



**CUMMING SCHOOL OF MEDICINE
GRADUATE COURSE OUTLINE**

COURSE TITLE: ADVANCED TOPICS IN REPRODUCTIVE HEALTH			
Course	MDSC 701		
Pre/Co-Requisites	Consent of the course coordinator. Interested graduate students must contact Dr. Kastelic before registration.		
Faculty	University of Calgary, Faculty of Veterinary Medicine, Cumming School of Medicine, Graduate Science Education		
Instructor Name(s)	Drs J. Kastelic (course coordinator), R. McCorkell, H. Habibi, D. Toms, J. Thundathil, C. Klein, D. Slater, W. Dean, M. Hemberger	Email	jpkastel@ucalgary.ca
Office Location	TRW 1E15	Office Hours	Tues & Wed 1-3 or by appointment
Instructor Email Policy	Email is the preferred means of communication. Will reply as soon as possible and always within 2 business days.		
Telephone No.	Cell: 403 210 8660; Office: 403 690 9273		
TA Name, if applicable	N/A	Email	
Class Term, Days	Fall 2019, Tuesdays and Thursdays		
Class Times	0900 TO 1030		
Class Location	TRW 2E09		

COURSE INFORMATION/DESCRIPTION OF THE COURSE
<p>A series of topics, ranging from basic sciences to clinical subjects, will be covered in both a lecture and discussion format. Students will be expected to actively participate during classroom sessions. Lectures will be followed by student presentations on that topic in the following class, using one or more approved original research papers. The presenting student will lead the discussion. In addition, this course will provide students an opportunity to advance their knowledge regarding a wide variety of methods in reproductive biology.</p> <ol style="list-style-type: none"> 1. Spermatogenesis (Kastelic): The lecture will discuss the various somatic and germ cells present in testis and coordinated regulation of spermatogenesis. Emphasis will be on transcriptional regulation of genes encoding proteins required for germ cell differentiation, and protein interaction in structures unique to spermatozoa. 2. Neuro-endocrine axis (Habibi): The lecture will focus on hormonal control of brain-pituitary-gonadal axis. We will explore stimulatory and inhibitory hormones and their role in integrated control of reproduction. Emphasis will be placed on the role of neurohormones in endocrine and paracrine regulation of pituitary and

ovarian function. We will also discuss pharmacology and therapeutic use of gonadotropin-releasing hormones as effective medicinal tools for induction of ovulation and treatment of hormone-dependant cancers.

3. Oogenesis and folliculogenesis (McCorkell): Objectives are to introduce: 1) oogenesis (development of female gamete) versus folliculogenesis; 2) embryological formation of ovaries, gametes and follicles; 3) morphological development of a follicle; 4) developmental dynamics of follicles; and 5) folliculogenesis versus spermatogenesis.

4. Stem cells (Toms): Embryonic stem (ES) cells are derived from the inner cell mass of the blastocyst. Based upon their pluripotency, ES have the capacity to differentiate into any cell type in the body. In this lecture, we will discuss the importance of ES cells in both the genetic engineering of animals and in the emerging field of cytotherapeutics. We will discuss the ethical issues behind ES cells and new technologies being developed to circumvent ethical controversies.

5. Mechanisms of mammalian fertilization (Thundathil): Objectives are to: 1) describe the cellular and molecular mechanisms of mammalian fertilization; 2) analyze common causes of fertilization failure; and 3) identify future areas of research. Discussion will be focused on biochemistry sperm-oocyte binding, acrosome reaction, gamete fusion and egg activation, cortical granule exocytosis, resumption of meiosis, sperm DNA decondensation and pronucleus formation and fate of sperm components within the egg. In addition, various sperm function assays available for testing the ability of sperm to perform these functions will be discussed.

6. Preimplantation embryo development and implantation (Klein): This class will focus on characteristics of various stages of preimplantation embryos, lab procedures for evaluation of preimplantation embryos, oocyte quality, and developmental competence of embryos, maternal-zygotic transition, and effects of physical and chemical conditions on preimplantation embryo development. Topics of discussion will include: various types of implantation, stages of implantation, embryo interactions with the uterine epithelium, and mechanisms regulating trophoblast invasion. In addition, we will discuss the hormonal control of implantation, including concepts of “uterine receptivity” and “implantation window” and the roles of steroid hormones.

7. Germ cell transplantation (Kastelic): Donor germ cells colonize a recipient’s testis and produce donor-derived sperm; therefore, the recipient male can distribute genetic material of the germ cell donor. Germ cell transplantation represents a functional reconstitution assay for male germline stem cells. There are three major applications for this technology in animals; 1) study fundamental aspects of male germline stem cell biology and male fertility; 2) preserve the reproductive potential of genetically valuable individuals by male germ cell transplantation within or between species and 3) produce transgenic sperm by genetic manipulation of isolated germ line stem cells and subsequent transplantation. Transgenesis through the male germ line has tremendous potential in species in which embryonic stem cells are not available and somatic cell nuclear transfer has limited success.

8. Placenta (Hemberger): The placenta is key for ensuring embryonic growth and survival during mammalian reproduction. Defects to placental structure and function result in growth deficits, intra-uterine lethality or even in specific congenital birth defects. Despite these pivotal roles, the placenta remains often overlooked as the potential target organ when malformation at birth are investigated. In this session, we will explore the various functions of the placenta in maintaining a healthy pregnancy, and discuss novel avenues into placental research using stem cell models.

9. Epigenetics & Reproduction (Dean): Epigenetics studies all the processes which influence cell fate commitment without changes to the underlying genetic code. Vital in establishment of germ cells is the epigenetic reprogramming which takes place during embryonic and fetal development, setting a course for instructions to be inherited across generations. We will explore mechanisms that are critical for the establishment and erasure of epigenetic signatures and the role that the environment may have in shaping the phenotypic outcome.

10. Pregnancy and parturition (Slater): This lecture will give an outline of maternal adaptation to pregnancy and the process of parturition. Topics of discussion will include endocrine regulation of pregnancy and initiation of labour. In addition, we will discuss preterm labour and current hypotheses and rationale for the treatment of premature contractions.

11. Assisted reproductive technologies (Kastelic): This class will present an overview of several assisted reproductive technologies in animals and humans, including principles, advantages and limitations.

12. Development of the reproductive system (Kastelic) This class will focus on the cellular and molecular bases of the development of male and female reproductive systems, with an emphasis on function and developmental anomalies. The learning objectives are to: 1) understand the current concept of gonadal differentiation; 2) understand the cell biology of primordial germ cells; 3) analyze the practical significance of understanding the differentiation of reproductive system; and 4) identify future areas of research.

LEARNING RESOURCES/REQUIRED READING

The reading materials required for different topics will vary; this will be discussed in the class by individual instructors.

COURSE OBJECTIVES/LEARNING OUTCOMES

1. To develop knowledge regarding current topics in reproductive health.
2. To critically evaluate scientific literature and identify strengths, weaknesses and knowledge gaps.
3. To develop skills in presentation and leading a discussion on scientific data and research methodologies.
4. To demonstrate in-depth knowledge in research methodologies through oral and written communications.

CUT POINTS FOR GRADES

This course adheres to the grading system outlined in the University of Calgary, Faculty of Graduate Studies Calendar. Grades of A+ and A are not distinguished in the calculation of GPAs. Percentage/letter grade conversion used for this course is as follows

Grade	Grade Point Value	Percentage Conversion	Graduate Description
A+	4.00	95-100	Outstanding
A	4.00	90-94	Excellent – superior performance showing comprehensive understanding of the subject matter
A-	3.70	85-89	Very Good Performance
B+	3.30	77-84	Good Performance
B	3.00	72-76	Satisfactory Performance
B-	2.70	68-71	Minimum Pass for Students in the Faculty of Graduate Studies
C+	2.30	63-67	All grades below 'B-' are indicative of failure at the graduate level and cannot be counted toward Faculty of Graduate Studies course requirements

Assessment Components: The University policy on grading related matters is outlined in the 2019-2020 Calendar .			
Assessment Methods	Description	Weight %	Due Date and Time
Review of journal articles	Two sessions are allocated for each topic. In the first session, the instructor will provide an overview of the topic and the second session is for review of journal articles. There will be two presentations for each topic. The presenter should identify an article related to the topic (in consultation with the instructor) and present the content of the article using PowerPoint (~ 20 min). The selected papers should be distributed to the class (URL by email) by the presenter (due 48 hours before the class). Each presentation will be followed by discussion (~20 min). The presenter will lead the discussion (highlighting merit of study, weaknesses, further studies required, etc.). The presenter will be evaluated for his/her skills in presentation, critical thinking and leading a discussion based on a scoring rubric. Presenting students will bring a copy of the scoring rubric to the class and provide this to instructors before their presentations. The instructor and the course participants will provide constructive feedback on the presentation, optimizing the learning experience. In addition, course instructors will submit their written evaluations for each presenter (in the specified scoring rubric) to the course coordinator. Each registered student will make multiple presentations during this course. Students will be monitored for their participation in the discussion. A schedule for review of journal articles will be established in the first class in discussion with the students.	30	Presenter must distribute paper to class by email no later than 48 hours before class starts.

Assignment	Students need to select a method in reproductive biology for their presentation, in consultation with course coordinator. They are required to write a review paper (10 pages, single-spaced including figures and references) on the selected method and distribute a copy of this paper to the class at least 1 week before the date of their scheduled presentation (20% of the course grade is allocated for this review paper). In addition, students will present their paper (30 min; ppt format) as scheduled below. Each presentation will be followed by a discussion (20% of the course grade is allocated for this activity). In addition to the course coordinator, a recognized expert in your topic may be present in the class at the time of your presentation and he/she may contribute to evaluation of your assignment.	40	Presentation dates: Dec 3 and 5. Paper due by email by 10 PM local time 7 days before presentation
Final examination	Final exam (30% of course grade) will be essay questions based on topics covered in class. No books, notes or electronic devices allowed.	30	Scheduled by Registrar

ASSESSMENT AND EVALUATION INFORMATION

ATTENDANCE AND PARTICIPATION EXPECTATIONS:

Students are expected to attend all classes. If they are unable to attend, they are asked to contact the Course Coordinator, by email, in advance of the class, or as soon as possible after the class, indicating the reason for their absence.

GUIDELINES FOR SUBMITTING ASSIGNMENTS:

Review paper (approximately 10 pages, typed, single-spaced, including figures and references) on the selected method, with a copy distributed to the class by email by 10 PM at least 1 week before the date of their scheduled presentation. Format of citations in text and of bibliography are students' choice but must be clear and consistent.

FINAL EXAMINATIONS: The final examination will be essay questions based on the topics covered in the class. Students will be able to choose from a selection of essay questions.

EXPECTATIONS FOR WRITING: Review papers and examinations should be in well written English, with proper grammar, sentence structure, spelling and punctuation. Final exam will be hand written and must be legible.

LATE AND/OR MISSING ASSIGNMENTS:

Late or missing assignments will not be considered for evaluations.

Is a passing grade on a particular component essential to pass the course as a whole?

A passing grade on each component of the assessment (review of journal articles, assignment and final examination) is essential to pass the course as a whole.

COURSE TIMETABLE			
Course Schedule Date	Topic & Reading	Instructor	Assignments/Due Dates & Times
Sept 5 and 10	Spermatogenesis	Kastelic	Student presentation Sept 10, 9 am
Sept 12 and 17	Neuro-endocrine axis	Habibi	Student presentation Sept 17, 9 am
Sept 19 and 2	Oogenesis and folliculogenesis	McCorkell	Student presentation Sept 24, 9 am
Sept 26 and Oct 1	Stem Cells	Toms	Student presentation Oct 1, 9 am
Oct 3 and Oct 8	Mammalian fertilization	Thundathil	Student presentation Oct 8, 9 am
Oct 10 and 15	Preimplantation development, implantation, MRP	Klein	Student presentation Oct 15, 9 am
Oct 17 and 22	Germ cell transplantation	Kastelic	Student presentation Oct 22, 9 am
Oct 24 and Oct 29	Placenta	Hemberger	Student presentation Oct 29, 9 am
Oct 31 and Nov 5:	Epigenetics & Reproduction	Dean	Student presentation Nov 5, 9 am
Nov 7 and Nov 19:	Pregnancy & parturition	Slater	Student presentation Nov 19, 9 am
Nov 21 and 26	Assisted reproductive technologies	Kastelic	Student presentation Nov 26, 9 am
Nov 28	Development of the reproductive system	Kastelic	
Dec 3 and 5	Assignment presentations (research methodology)	Kastelic	Paper due by 10 PM local time 7 days before presentation
INTERNET AND ELECTRONIC COMMUNICATION DEVICE INFORMATION			
<p>Cell phones must be turned off in class unless otherwise arranged with the instructor.</p> <p>The use of laptop and mobile devices is acceptable when used in a manner appropriate to the course and classroom activities. Students are to refrain from accessing websites that may be distracting for fellow learners (e.g. personal emails, Facebook, YouTube). Students are responsible for being aware of the University's Internet and email use policy, which can be found at https://www.ucalgary.ca/policies/files/policies/electronic-communicationspolicy.pdf.</p>			



UNIVERSITY OF CALGARY POLICIES AND SUPPORTS

ACADEMIC ACCOMMODATIONS

Students seeking an accommodation based on disability or medical concerns should contact Student Accessibility Services; SAS will process the request and issue letters of accommodation to instructors. For additional information on support services and accommodations for students with disabilities, visit www.ucalgary.ca/access/. Students who require an accommodation in relation to their coursework based on a protected ground other than disability should communicate this need in writing to their Instructor. The full policy on Student Accommodations is available at <http://www.ucalgary.ca/policies/files/policies/student-accommodation-policy.pdf>

IMPORTANT INFORMATION

Any research in which students are invited to participate will be explained in class and approved by the appropriate University Research Ethics Board

INSTRUCTOR INTELLECTUAL PROPERTY

Course materials created by professor(s) (including course outlines, presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the professor(s). These materials may NOT be reproduced, redistributed or copied without the explicit consent of the professor. The posting of course materials to third party websites such as note-sharing sites without permission is prohibited. Sharing of extracts of these course materials with other students enrolled in the course at the same time may be allowed under fair dealing

COPYRIGHT LEGISLATION

All students are required to read the University of Calgary policy on Acceptable Use of Material Protected by Copyright (www.ucalgary.ca/policies/files/policies/acceptable-use-of-material-protected-by-copyright.pdf) and requirements of the copyright act (<https://laws-lois.justice.gc.ca/eng/acts/C-42/index.html>) to ensure they are aware of the consequences of unauthorised sharing of course materials (including instructor notes, electronic versions of textbooks etc.). Students who use material protected by copyright in violation of this policy may be disciplined under the Non-Academic Misconduct Policy

ACADEMIC INTEGRITY

The Cumming School of Medicine expects intellectual honesty from its students. Course participants should be aware of University policies relating to Principles of Conduct, Plagiarism and Academic Integrity. These are found in the printed Faculty of Graduate Studies Calendar, or online under Academic Regulations in the Faculty of Graduate Studies Calendar, available at [Faculty of Graduate Studies Academic Regulations](#)

ACADEMIC MISCONDUCT

For information on academic misconduct and its consequences, please see the University of Calgary Calendar at <http://www.ucalgary.ca/pubs/calendar/current/k.html>

EMERGENCY EVACUATION AND ASSEMBLY POINTS

Assembly points for emergencies have been identified across campus. The primary assembly points for South Campus (Health Science Centre (HSC); Health & Research Innovation Centre (HRIC); Heritage Medical Research Building (HMRB) and Teaching, Research and Wellness (TRW)) are:



- HSC and HMRB: HRIC Atrium (alternate assembly point is Parking Lot 6)
- HRIC: HMRB Atrium (alternate assembly point is Parking Lot 6)
- TRW: McCaig Tower (alternate assembly point is HMRB – Atrium)

APPEALS

If there is a concern with the course, academic matter or a grade, first communicate with the instructor. If these concerns cannot be resolved, students can proceed with an academic appeal, as per Section N of the Faculty of Graduate Studies Calendar. Students must follow the official process and should contact the Student Ombuds Office (<http://www.ucalgary.ca/provost/students/ombuds>) for assistance with this and with any other academic concerns, including academic and non-academic misconduct

THE FREEDOM OF INFORMATION AND PROTECTION OF PRIVACY (FOIP) ACT

This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIP) and students should identify themselves on written assignments (exams and term work.) by their name and ID number on the front page and ID on each subsequent page. Assignments given by you to your course instructor will remain confidential unless otherwise stated before submission. The assignment cannot be returned to anyone else without your expressed permission to the instructor. Grades will be made available on an individual basis and students will not have access to other students' grades without expressed consent. Similarly, any information about yourself that you share with your course instructor will not be given to anyone else without your permission

WELLNESS AND MENTAL HEALTH RESOURCES

The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the excellent mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre), <https://www.ucalgary.ca/wellnesscentre/services/mental-health-services> and the Campus Mental Health Strategy website <https://www.ucalgary.ca/mentalhealth/>

SUPPORTS FOR STUDENT LEARNING, SUCCESS, AND SAFETY

Student Ombudsman: The Student Ombuds' Office supports and provides a safe, neutral space for students. For more information, please visit www.ucalgary.ca/ombuds/ or email ombuds@ucalgary.ca

Student Union: The SU Vice-President Academic can be reached at (403) 220-3911 or suvpaca@ucalgary.ca; Information about the SU, including elected Faculty Representatives can be found here: <https://www.su.ucalgary.ca>

Graduate Student's Association: The GSA Vice-President Academic can be reached at (403) 220- 5997 or gsa.vpa@ucalgary.ca; Information about the GSA can be found here: <https://gsa.ucalgary.ca>

**SAFEWALK**

Campus security will escort individuals, day or night, anywhere on campus (including McMahon Stadium, Health Sciences Centre, Student Family Housing, the Alberta Children's Hospital and the University LRT station). Call 403-220-5333 or visit <http://www.ucalgary.ca/security/safewalk>. Use any campus phone, emergency phone or the yellow phone located at most parking lot pay booths. Please ensure your personal safety by taking advantage of this service.