



**Faculty of Engineering**  
**Department of Mechanical Engineering**  
**COURSE OUTLINE**

**BME 201– Quantitative Physiology**

**Term – Summer 2017 (201705)**

Instructor	Office Hours
Dr. Erdem Yazganoglu	Days: By appointment
Phone: 250 370 8111 - 13862	Time:
E-mail: yazganog@uvic.ca	Location:

**List all prerequisites and co-requisites:**  
 CHEM 101 or CHEM 150; and one of PHYS 111, PHYS 112, PHYS 125, PHYS 130.

**LECTURE DATE(S)**

Section: A /CRN 30064	Days: Tue - Thu	Time: 6:30 pm	Location: HHB 110

**TUTORIAL SECTIONS**

Section: T	Days:	Time:	Location:
T01	Monday	3:00 – 3:50 pm	CLE A205

**LAB SECTIONS**

Section: B (Multiple)	Days:	Time:	Location:
Insert additional rows if required	(or leave blank and state how/when labs will be scheduled)		
Lab #1:	May 29, 2017	4:00 – 6:50 pm	McKinnon Building 171
Lab #2:	June 12, 2017	4:00 – 6:50 pm	McKinnon Building 171
Lab #3:	June 26, 2017	4:00 – 6:50 pm	McKinnon Building 171
Lab #4	July 12, 2017	4:00 – 6:50 pm	McKinnon Building 171

Lab times and locations are also available from the [timetable](#) through Sign in to UVic, My Page.

TA Name	E-mail	Office
Laura de la Vega	ldlvr.uvic@gmail.com	

Required Text	Optional Text
Title:	Quantitative human physiology: An introduction
Author:	Joseph Feher
Publisher/Year:	Elsevier/2012

**Reference Materials:**  
 Title: Medical Physiology  
 Author: Guyton, AC and Hall, JE  
 Publisher: Elsevier Saunders  
 Year: 2006  
 Availability: Online at <https://archive.org/details/GuytonHallTextbookOfMedicalPhysiology11thEdition>

## COURSE OBJECTIVES:

Physiology is the science of the function of living systems. This course specifically deals with the functions in human bodies and approaches it from a mathematical point of view. Each of these functions is performed by various systems, such as cardiovascular or endocrine system.

- Discuss human organ systems and their functions
- Learn the quantitatively measureable variable related to the functions of each of those organ systems
- Discuss the normal range of those variables and provide some examples for the effect of abnormal values of those variables
- Learn about controlling mechanisms in human body which keeps those variables in normal range and the threshold effect which affects the performance of organ systems
- Learn the interactions between organ systems and the effect of impairment in each system on others

**LEARNING OUTCOMES:** At the end of this course, students will be able to:

- Explain the measures for normal functioning of each of organ systems
- Discuss the impact of change in those measures on the related organ system functions
- Discuss the interactions between organ systems and calculate the impact of changes in one system on other systems
- Utilize the mathematical models presented in this course to develop artificial systems that can improve or even replace organ systems

<b>Weight &amp; Date(s) of Assessments:</b>	<b>Weight</b>	<b>Date</b>
Assignments: Organ System Review	20%	June 25, 2017
Labs	20%	TBD
Mid-terms	48%	Date: May 26; June 8; June 29; July 25, 2017
Student Presentations	6%	TBD
Group work assessment	6%	July 28, 2017
Final Exam	%(max 60% unless approved otherwise)	Date: TBA

## ASSIGNMENTS (Include Assignment Schedule) (Description & Method of Delivery)

Assignment will make up 20% of the course mark. The objective of the assignment is to encourage Bio-medical engineering students to identify the functions of a selected organ, review existing technologies, and identify the strengths and weaknesses of existing technologies to achieve the required functions of the selected organ. Forming groups for assignment is allowed and up to 3 students can be a group.

The following questions are provided as guideline for assignment.

1. What is the overall function of the organ selected?
2. What are the specifications for the organ (e.g. output capacity, force it needs to generate, force it needs to endure, frequency of output, sensitivity, connectivity, ability to respond to

changing needs, energy required, weight, size, etc.). These specifications would change depending on the organ, for example output capacity and ability to respond to changing needs might be relevant specifications for the heart but not for the eye. The specifications of the eye might be the image size, image clarity, and connection to the nervous system.

3. What kind of technology do we currently have and what kind of technology that is promising a future to repair the damaged organ?
4. What are the problems with the existing technologies? What is the most important challenge that technology needs to overcome in order to develop a viable solution?

**Assignment can be completed in teams of 3 students.**

Assignments will be submitted through CourseSpaces.

Evaluation of the Assignment: Maximum total length of the paper is 6 paged single spaced and 12 pages double spaced. A minimum of 12pt characters must be used with one inch or 2.54 cm borders. Appendices are not counted within the page limit.

Characteristic	Percentage of the Mark
Description (calculation) of the organ's function and specifications	30%
Environmental scan for existing solutions	30%
Gap between the identified specifications and existing technologies	30%
Quality of writing and referencing (logical flow, clarity, brevity, factual, without duplications)	10%

### LABORATORIES (Description & Method of Delivery)

There will be four labs for each of the nervous, cardiac, respiratory, and metabolism systems. A pre-lab and post-lab assignments will be given. Assignments will be posted in courseSpaces and students will hand-in the answers. Lab instructor will communicate the date, time and place of submissions to the students.

Lab #	Modules	Start	Due (5 pm)
1	Nervous System	May 29, 2017	TBD
2	Cardiac	June 12, 2017	TBD
3	Respiratory	June 26, 2017	TBD
4	Metabolism	July 12, 2017	TBD

### MID-TERMS (Description & Method of Delivery)

There will be four mid-terms, approximately once every three weeks. Dates of the mid-terms are presented above and also in course schedule. Mid-terms will be 20 multiple choice and 4 short answer questions. Short answer questions will be problem solutions or explanations of the concepts.

Mid-terms will be done in class. If students miss a mid-term without an evidence of university acceptable reasons, they will receive "0" for the mid-term.

There will be no Final exam.

Mid-terms are not cumulative, they will cover the topics that are presented from the previous mid-term.

### **PRESENTATIONS: (Description & Method of Delivery) (remove sample text)**

Students will present an endocrine system in class. Instructor will assign the groups and determine the dates of the presentations. Students are expected to present the following related to an endocrine organ.

1. Organ and location
2. Hormones released
3. Actions of the hormones in human body
4. Mechanisms that hormones realized their actions
5. Positive or negative feedback mechanism of regulation

Presentations need to be 15 minutes and will be submitted to coursespaces after the presentation and presentations will be marked using the following rubric:

Characteristic	Percentage of the Mark
Content of the presentation: coverage of the endocrine organ, functions of the hormones, their affect and the feedback mechanisms.	30%
Presenters fluency on the endocrine organ and ability to answer questions	30%
Audience participation and audience response to presentation	20%
Flow, timing, visuals, and audio	20%

### **GROUP WORK ASSESSMENT (Description & Method of Delivery)**

Students in pre-determined groups will be solving problems in class and also present endocrine systems. Students will assess their group members' preparation and contribution to the group work and presentations. This is to encourage all students to contribute to the group work. Instructor will provide a form to be completed. Students who do not complete and submit their group member assessment will receive "0" for the group work assessment.

**NOTE:** Failure to complete assignment, presentation and laboratory requirements will result in a grade of N being awarded for the course.

The final grade obtained from the above marking scheme for the purpose of GPA calculation will be based on the percentage-to-grade point conversion table as listed in the current Undergraduate Calendar.

## **COURSE LECTURE NOTES**

Unless otherwise noted, all course materials supplied to students in this course have been prepared by the instructor and are intended for use in this course only. These materials are NOT to be re-circulated digitally, whether by email or by uploading or copying to websites, or to others not enrolled in this course. Violation of this policy may in some cases constitute a breach of academic integrity as defined in the UVic Calendar.

**\*\*Please include one or the other (below) in your outline. (remove this note)**

**There will be no supplemental examination for this course.**



# Faculty of Engineering

## Department of Mechanical Engineering

### COURSE OUTLINE

#### **GENERAL INFORMATION**

##### **Note to Students:**

Students who have issues with the conduct of the course should discuss them with the instructor first. If these discussions do not resolve the issue, then students should feel free to contact the Chair of the Department by email or the Chair's Secretary to set up an appointment.

##### **Attendance**

Students are expected to attend all classes in which they are enrolled. An academic unit may require a student to withdraw from a course if the student is registered in another course that occurs at the same time....

An instructor may refuse a student admission to a lecture, laboratory, online course discussion or learning activity, tutorial or other learning activity set out in the course outline because of lateness, misconduct, inattention or failure to meet the responsibilities of the course set out in the course outline. Students who neglect their academic work may be assigned a final grade of N or debarred from final examinations.

Students who do not attend classes must not assume that they have been dropped from a course by an academic unit or an instructor. Courses that are not formally dropped will be given a failing grade, students may be required to withdraw and will be required to pay the tuition fee for the course." UVic Calendar, (2017) <http://web.uvic.ca/calendar2017-01/undergrad/info/regulations/attendance.html#>

##### **Equality**

This course aims to provide equal opportunities and access for all students to enjoy the benefits and privileges of the class and its curriculum and to meet the syllabus requirements. Reasonable and appropriate accommodation will be made available to students with documented disabilities (physical, mental, learning) in order to give them the opportunity to successfully meet the essential requirements of the course. The accommodation will not alter academic standards or learning outcomes, although the student may be allowed to demonstrate knowledge and skills in a different way. It is not necessary for you to reveal your disability and/or confidential medical information to the course instructor. If you believe that you may require accommodation, the course instructor can provide you with information about confidential resources on campus that can assist you in arranging for appropriate accommodation. Alternatively, you may want to contact the Resource Centre for Students with a Disability located in the Campus Services Building.

The University of Victoria is committed to promoting, providing, and protecting a positive, and supportive and safe learning and working environment for all its members.

##### **Resource Centre for Students with Disabilities**

<http://www.uvic.ca/services/rcsd/>

##### **Accommodation of Religious Observance (AC1210)**

<http://web.uvic.ca/calendar2017-01/general/policies.html>

##### **Discrimination and Harassment Policy (GV0205)**

<http://web.uvic.ca/calendar2017-01/general/policies.html>

##### **Faculty of Engineering, University of Victoria Standards for Professional Behaviour**

*"It is the responsibility of all members of the Faculty of Engineering, students, staff and faculty, to adhere to and promote standards of professional behaviour that support an effective learning environment that prepares graduates for careers as professionals..."*

You are advised to read the Faculty of Engineering document Standards for Professional Behaviour which contains important information regarding conduct in courses, labs, and in the general use of facilities.

<http://www.uvic.ca/engineering/assets/docs/professional-behaviour.pdf>

##### **Academic Integrity**

Academic integrity is intellectual honesty and responsibility for academic work that you submit individual or group work. It involves commitment to the values of honesty, trust, and responsibility. It is expected that students will respect these ethical values in all activities related to learning, teaching, research, and service. Therefore, plagiarism and other acts against academic integrity are serious academic offences.

##### The responsibility of the institution

Instructors and academic units have the responsibility to ensure that standards of academic honesty are met. By doing so, the institution recognizes students for their hard work and assures them that other students do not have an unfair advantage through cheating on essays, exams, and projects.

##### The responsibility of the student

Plagiarism sometimes occurs due to a misunderstanding regarding the rules of academic integrity, but it is the responsibility of the student to know them. If you are unsure about the standards for citations or for referencing your sources, ask your instructor. Depending on the severity of the case, penalties include a warning, a failing grade, a record on the student's transcript, or a suspension.

It is your responsibility to understand the University's policy on academic integrity:

<http://web.uvic.ca/calendar2017-01/undergrad/info/regulations/academic-integrity.html#>

## Course Schedule (remove example text)

Module	Topics	Date/Week
1	Introduction of the Course, course outline and meeting with Instructors (45 min) Nervous System Introduction – Organization of Nervous System and Cells, synapses, and neurotransmitters	May 2
2	Nervous System Introduction – Organization of Nervous System and Cells, synapses, and neurotransmitters	May 5
3	Nervous System – Spinal Reflexes and Balance and Control of Movement	May 9
4	Nervous System – Cutaneous Sensory Systems and Autonomic Nervous System	May 12
5	Nervous – Vision and Hearing	May 16
6	Cardiac – Overview of Cardiovascular System and Blood – Heart as a Pump	May 19
7	<b>Mid Term 1</b>	May 26
8	Cardiac – Action potential and Electrocardiogram	May 23
9	Cardiac – Cellular basis of Cardiac Contraction and Cardiac Function Curve	May 25
10	Cardiac – Vascular Function: Hemodynamics	May 30
11	Cardiac – Microcirculation and Solute Exchange and Regulation of Perfusion.	June 1
12	Cardiac – Integration of Cardiac Output and Venous return	June 6
13	<b>Mid term 2</b>	June 8
.	Cardiac – Regulation of Arterial Pressure	June 13
.	Respiratory – The Mechanics of Breathing	June 15
.	Respiratory – Lung Volumes and Airway Resistance	June 20
	Respiratory – Gas exchange in the lungs	June 22
	Respiratory – Oxygen and Carbondioxide Transport	June 27
	Respiratory – Control of Ventilation	June 29
	<b>Mid-Term 3</b>	July 6
	Renal – Body Fluid Compartments and Overview of Kidney Function and Anatomy	July 11
	Renal – Glomerular Filtration	July 13
	Renal - Tubular Reabsorption and Secretion	July 18
	Renal – Concentration/Dilution of Urine and Regulation of Fluid and Electrolytes	July 20
	Renal – Acid – Base balance	July 25
	<b>Mid-Term 4 – Social Gathering</b>	July 27