervix and is locked in position. At this point the demonstrator may ask the students to feel the resistance to any further counter clockwise rotation of the catheter. Discussions on pregnancy diagnosis in swine will also be made following the demonstration.

#### **References:**

Ch 28 in 'Reproduction in Farm Animals' by Hafez, E.S.E. and B. Hafez

### **Avian Reproduction (video) Evaluation and Preservation of Semen**

A basic lecture that outlines the avian reproductive system will be given. This is followed by a video to demonstrate semen collection from a rooster. This demonstration is important as it highlights the proper way to handle a rooster with one hand while using the other hand to stroke its back. It is important to ensure that the bird is calm and relaxed during the process. Stroking will induce ejaculation.

#### **References:**

Ch 16 in 'Reproduction in Farm Animals' by Hafez, E.S.E. and B. Hafez

Ch 15 and 16 in 'Applied Animal Reproduction' by Bearden, Fuquay and Willard

### **Student Seminar: Improving Reproductive Efficiency**

Students will be assigned topics a month before the seminar presentation and will be expected to work in groups. More details on the assignment will be provided at a later date.

## 1.18 Policies Related to Student Discipline

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### **Academic Dishonesty: Plagiarism, Cheating and Examination Impersonation**

You should acquaint yourself with the University's policy on plagiarism, cheating, and examination impersonation as detailed in the General Academic Regulations and Policy section of the University of Manitoba Undergraduate Calendar or you may refer to Student Affairs at <http://www.umanitoba.ca/student>.

### **Policy on Respectful Work and Learning Environment**

[http://umanitoba.ca/admin/governance/governing\\_documents/community/566.html](http://umanitoba.ca/admin/governance/governing_documents/community/566.html)

### **Inappropriate and Disruptive Student Behaviour**

[http://umanitoba.ca/admin/governance/governing\\_documents/students/279.html](http://umanitoba.ca/admin/governance/governing_documents/students/279.html)

### **Accessibility Policy for Student with Disabilities**

[http://umanitoba.ca/admin/governance/governing\\_documents/students/281.html](http://umanitoba.ca/admin/governance/governing_documents/students/281.html)

### **Writing [and Learning] Assistance**

The following information from the Learning Assistance Centre may be helpful to those of you who may struggle with content, or writing papers.

#### **The Learning Assistance Centre (LAC)**

Through the LAC, you may meet with a study skills specialist to discuss concerns such as time management, reading and note-taking strategies, as well as test-taking strategies. You may also meet one-on-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. Writing tutors can also give you feedback if you submit a draft of your paper online. Please note that the online tutors require 48 business hours (i.e., Monday to Friday) to return your paper with comments. (Located in 201 Tier Building)

**Writing Tutors [and Learning Skills Tutors]** work on both the Fort Garry and Bannatyne Campuses. Tutors on the Fort Garry campus work in the Elizabeth Dafoe Library and the Learning Assistance Centre (201 Tier). Tutors on the Bannatyne campus work in 245 "T" wing (Basic Science Building). Check scheduled hours of availability on-line through the Learning Assistance Centre site ([www.umanitoba.ca/student/u1/lac](http://www.umanitoba.ca/student/u1/lac)), or call 480-1481 (Fort Garry Campus) or 272-3190 (Bannatyne Campus).

The **Virtual Learning Commons** is a unique learning and social networking site at the University of Manitoba. Students can access a variety of Learning Assistance Centre resources on-line at [www.umanitoba.ca/virtualllearningcommons](http://www.umanitoba.ca/virtualllearningcommons). Of special interest are several links to excellent, brief, on-line tutorials on integrity in academic work (e.g., what is plagiarism? How do you paraphrase? What are appropriate citation formats?), and an Assignment Manager program that automatically creates a timetable for completion of each step in the writing process.

#### **Student Accessibility Services**

Student Accessibility Services (SAS) provides support and advocacy for students with disabilities of all kinds: hearing, learning, injury-related, mental health, medical, physical or visual. Students with temporary disabilities such as sprains and breaks are also eligible to use our services. SAS acts as a liaison between students and the faculty and staff of the University of Manitoba as well as support agencies within the province of Manitoba. Please phone: 474-6213 (voice) or 474-9690 (TTY) for service.

#### **Student Counselling and Career Centre**

Student Counselling and Career Centre (SCC) offers individual, couple or family counselling in individual and groups formats. Please phone: 474-8592 or visit SCCC at 474 University Centre.

#### **University of Manitoba Libraries**

Students can access e-journals to look up the most recent journal articles in most animal science journals. Course text books may also be available in the library. There currently is no course material placed on reserve.

## 1.19 Important Dates

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For a complete list of important dates, please see ‘**Important Dates and Deadlines**’ under Registrar’s Office (Student Affairs) on the university website: <http://umanitoba.ca/student/records/deadlines/>

### General Dates

- |    |                                  |                       |
|----|----------------------------------|-----------------------|
| a) | Last Course Drop Date:           | September 22, 2020    |
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| e) | Remembrance Day (No classes):    | November 11, 2020     |
| f) | Fall Midterm Break (No classes): | November 9 – 13, 2020 |
| g) | Last Day of classes:             | December 11, 2020     |

### Course Specific Dates

- |                     |   |
|---------------------|---|
| <b>Term Test 1:</b> | <b>October 13<sup>th</sup> (25% of final grade)</b> |
| <b>Term Test 2:</b> | <b>November 5<sup>th</sup> (25% of final grade)</b> |

Important dates



UNIVERSITY  
OF MANITOBA

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

|  |   |
|--|---|
| <b>Course Title &amp; Number:</b>      | ANSC 0680 DAIRY CATTLE PRODUCTION<br>ANSC 4530 RUMINANT PRODUCTION SYSTEMS-MILK                                   |
| <b>Number of Credit Hours:</b>         | 3 credit hours  |
| <b>Class Times &amp; Days of Week:</b> | Mon, Wed, and Fri: 10:30 a.m. - 11:20 p.m.  |
| <b>Lab Times &amp; Days of Week:</b>   | Wednesdays: 2:30 – 4:30 p.m.  |
| <b>Location for classes:</b>           | Virtual <a href="https://umlearn2.webex.com/meet/kees.plaizier">https://umlearn2.webex.com/meet/kees.plaizier</a> |
| <b>Location for labs:</b>              | Virtual <a href="https://umlearn2.webex.com/meet/kees.plaizier">https://umlearn2.webex.com/meet/kees.plaizier</a> |
| <b>Pre-Requisites:</b>                 | For ANSC 4530: ANSC 2500. For ANSC 0680: ANSC 0420 or equivalent  |

|                                      |   |
|--------------------------------------|---|
| <b>Instructor(s) Name:</b>           | Dr. J.C. Plaizier   |
| <b>Office Location:</b>              | N.A.  |
| <b>Office Hours or Availability:</b> | As the course will be given virtually, there will be no office hours. However, if you want to talk to me individually or as a group, you can email me, and we will set up a video conference. All email communication must conform to the “Communicating with Students” 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. Plaizier 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. |
| <b>Office Phone No.</b>              | N.A.  |
| <b>Email:</b>                        | plaizier@umanitoba.ca   |

## 1.1 Course Description

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### **ANSC 4350: Ruminant Production Systems-Milk**

Will describe the industry in terms of size, complexity and relationship to the economy and give an understanding of the breeding, feeding, management and marketing practices in a modern system for milk production. The course will focus on dairy cows, but some references will be made to milking goats and sheep.

### **ANSC 0680: Dairy Cattle Production and Management**

A study of current production practices in Canada's dairy industry with focus on nutrition, reproduction, genetics, health, replacement rearing and marketing. The course will focus on dairy cows, but some references will be made to milking goats and sheep.

## 1.2 . General Information

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Students are expected to have background in animal science, including anatomy, nutrition, reproduction, and genetics. The student's own initiative in reading the reference material and related publications is required for maximum benefit.

Course instruction will include three 50-minute lectures each week and 3 hours per week of laboratory practicum. Lab sessions will take the form of tutorials/ lectures using PowerPoint presentations and video clips.

Students are expected to take the initiative to read and understand the concepts covered and the listed reference text would be able to assist them achieve this.

Students will visit the dairy unit Glenlea Research Farm and 2 commercial dairy farms virtually during the laboratory period. During these visits, information provide during classes will be demonstrated. Students will be expected to be engaged in all these learning activities and are reminded that the materials covered in tutorials complement the lectures and are designed to give students an opportunity to observe relevant practical exercises. Material covered in the labs may still form part of the tests.

## 1.3 Course Goals

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The objectives of the courses are:

- a) To introduce students to the basic principles and practical skills in milk production systems with special reference to dairy production and management.
- b) List and explain the management practices used in modern dairy production.
- c) Discuss these management practices in relation to their impact on the profitability of dairy and other milk production systems.
- d) To develop critical thinking skills so that students can make management decisions

based on science-based animal husbandry principles.

#### **1.4 Behavioural Learning Objectives**

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- Be familiar with the marketing of raw milk in Canada, supply management, and international issues related to milk marketing.
- Develop an understanding of the different needs of dairy calves, heifers and cows at different stages of their life and production.
- Develop an understanding of the basic digestive, physiological and metabolic processes of dairy calves, heifers and cows, as they relate to production, health, welfare, pregnancy, growth of dairy animals at different stages of their life and production.
- Be familiar with the current methods and techniques used for the management of reproduction, breeding, and sire selection of dairy cows and heifers.
- Be familiar with the milking procedure and milking machines, and issues related to milk quality and mastitis.
- Be familiar with the environmental impacts of the dairy industry and manure management .
- Be familiar with housing systems of confined dairy animals in Canada, and how housing affects production welfare, and health of dairy cows.
- Be aware about the relationship between nutrition, environment, welfare and health.
- Be exposed to current and emerging issues in the dairy industry.
- Acquire some of the skills needed to be able to effectively gather, integrate and analyze scientific information to make informed decisions related to the management of dairy animals and dairy farms and be able to develop a critical view of management practices on dairy farms.

#### **1.5 Textbook, Readings, Materials**

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There are no text books for this course. The following books provide good background information and additional reading material. Dairy Cattle Science 2006 by Tyler, H. D. Z., and M. Eugene, Large Dairy Herd Management (e-book) by the American Dairy Science Association; NRC Nutrient Requirements for Dairy Cattle 2001, National Research Council, Washington, USA

Journals that include good information on dairy cattle production include Hoards Dairyman, Progressive Dairy, The Milk producer (from Dairy Farmers of Ontario). You will need to do a literature search for your term project. For this search I recommend Google Scholar (<https://scholar.google.com>).

#### **1.6 Course Technology**

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- Students will need to use Webex for the classes and laboratory sessions. Make sure that your computer and internet connection are sufficient for Webex classes. During these classes please mute your microphone. If you want to ask a question, then please let me know that via a chat, and I will ask you to unmute your microphone and ask me the question
- Lecture and tutorial notes will be posted on UMLearn and students are expected to print the notes before class and bring them for the lecture. I will make every effort to post these notes in advance.

## 1.7 I Expect You To

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- Fully participate in class, make an effort to consult recommended textbooks on issues that may not be clear to you, pay attention in class and contribute to class discussions.
- Complement the notes that I provide with your own notes that you take during lectures. The notes that I provide are sometimes incomplete and you will be expected to attend lectures in order to complete your notes. You will also be evaluated based on your comprehension of material covered in the lectures, handouts and any relevant discussions during class.
- Produce university-level quality writing: legible and proofread. You will have to submit assignments by email. If there are a significant number of errors or if it is difficult to read, the assignment will be returned to you prior to grading for changes. In most cases, your assignment will then be late and docked points.

## 1.8 You can expect me to

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- Treat you with respect and I would appreciate the same courtesy in return. See [Respectful Work and Learning Environment Policy](#).
- Change the course plan outlined herein in response to genuine concerns or events that may be beyond my or your control. Thus where necessary class topics or laboratory exercises may be changed.
- Give you feedback – particularly for tests and laboratory exercises. I expect that comments, corrections and suggestions that I make are taken seriously because that feed back is an important way to learn.
- Provide clarity when you face difficulties understanding some of the concepts for the course
- Treat you, as adult learners, with the related style of respect.

## 1.9 Course Syllabus

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### Class Schedule

#### September

- 9 - Fermentation and digestion (JP)
- 11 - Metabolism (JP)
- 14 - Gut microbiota (JP)
- 16 - First class diploma, Industry overview (JP)
- 18 - Dairy breeds, production cycles, levels of production (JP)
- 21 - Supply management (JP)
- 23 - Nutrient utilization (JP)
- 25 - Nutrition, Energy (JP)
- 28 - Nutrition, Protein (JP)
- 30 - Nutrition, Carbohydrates (JP)

#### October

- 2 - Nutrition, Minerals and vitamins (JP)
- 5 - Nutrition, Feed intake (JP)
- 7 - Dairy cattle feeds (JP)
- 9 - Midterm 1**
- 12 - Thanksgiving, University closed**

- 14 - Diploma Field Trip, Milk (JP)
- 16 - Mammary gland and milking (JP)
- 19 - Milk production (JP)
- 21 - Milk processing (JP)
- 23 - Mastitis (JP)
- 26 - Invited Speaker. Dr. Rob Berry, MAFRD
- 28 - Genetics and selection (JP)
- 30 - Genetics and selection (JP)

### November

- 2 - Housing (JP)
- 4 - Housing (JP)
- 6 - Midterm 2**
- 9 - Fall term break**
- 11 - Fall term break**
- 13 - Fall term break**
- 16 - Manure management
- 18 - Management of calves (JP)
- 20 - Management of heifers (JP)
- 23 - Dry cow management (JP)
- 25 - Reproduction (JP)
- 27 - Reproduction (JP)
- 30 - Class presentations (Assignment 3)

### December

- 2 - Class presentations (Assignment 3)
- 4 - Class presentations (Assignment 3)
- 7 - Welfare and lameness (JP)
- 9 - Last class Diploma-Review (JP)
- 11 - Last class Degree- International comparisons (JP)

### 1.10 Lab Schedule

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- September 9 - No lab
- September 16 - Type traits (JP)
- September 23 - Dairy Farmers of Manitoba (JP)
- September 30 - Feed analysis (JP)
  
- October 7 - Cost of production, Assignment 1. (JP)
- October 14 - Videos on dairy cattle production (JP)
- October 21 - Feed formulation. Assignment 2.
- October 28 - Glenlea: milking, mastitis and feeding (JP, BB)
  
- November 4 - Interpretation of DHI reports, Genetic evaluation (JP)
- November 11 - Remembrance Day, no lab
- November 18 - Glenlea: Body condition scoring (BB, JCP)

November 25 - Glenlea: reproduction and housing (JP, BB)

December 2 - Virtual Farm tour

December 9 - Virtual farm tour

JP = J.C. Plaizier BB = Brittany Byron

### 1.11 Grading

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#### Course Grading Schedule

|  |         |
|--|---------|
| Participation in class                             | - 5 %   |
| Term project (Group presentation)                  | - 15%   |
| Outline and references (due October 7),            | - 5%    |
| Presentation (November 30 to December 4)           | - 10%   |
| Mid-term test 1(October 12)                        | - 15%   |
| Mid-term test 1(November 6)                        | - 15%   |
| Assignment #1 (Cost of production, Due October 14) | - 7.5%  |
| Assignment #2 (Feed formulation, Due October 28)   | - 12.5% |
| Final exam   | - 30%   |

All of your assignments and tests will be calculated as a percentage and converted into a letter grade. Your total mark, adjusted for the proportion contributed from each assignment or test will be used to determine the letter grade.

| Letter Grade | Marks         |
|--------------|---------------|
| A+           | 92-100%       |
| A            | 85-91.9%      |
| B+           | 78-84.9%      |
| B            | 70-77.9%      |
| C+           | 62-69.9%      |
| C            | 55-61.9%      |
| D            | 50-54.9%      |
| F            | Less than 50% |

### 1.12 Seminar Assignment Descriptions

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You must select a topic on which to make your presentation. This is a group presentation and groups can be made up to a maximum of three members. You must submit electronic copies of the PowerPoint presentation. Subjects for presentations that you can choose from are given below. Other subjects will be considered, but need to be approved by me.

Potential topics:

- How does BSE affect the Manitoba dairy industry?
- How can we dispose of culled cows?
- The future of supply management in the dairy industry
- The value of manure as fertilizer
- The Manitoba dairy industry and the environment
- Infectious disease (Johne’s disease and leucosis): the problem and possible solutions
- Are we burning out our dairy cows?
- Strategies to optimize longevity of dairy cows.
- Improving reproductive performance on dairy farms.

**1.13 Seminar Submission Guidelines**  
**Peer Evaluation Rubric**

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Students will be asked to determine the quality of the presentation, presenters’ understanding of the subject and the ability to stimulate discussion.

| Criteria  |  |
|---|--|
| <b>Quality of presentation</b><br>Organization of ideas /4<br>Delivery of presentation /3<br>Quality of slides /2 |  |
| <b>Understanding of subject matter</b><br>Depth and breadth of coverage /5<br>Ability to answer questions /5      |  |
| <b>Ability to stimulate discussion</b><br>Interest generated /1   |  |
| <b>Total marks</b> /20  |  |

**1.14 Assignment Grading Times**

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Your marks will be available about 1 week after the submission of your assignment or test. Final grades will be posted in Aurora 7 days after you write the final examination.

**1.15 Assignment Extension and Late Submission Policy**

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- All assignments should be submitted by the due date listed in the course schedule. If an extension is required all group members must come and see me and present the reason they need the extension.
- Groups that fail to submit work on time and do not ask for an extension are subject to the late assignment penalty. The penalty is an 8% per working day reduction in the value of the project’s grade for up to five working days. After that point, the work is worth zero percent. Students who are not able to contribute to group work and who may otherwise hold everyone back due to health or other compassionate reasons need to submit a written explanation ahead of time or, if that is not possible, after the missed due date. However, group members are expected to complete the assignment on time.
- If an extension is granted to a group, the penalty will be 2% for each working day. Only in extreme circumstances (medical note is required) will an extension be granted with no late deductions.

- We all live and work in an environment that requires us to balance among many demanding tasks and to that end, excuses such as; computer failure, employment responsibility and routine financial support needs, social activities and commitments and stress will not be acceptable grounds for turning in your work late.

### 1.16 Laboratory Assignment Descriptions

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There are two laboratory assignments. Assignment 1 is related to the estimation of the cost of production and the margin over feed costs using a cost of production Excel spread sheet from Dairy Farmers of Manitoba, the milk check and the cost of feeds. Assignment 2 is related to the least cost diet formulation for lactating dairy cows using the WUFFF Excel spreadsheet, nutrient requirements, and feed analysis. You will need Microsoft excel for both assignment. For the feed formulation assignment, you will need to Solver add-in of Excel, which you may have to install.

### 1.17 Policies Related to Student Discipline

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#### **Academic Dishonesty: Plagiarism, Cheating and Examination Impersonation**

You should acquaint yourself with the University's policy on plagiarism, cheating, and examination impersonation as detailed in the General Academic Regulations and Policy section of the University of Manitoba Undergraduate Calendar or you may refer to Student Affairs at <http://www.umanitoba.ca/student>.

#### **Policy on Respectful Work and Learning Environment**

[http://umanitoba.ca/admin/governance/governing\\_documents/community/566.html](http://umanitoba.ca/admin/governance/governing_documents/community/566.html)

#### **Inappropriate and Disruptive Student Behaviour**

[http://umanitoba.ca/admin/governance/governing\\_documents/students/279.html](http://umanitoba.ca/admin/governance/governing_documents/students/279.html)

#### **Accessibility Policy for Student with Disabilities**

[http://umanitoba.ca/admin/governance/governing\\_documents/students/281.html](http://umanitoba.ca/admin/governance/governing_documents/students/281.html)

#### **Writing [and Learning] Assistance**

The following information from the Learning Assistance Centre may be helpful to those of you who may struggle with content, or writing papers.

#### **The Learning Assistance Centre (LAC)**

Through the LAC, you may meet with a study skills specialist to discuss concerns such as time management, reading and note-taking strategies, as well as test-taking strategies. You may also meet one-on-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. Writing tutors can also give you feedback if you submit a draft of your paper online. Please note that the online tutors require 48 business hours (i.e., Monday to Friday) to return your paper with comments. (Located in 201 Tier Building)

**Writing Tutors [and Learning Skills Tutors]** work on both the Fort Garry and Bannatyne Campuses. Tutors on the Fort Garry campus work in the Elizabeth Dafoe Library and the Learning Assistance Centre (201 Tier). Tutors on the Bannatyne campus work in 245 "T" wing (Basic Science Building). Check scheduled hours of availability on-line through the Learning Assistance Centre site ([www.umanitoba.ca/student/u1/lac](http://www.umanitoba.ca/student/u1/lac)), or call 480-1481 (Fort Garry Campus) or 272-3190 (Bannatyne Campus).

The **Virtual Learning Commons** is a unique learning and social networking site at the University of Manitoba. Students can access a variety of Learning Assistance Centre resources on-line at [www.umanitoba.ca/virtualearningcommons](http://www.umanitoba.ca/virtualearningcommons). Of special interest are several links to excellent, brief, on-line tutorials on integrity in academic work (e.g., what is plagiarism? How do you paraphrase? What are appropriate citation formats?), and an Assignment Manager program that automatically creates a timetable for completion of each step in the writing process.

**Student Accessibility Services**

Student Accessibility Services (SAS) provides support and advocacy for students with disabilities of all kinds: hearing, learning, injury-related, mental health, medical, physical or visual. Students with temporary disabilities such as sprains and breaks are also eligible to use our services. SAS acts as a liaison between students and the faculty and staff of the University of Manitoba as well as support agencies within the province of Manitoba. Please phone: 474-6213 (voice) or 474-9690 (TTY) for service.

**Student Counselling and Career Centre**

Student Counselling and Career Centre (SCC) offers individual, couple or family counselling in individual and groups formats. Please phone: 474-8592 or visit SCCC at 474 University Centre.

**University of Manitoba Libraries**

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## 1.18 Important Dates

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**Course Specific Dates**

- |                     |  |
|---------------------|--|
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| <b>Term Test 2:</b> | <b>November 10<sup>th</sup> (25% of final grade)</b> |

Important dates