PHGY 550
Molecular Physiology of Bone
(3 credit course)

Course Outline 2018

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PREREQUISITES: U3 physiology or equivalent and graduate level, by permission

TIME/LOCATION:			
	Lecture	Tuesday 8:35am-9:25pm	Room 1101 McIntyre Medical Sciences
	Discussion	Monday 8:35am-10:25am	Room 1101 McIntyre Medical Sciences

COURSE SECRETARY: Ms. Maria Dimas**,** Physiology General Office, Room 1021
undergrad2.physiology@mcgill.ca

myCourses Maintained by the Department of Physiology

If you have a disability please contact the instructor to arrange a time to discuss your situation. It would be helpful if you contact the Office for Students with Disabilities at 398-6009 (online at http://www.mcgill.ca/osd) before you do this.

COURSE DESCRIPTION
Students will develop a working knowledge of the skeletal tissues, specifically cartilage, bone, growth and metabolism and an understanding of the pathogenesis and treatment of heritable and acquired disorders of the skeleton. Discussion topics will be based on the preceding lectures and on assigned readings from the current literature. They will include the molecular and cellular environment of bone, heritable and acquired disorders of the skeleton and research models and approaches currently used in the study of cartilage and bone disease.

INSTRUCTION METHOD
A one-hour, instructor-driven lecture will be given each Tuesday (unless otherwise announced) to introduce a topic and provide the students with background knowledge. 1 review article and 1-2 scientific articles will be assigned for the two-hour, student-driven discussion to be held the following Monday. Each scientific article will be formally presented by a pre-determined group of students, who will be expected to answer questions from other students and to lead a discussion of the article following the presentation.

EXPECTATIONS AND EVALUATION
Lectures and Discussions: Attendance is mandatory, except in case of illness of where prior notice is given. Lectures provide background knowledge essential for understanding the assigned discussion papers. For each unauthorised absence 0.5% marks will be deducted from the final score.
Presentation of Scientific Papers 30%: Each student will participate in the presentation of at least 2 scientific papers. The objective is to present a comprehensive and critical summary of the content, which includes the scientific rationale for the study, relevant background information, the results and the author's interpretation of the data.
Summaries, Question Period and Discussion 30%: Each student will prepare a one-page critical summary for each discussion session. The summary should be written to answer the question “In your opinion, which of the experiments is most critical for the study and why”. Participation in the question period and discussion following the presentation is mandatory. The objective is to learn how to critically review the scientific literature and to formulate new hypotheses on the basis of previous work.
Short Essays 40%: Students will choose 3 topics on which they will write 4-5 pages (including references) double spaced based on information from no more than 10 references selected from the current literature. The objective of these papers is to synthesize the knowledge gained from lectures, readings and discussion and to use it to formulate and test a novel hypothesis.

REFERENCE MATERIAL

The assigned readings will be accessible electronically through *myCourses*, with the assistance of the Dept of Physiology. Additional reference material may be assigned at the discretion of the Instructor.

LEARNING OUTCOMES

Upon completion of this course the student should be able to:

- **a)** Describe how the skeleton develops and define the molecular and cellular components of cartilage and bone, as well as the physiological roles played by the skeleton.
- **b)** Explain skeletal homeostasis in the context of relevant hormones, exercise and nutrition and understand the consequences of their deficit on cartilage and bone growth and metabolism.
- **c)** Provide examples of skeletal disorders and identify their pathophysiological basis.
- **d)** Discuss examples of human skeletal diseases with reference to animal and cell models used to examine the molecular pathways involved in their pathogenesis.
- **e)** Discuss the relative roles of genetic and epigenetic factors in common skeletal disorders such as osteoporosis, osteomalacia and osteoarthritis.
- **f)** Develop an individual outlook conducive to the maintenance of skeletal homeostasis and the prevention of common disorders of bone metabolism.

LECTURE TOPICS (Please see the course schedule for specific information):

- Introduction to bone cells, their differentiation and function (Dr. Monzur Murshed)
- RANKL, RANK, OPG in bone and beyond (Dr. Kerstin Tiedemann)
- Diseases associated with abnormal skeletal tissue mineralization (Dr. Juliana Marulanda)
- Osteocytes and skeletal tissue mechanobiology (Dr. Bettina Willie)
- Mathematical modeling as a tool to understand complex questions in bone biology (Dr. Svetlana Komarova)
- New signaling molecules and their potential therapeutic use in bone disease (Dr. Pierre Moffatt)
- Calcium and phosphate homeostasis (Dr. Svetlana Komarova)
- Osteogenesis Imperfecta (Dr. Frank Rauch)
- Reciprocal regulation of bone and energy metabolism (Dr. Mathieu Ferron)
- Cancer and Bone (Dr. Peter Siegel)
- Bone pain (Dr. Laura Stone)

In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.

In accord with McGill University's Charter of Students' Rights, students have the right to submit any written work that is to be graded in English or in French.

McGill University values academic integrity. Therefore all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see www.mcgill.ca/srr/honest/for more information).

L'université McGill attache une haute importance à l'honnêteté académique. Il incombe par conséquent à tous les étudiants de comprendre ce que l'on entend par tricherie, plagiat et autres infractions académiques, ainsi que les conséquences que peuvent avoir de telles actions, selon le Code de conduite de l'étudiant et des procédures disciplinaires (pour de plus amples reseignements, veuillez consulter le site www.mcgill.ca/integrity).

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