

MDSC 404
Integrative Human Physiology

Course Coordinator – Dr. James Fewell (fewell@ucalgary.ca)

Instructors

- Neurophysiology, Cardiovascular & Respiratory
Dr. James Fewell (fewell@ucalgary.ca)
- Endocrine & Renal
Dr. Francine Smith (fsmith@ucalgary.ca)
- Gastrointestinal & Liver
Dr. Donna-Marie McCafferty (dmmccaff@ucalgary.ca)

Office Hours/Policy on Answering Student Email

- Office hours will be set and communicated by individual instructors.
- Emails from student's@ucalgary.ca account will be answered Monday to Friday from 0800 to 1600 within 48 hours of receipt; questions regarding unit material will not be answered within 24 hours of a unit examination.

Teaching Assistants

- TBA

Time and Location

- Learning will occur in both synchronous (ie real-time Zoom lectures) and asynchronous (ie recorded Zoom lectures, text reading assignments, videos, tutorials and practice examinations) contexts. Synchronous lectures will be held Monday, Wednesday and Friday from 1510 to 1600 via Zoom. The teaching assistant will be available after lecture to answer questions via Zoom until 1700.
- This course will take place **in a blended format**. Lectures will take place via Desire2Learn (D2L) and Zoom. To best succeed in the course, students are encouraged to participate in the asynchronous learning tasks (eg. Read assigned material before lectures, view relevant videos, etc) and synchronous Zoom sessions. When unable to participate live due to unforeseen circumstances, inform the instructor in advance and propose and implement an alternative participation activity. **Unit exams will take place IN-PERSON (dates indicated below).**
- **Please note: the format for the Winter term has not yet been determined. Students should anticipate that it could return to in-person**

Important Dates

Fall Term

- First day of class: Wednesday, September 8
- Fall term Break (no classes held) November 7-13
- Last day of class: Wednesday, December 8

Winter Term

- **Format for the Winter term has not yet been determined**

- First day of class: Monday, January 10
- Winter term break (no classes held): February 20-26
- Last day of class: Monday, April 11
- Good Friday – April 15 / Easter Monday - April 18

Prerequisite

- Admission to the BHSc Honours program.

Course Description

- Physiology is defined as the study of how living organisms function and encompasses the integration of processes from molecules to the whole organism. Provides fundamental principles and concepts about the physiology of the major human organ systems.

Overarching Theme

- Course format consists of lectures provided by published scholars as well as student-initiated discussions of various topics.

Global Objective

- The global objective of MDSC 404 is to provide a founding in integrative human physiology.

Course Learning Outcomes

- By the end of this course, students will have a founding in integrative human physiology that will allow them: a) to recall fundamental principles and concepts regarding physiology of the nervous system, endocrine system, cardiovascular system, respiratory system, renal system and gastrointestinal system, b) to apply these physiological principles and concepts to predict the body's response to perturbations that disrupt homeostasis, and c) to predict how disease or injury of an organ can lead to disordered function (i.e., pathophysiology) and disrupt homeostasis.

Learning Resources

- Required textbook - Derrickson's Human Physiology, 2rd edition, John Wiley and Sons, 2019.

A Note regarding readings

- A list of required readings for all course sections will be outlined on D2L and links and documents will be made available, where appropriate. Required readings have been chosen carefully to inform you and enhance the lecture material. **Students are REQUIRED to complete assigned readings BEFORE each lecture.** Instructors will proceed in class on the assumption that students have read completely the assigned readings.
- Students should be aware that many of the readings they will be assigned might be of an unfamiliar nature and style. Students should allot sufficient time to allow for several reads of the assigned material.

Learning Technology Requirements

- Brightspace (by D2L) is located on the University of Calgary server and will be used extensively for communication with students. **It is the student's responsibility to ensure that they receive all posted communications and documents and that they receive emails sent by instructors or fellow students through D2L.** Only your @ucalgary.ca email address may be linked to D2L. Please ensure that you are regularly checking your @ucalgary.ca account.

- A laptop, desktop, tablet or mobile device is required for D2L access. If you need help accessing or using D2L, please visit the Desire2Learn resource page for students: <http://elearn.ucalgary.ca/d2l-student/>.

Evaluation

- The University policy on grading and related matters is described in section F of the 2021-2022 Calendar.
- In determining the overall grade in the course, the following weights will be used: scheduled unit examinations 90%, unannounced unit quizzes 10%.
- A scheduled unit examination consisting of questions from the various lectures will be given face-to-face from 1530 to 1645 in a large CSM lecture theatre at the end of each unit; 75 minutes will be allowed for the student to complete each unit examination. Unit examinations are timed and closed book; a nonprogrammable calculator may be used.
- Two unannounced unit quizzes, each consisting of 5 questions from lectures to date in a unit will be given via D2L from 1615 to 1645; 30 minutes will be allowed for the student to complete each quiz. Unannounced quizzes are timed and open book; a nonprogrammable calculator may be used.
- Each of the six equally weighted unit marks derived from your unit examination and unit quizzes will be recorded on a percentage basis and averaged to determine your final mark in the course; there will NOT be a Registrar-scheduled final examination. Scheduled unit examinations and unannounced unit quizzes will be in multiple choice, fill-in-the-blank, true-false, short answer and/or essay format. Deferred examinations (see below) may be of a different format (e.g., oral examination) from scheduled examinations.
- A passing grade on any examination is not essential for the student to pass MDSC 404.
- Students in MDSC 404 are not expected to participate as subjects in research projects of professors involved in the course.
- If you have queries about marking of your unit examination or quizzes, you should bring it to the attention of the unit coordinator but not sooner than 24 hours of the marked examinations or quizzes are returned. If you then wish to seek a reappraisal, you must provide your concerns and request for reappraisal in writing to the unit coordinator **within ten days**. If you are not satisfied with the initial reappraisal, you have the right to take the matter -- **within two days** -- to the Associate Dean (Undergraduate Health and Science Education), Dr. Ebba Kurz who will arrange for an independent reassessment of the work. The result of this reassessment will be given to the student in writing. The reappraisal of the examination and/or quizzes may cause the grade to be raised, lowered or to remain the same.

Final Course Grade

Regarding queries about the final course grade, the only element that can be considered is the final assessment (i.e., GI&L exam). Students seeking a reappraisal **MUST** obtain a **Reappraisal of Final Grade form from the Registrar's** website and submit it to the Registrar's office no later than June 1st.

Grading Scheme:

Letter Grade	Description	Percentage
A+	Outstanding performance	96-100
A	Excellent performance	90-95
A-	Approaching excellent performance	85-89

B+	Exceeding good performance	80-84
B	Good performance	75-79
B-	Approaching good performance	70-74
C+	Exceeding satisfactory performance	65-69
C	Satisfactory performance	60-64
C-	Approaching satisfactory performance	57-59
D+	Marginal pass	54-56
D	Minimal pass	50-53
F	Did not meet course requirements	0-49

Deferred Examinations

- Deferred examinations are allowed only in the following circumstances: debilitating illness, severe domestic affliction, and religious conviction or absence due to a Faculty-approved activity. If you wish to defer an examination, you must contact the unit lead BEFORE the time of the scheduled examination and provide appropriate supporting documentation as per Section N.1 of the University Calendar (<https://www.ucalgary.ca/pubs/calendar/current/n-1.html>). The makeup examination will usually be scheduled and administered within 7 days of the missed scheduled examination and will be different from the original examination. If a student misses a scheduled examination, they are upon their honour code not to discuss the missed examination with their fellow students before taking the deferred examination.
- A student who is absent from an assessment in a course will receive a grade of zero on the assessment. If a student communicates with the instructor and explains the circumstances around the absence, the instructor may transfer the percentage weight for the assessment to another component of the course (such as the next examination), set another assessment, or make other alternative arrangements. An instructor will normally make this decision based on the information provided by the student.

Missed Components of Term Work

- **Students who miss a quiz will receive a mark of zero.** The only exceptions to this are those in keeping with the University Calendar (debilitating illness, religious conviction, or severe domestic affliction) that are received in writing and with supporting documentation.

Course Evaluations and Student Feedback

- Student feedback will be sought at the end of the course through the Universal Student Rating of Instruction (USRI) and a qualitative student evaluation. Students are welcome to discuss the process and content of the course at any time with the instructor. Students may also address any concerns they may have with Dr. Ebba Kurz, Associate Dean (Undergraduate Health and Science Education) in the Cumming School of Medicine (kurz@ucalgary.ca).

Attendance

- Attendance is mandatory for this course

Conduct During Lectures

- The classroom should be respected as a safe place to share ideas without judgement - a community in which we can all learn from one another. Students are expected to frame their comments and questions to lecturers in respectful and appropriate language, always maintaining sensitivity towards the topic. Students, employees, and academic staff are also expected to

demonstrate behaviour in class that promotes and maintains a positive and productive learning environment.

- As members of the University community, students, employees and academic staff are expected to demonstrate conduct that is consistent with the University of Calgary Calendar, the Code of Conduct and Non-Academic Misconduct policy and procedures, which can be found at <https://www.ucalgary.ca/policies/> .
- **Students are expected to take notes during class and should not rely solely on material supplied by the instructors.**

Use of Internet and Electronic Communication Devices in Class

- The Bachelor of Health Sciences program aims to create a supportive and respectful learning environment for all students. The use of laptop and mobile devices is acceptable when used in a manner appropriate to the course and classroom activities. However, research studies have found that inappropriate/off-topic use of electronic devices in the classroom negatively affects the learning of others during class time.
- 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-communications-policy.pdf> .

UNIVERSITY OF CALGARY POLICIES AND SUPPORTS

Copyright

All students are required to read the University of Calgary policy on Acceptable Use of Material Protected by Copyright (<https://www.ucalgary.ca/policies/files/policies/acceptable-use-of-material-protected-by-copyright-policy.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 unauthorized 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 <https://www.ucalgary.ca/pubs/calendar/current/k.html>.

Instructor Intellectual Property

Course materials created by instructors (including course outlines, presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the instructor. 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.

Academic Accommodations

It is the student's responsibility to request academic accommodations according to the University policies and procedures listed below. The Student Accommodations policy is available at <https://ucalgary.ca/student-services/access/prospective-students/academic-accommodations>. Students needing an accommodation based on disability or medical concerns should contact Student Accessibility Services (SAS) in accordance with the Procedure for Accommodations for Students with Disabilities (<https://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities.pdf>). SAS will process the request and issue letters of accommodations 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 Dr. Ebba Kurz (kurz@ucalgary.ca), Associate Dean (Undergraduate Health and Science Education).

Academic Misconduct

The University of Calgary is committed to the highest standards of academic integrity and honesty. The University of Calgary has created rules to govern all its members regarding the creation of knowledge and the demonstration of knowledge having been learned.

Academic Misconduct refers to student behaviour that compromises proper assessment of a student's academic activities and includes (but is not limited to): cheating, fabrication, falsification, plagiarism, unauthorized assistance, failure to comply with an instructor's expectations regarding conduct required of students completing academic assessments in their courses, and failure to comply with exam regulations applied by the Registrar. **It also includes using of third-party websites/services to access past/current course material, essay/assignment writing services, or real-time assistance in completing assessments, seeking answers to assessment questions and similar, whether paid, bartered or unpaid.**

For information of the Student Academic Misconduct Policy and Procedures, please visit;

<https://ucalgary.ca/policies/files/policies/student-academic-misconduct-policy.pdf>

<https://ucalgary.ca/policies/files/policies/student-academic-misconduct-procedure.pdf>

Additional information is available on the Academic Integrity website at: <https://ucalgary.ca/student-services/student-success/learning/academic-integrity>.

Recording of Lectures

Audio or video recording of lectures is prohibited except where explicit permission has been received from the instructor.

Freedom of Information and Protection of Privacy Act

Student information will be collected in accordance with typical (or usual) classroom practice. Students' assignments will be accessible only by the authorized course faculty. Private information related to the individual student is treated with the utmost regard by the faculty at the University of Calgary

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 I of the University Calendar. Students must follow the official reappraisal/appeal process and may contact the Student Ombuds' Office (<http://www.ucalgary.ca/ombuds>) for assistance with this and with any other academic concerns, including academic and non-academic misconduct. Students should be aware that concerns about graded term work may only be initiated **within 10 business days** of first being notified of the grade. <https://www.ucalgary.ca/pubs/calendar/current/i-2.html>

Sexual Violence Policy

The University recognizes that all members of the University Community should be able to learn, work, teach and live in an environment where they are free from harassment, discrimination, and violence. The University of Calgary's sexual violence policy guides us in how we respond to incidents of sexual violence, including supports available to those who have experienced or witnessed sexual violence, or those who are alleged to have committed sexual violence. It provides clear response procedures and timelines,

defines complex concepts, and addresses incidents that occur off-campus in certain circumstances. Please see the policy available at <https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf>

Resources for Support of Student Learning, Success, Safety and Wellness

Student Success Centre	http://www.ucalgary.ca/ssc/
Student Wellness Centre	http://www.ucalgary.ca/wellnesscentre/
Distress Centre	http://www.distresscentre.com/
Library Resources	http://library.ucalgary.ca

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 (<https://www.ucalgary.ca/wellnesscentre/services/mental-health-services>) and the Campus Mental Health Strategy (<http://www.ucalgary.ca/mentalhealth/>).

Student Ombuds' Office

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

BHSc Student Faculty Liaison Committee (SFLC)

The BHSc SFLC, with elected representatives from all majors, serves to raise issues of interest to BHSc students to the program administration, including items pertaining to curriculum, scheduling and events. A list of current representatives can be found on the BHSc website.

Student Union (SU) Information

The SU Vice-President Academic can be reached at (403) 220-3911 or suvpaca@ucalgary.ca; the SU representatives for the Cumming School of Medicine can be reached at medrep1@su.ucalgary.ca or medrep2@su.ucalgary.ca.

Student Success Centre

The Student Success Centre provides services and programs to ensure students can make the most of their time at the University of Calgary. Our advisors, learning support staff, and writing support staff assist students in enhancing their skills and achieving their academic goals. They provide tailored learning support and advising programs, as well as one-on-one services, free of charge to all undergraduate and graduate students. For more information visit: <https://www.ucalgary.ca/student-services/student-success>

Emergency Evacuation/Assembly Points

As part of the University of Calgary Emergency Evacuation plan, students, faculty, and staff should locate the closest Assembly Point in case of Fire Alarm. Safety signage is posted throughout the campus showing the locations and the possible route to these locations. All students, faculty, and staff are expected to promptly make their way to the nearest Assembly Point if the Fire Alarm is activated. No one is to return into campus facilities until an all clear is given to the warden in charge of the Assembly Area. For more information, see <https://www.ucalgary.ca/emergencyplan/building-evacuation/assembly-points>

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.

Class Examination Schedule

Unit	Unit Lead	Readings	Examination Date
Neurophysiology	Dr. Fewell	TBA	Wednesday - October 6
Cardiovascular	Dr. Fewell	TBA	Friday – November 5
Respiratory	Dr. Fewell	TBA	Wednesday – December 8
Renal	Dr. Smith	TBA	Friday – February 4
Endocrine	Dr. Smith	TBA	Friday – March 11
GI & Liver	Dr. McCafferty	TBA	Wednesday – April 14

Class Lecture & Examination Schedule – 2021 Fall Term

#	Unit	Date	Lecture	Faculty
1	Introduction	W 8 Sept	Intro to MDSC 404 / Davison Award; Homeostasis & rheostasis	Dr. J. Fewell
2	Neuro-1	F 10 Sept	Homeostasis & rheostasis (cont) Organization of the nervous system	Dr. J. Fewell
3	Neuro-2	M 13 Sept	Electrical signals – biopotentials, membrane excitability & action potentials	Dr. J. Fewell
4	Neuro-3	W 15 Sept	Transmitters, receptors and synaptic mechanisms	Dr. J. Fewell
5	Neuro-4	F 17 Sept	Central nervous system & sleep	Dr. J. Fewell
6	Neuro-5	M 20 Sept	Peripheral nervous system – afferent: Somatosensory system	Dr. F. Smith
7	Neuro-6	W 22 Sept	Peripheral nervous system – afferent: Special senses I	Dr. F. Smith
8	Neuro-7	F 24 Sept	Peripheral nervous system – afferent: Special senses I	Dr. F. Smith
9	Neuro-8	M 27 Sept	Peripheral nervous system – afferent: Special senses I	Dr. F. Smith
10	Neuro-9	W 29 Sept	Peripheral nervous system – efferent: Somatomotor nervous system & skeletal muscle physiology	Dr. J. Fewell
11	Neuro-10	F Oct 1	Peripheral nervous system – efferent: Autonomic nervous system	Dr. J. Fewell
12	Neuro-11	M Oct 4	Thermoregulation & Fever	Dr. J. Fewell
13	Exam 1	W 6 Oct	Neurophysiology Unit Exam	
14	CV-1	F 8 Oct	Introduction Structure and function of the heart and circulation	Dr. J. Fewell
		M 11 Oct	Thanksgiving Day	
15	CV-2	W 13 Oct	Electrical properties of the heart	Dr. J. Fewell

16	CV-3	F 15 Oct	Electrocardiogram, cardiac arrhythmias and ECG interpretation	Dr. J. Fewell
17	CV-4	M 18 Oct	Microcirculation, lymphatic system and Starling forces	Dr. J. Fewell
18	CV-5	W 20 Oct	Cardiac muscle physiology	Dr. J. Fewell
19	CV-6	F 22 Oct	Cardiac metabolism	Dr. J. Fewell
20	CV-7	M 25 Oct	Cardiac excitation-contraction coupling	Dr. J. Fewell
21	CV-8	W 27 Oct	Cardiac cycle & assessment of ventricular performance	Dr. J. Fewell
22	CV-9	F 29 Oct	Coronary physiology & mechanical determinants of oxygen demand	Dr. J. Fewell
23	CV-10	M 1 Nov	Neurohumoral regulation of the heart and circulation	Dr. J. Fewell
24	CV-11	W 3 Nov	Heart failure & circulatory shock	Dr. J. Fewell
25	EXAM 2	F 5 Nov	Cardiovascular Unit Exam	
		7-13 Nov	Fall Term Break	
26	Resp-1	M 15 Nov	Introduction Concept of internal & external respiration Structure & function of the lung	Dr. J. Fewell
27	Resp-2	W 17 Nov	Ventilation Surfactant	Dr. J. Fewell
28	Resp-3	F 19 Nov	Diffusion Blood flow - perfusion	Dr. J. Fewell
29	Resp-4	M 22 Nov	Ventilation/Perfusion relationship	Dr. J. Fewell
30	Resp-5	W 24 Nov	Causes of hypoxemia	Dr. J. Fewell
31	Resp-6	F 26 Nov	Blood gases Pulmonary acid-base homeostasis	Dr. J. Fewell
32	Resp-7	M 29 Nov	Gas transport to the periphery	Dr. J. Fewell
33	Resp-8	W 1 Dec	Control of ventilation – sensors, central controller & effectors	Dr. J. Fewell
34	Resp-9	F 3 Dec	Lung function tests – ventilation & gas exchange	Dr. J. Fewell
35	Resp-10	M 6 Dec	Respiratory insufficiency & failure	Dr. J. Fewell
36	EXAM 3	W 8 Dec	Respiratory Unit Exam	

Class Lecture & Examination Schedule – 2022 Winter Term **Format to be determined**

#	Unit	Date	Lecture	Faculty
37	Renal-1	M 10 Jan	Overview of Kidney Function / Organization of the Kidney	Dr. F. Smith
38	Renal-2	W 12 Jan	The Tubule	Dr. F. Smith
39	Renal-3	F 14 Jan	Renal Circulation	
40	Renal-4	M 17 Jan	Glomerular Filtration	Dr. F. Smith
41	Renal-5	W 19 Jan	Sodium & Chloride Tubular Handling	Dr. F. Smith
42	Renal-6	F 21 Jan	Organic Solutes	Dr. F. Smith
43	Renal-7	M 24 Jan	Potassium Handling	Dr. F. Smith
44	Renal-8	W 26 Jan	Acid Base Balance	Dr. F. Smith
45	Renal-9	F 28 Jan	Water Handling	Dr. F. Smith
46	Renal-10	M 31 Jan	Urine Concentration & Dilution	Dr. F. Smith
47	Renal-11	W 2 Feb	Overview of Renal Function & Fluid Volume Regulation	Dr. F. Smith
48	Exam 4	F 4 Feb	Renal Unit Exam	Dr. F. Smith & TA
49	Endo-1	M 7 Feb	Overview of the Endocrine System	Dr. F. Smith
50	Endo-2	W 9 Feb	The Hypothalamus & Pituitary Gland	Dr. F. Smith
51	Endo-3	F 11 Feb	The Thyroid Glands	Dr. F. Smith
52	Endo-4	M 14 Feb	The Parathyroid Glands & Vitamin D	
53	Endo-5	W 16 Feb	The Adrenal Glands	
54	Endo-6	F 18 Feb	The Stress Response	
		20-26 Feb	Winter Term Break	
55	Endo-7	M 28 Feb	The Endocrine Pancreas	Dr. F. Smith
56	Endo-8	W 2 Mar	The Male Reproductive System	Dr. F. Smith
57	Endo-9	F 4 Mar	The Female Reproductive System	Dr. F. Smith
58	Endo-10	M 7 Mar	Fertilization, Pregnancy & Labor	Dr. F. Smith
59	Endo-11	W 9 Mar	No assigned lecture; may use for review / study time	Dr. F. Smith
60	Exam 5	F 11 Mar	Endocrine Unit Exam	Dr. F. Smith & TA
61	GI&L-1	M 14 Mar	Introduction to GI function & Anatomy	Dr. DM McCafferty
62	GI&L-2	W 16 Mar	Brain-gut axis and the Enteric Nervous System	Dr. DM McCafferty
63	GI&L-3	F 18 Mar	Electrolyte and water transport	Dr. DM McCafferty
64	GI&L-4	M 21 Mar	Gastric Secretion	Dr. DM McCafferty
65	GI&L-5	W 23 Mar	Gastrointestinal motor function	Dr. DM McCafferty
66	GI&L-6	F 25 Mar	Hepatobiliary System	Dr. DM McCafferty
67	GI&L-7	M 28 Mar	Pancreatic exocrine function	Dr. DM McCafferty
68	GI&L-8	W 30 Mar	Digestion and Absorption I	Dr. DM McCafferty
69	GI&L-9	F 1 Apr	Digestion and Absorption II	Dr. DM McCafferty
70	GI&L-10	M 4 Apr	Gut Mucosal Defense	Dr. DM McCafferty

71	GI&L-11	W 6 Apr	Exam Review	Dr. DM McCafferty
72	Exam 6	F 8 Apr	GI & L Unit Exam	Dr. DM McCafferty & TA