

BIOM*4050 Biomedical Aspects of Aging

Tuesdays and Thursdays

Section 1: 10:00-11:20 a.m. Room 1642, Biomedical Sciences, OVC

Section 2: 1:00-2:20 p.m. Room 121, MacDonald Stewart Hall

Course Instructor: Bettina Kalisch, bkalisch@uoguelph.ca, ext. 54939

TA: Alexander McLachlan, amclachl@uoguelph.ca

Course Summary:

Aging involves the cumulative changes in an organism, organ, tissue or cell over time that lead to decreases in physiological and biochemical functional capacity. In humans aging is associated with degenerative changes in the skin, bones, heart, blood vessels, lungs, nerves and other organs and tissues. The relationship between aging and various organ systems will be discussed along with aging at the cellular/genetic level and the influences environmental factors have on the aging process.

Course Objectives:

The overall aim of this course is to introduce aspects of physiology, cell biology, genetics and biochemistry as they occur in cells, tissues and body organ systems in the aging human subject. Students are expected to gain an understanding of the alterations in biological functioning based on principles learned in earlier courses. Developing a critical attitude to the proposed theories of aging is an integral part of the course. The learning objectives are to foster independent learning, emphasize problem solving and to integrate information from varying disciplines.

Specific Objectives:

To provide students the opportunity to:

1. integrate knowledge of basic physiology, biochemistry and cellular biology to an applied area, biomedical aspects of aging, which is of practical significance in today's society.
2. research specific biomedical topics in aging and present their findings to colleagues in a clear, concise and scientific manner using a variety of approaches.
3. compose different types of scientific writing, e.g. short scientific articles appropriate for a lay publication, and short essay type answers.

Evaluation:

There will be **four** assignments and a final exam during the semester:

1. Assignment 1: Lay Magazine Article. Involves preparing a ~500-750 word article on an aging topic in a format and language style that would be suitable for a "lay" magazine, such as Macleans. Further details will be provided.

i. **10%** of your final grade

ii. **Due date: Friday October 8, 2010**

2. Assignment 2: Poster Presentation. Involves each student, working in groups of three, preparing and presenting to the class a poster presentation on a selected aging topic (see last page for suggested topics).

i. Scientific posters will be presented in class (or other venue) in one of three Poster Symposiums on Aging open to all members of the Department of Biomedical Sciences.

ii. **15%** of your final grade

iii. An electronic file of your poster will be submitted and made available to the entire class through "Desire2Learn".

iv. **Due dates: October 25, November 2, November 4, 2010**

3. Assignment 3: Problem based learning (PBL). In-class movie – "Rage Against the Darkness".

Aging and Quality of Life Program.

The elderly typically suffer from interacting physical, social and psychological conditions – both acute and chronic – that limit their independence and threaten their capacity to function in daily life.

i. From the documentary "Rage Against the Darkness", identify one age-related disability and produce a patient report (~ 2-3 pages) that briefly describes the biology behind the condition and its apparent social and psychological effects/impact. Suggest treatment options (medical, environmental, and/or behavioral), with justification(s), that may improve the patient's quality of life.

ii. **15%** of your final grade.

iii. **Due date: Friday December 3, 2010**

4. Assignment 4: Student Seminars.

Involves students working in pairs, preparing and presenting to the class a short PowerPoint seminar on a selected subject from a list of aging topics (see last page).

There are 25 seminar time-slots available (10 minute seminar + 5 minute question period). These talks will be presented during designated classes as mini-symposia based on aging themes.

i. **20%** of your final mark; 15% for the presentation and 5% for the submission of peer assessment forms.

ii. An electronic file of your seminar will be submitted and made available to the entire class through "Desire2Learn".

iii. **Seminar dates: September 28 (Cardiovascular/Respiratory); October 7 (Nervous system); October 14 (Special Senses/Sleep Disorders); October 26 (Digestive/Endocrine); November 18 (Integument/Skeletal); November 25 (Genetics/Environment).**

5. The final examination is worth **40%** of your final grade. The examination will consist of completing several short answer questions based on material covered in **all** lectures, student seminars and poster presentations. **Date and time: Thursday December 16, 7:00 to 9:00 pm. Location to be announced.**

Textbooks:

No single textbook is being recommended for the class. The following two texts have been found to be useful references for students in previous years: BIOLOGY OF AGING (2ND EDITION) by R. Arking, 1998; (3RD EDITION), 2006 PHYSIOLOGICAL BASIS OF AGING AND GERIATRICS (3RD EDITION) by P.S. Timiras, 2003

The Library has copies of these textbooks.

Schedule of Dates:

DATE	TOPIC
Thursday September 9	Introduction and course information
Tuesday September 14	Biomarkers
Thursday September 16	Non-genetic causes of aging
Tuesday September 21	Cellular Senescence
Thursday September 23	Cardiovascular system
Tuesday September 28	Assignment 4: Seminars – Cardiovascular/Respiratory system
Thursday September 30	Nervous system
Tuesday October 5	Nervous system
Thursday October 7	Assignment 4: Seminars – Nervous system
Friday October 8	Assignment 1 due
Tuesday October 12	Glucocorticoids and stress
Thursday October 14	Assignment 4: Seminars – Special senses/ Sleep disorders
Tuesday October 19	Renal system
Thursday October 21	Reproductive system
Tuesday October 26	Assignment 4 – Seminars: Digestive/Endocrine system
Thursday October 28	Assignment 2: Poster session 1
Tuesday November 2	Assignment 2: Poster session 2
Thursday November 4	Assignment 2: Poster session 3
Tuesday November 9	Pharmacology
Thursday November 11	Pharmacology
Tuesday November 16	Assignment 3: video – Rage Against the Darkness
Thursday November 18	Assignment 4: Seminars Integument/Skeletal system
Tuesday November 23	Biomarkers of Aging (genetic)
Thursday November 25	Assignment 4: Seminars – Genetics/Nutrition/Environment
Tuesday November 30	Longevity and Society/Exam review
Friday December 3	Assignment 3 due

Student Seminar/Poster Topics:

Topics are classified under general headings so that each group of presentations has a "theme" thus providing some cohesion to the symposium session.

For posters and seminars, students should incorporate recent (last five years) primary research results from journal publications with background information on the topic

Most information/references (~80%) should be from primary research and review papers with limited references from reliable web sources.

Students are responsible for the material covered in the student seminars and poster sessions as content for exam questions. Hard copies of the seminars and posters will not be provided

Seminars:

When possible, students should use PowerPoint format.

Seminars should be 10 minutes in length with 5 minutes for questions.

A PowerPoint tutorial will be available to the class.

At least one day before the date of the seminar each student group should e-mail the TA (Alexander McLachlan amclachl@uoguelph.ca) a copy of their seminar so it is ready for presenting and can be uploaded onto "Desire2Learn" for studying purposes.

Posters:

A poster is a visual display of information intended to catch and hold the attention of the observer long enough to implant a significant idea in the mind. The poster symposium day provides a forum for the exchange of scientific information on an aging subject.

Example poster template:

Poster training session(s) will be available to the class (TBA)

Posters can be produce using various computer programs (PowerPoint, Adobe Illustrator or Corel Draw) - PowerPoint templates will be available on "Desire2Learn"

Finished posters must be submitted to the TA (Alexander McLachlan, amclachl@uoguelph.ca) by 4 pm three working days before your presentation day so they can be printed in time for the poster session (Monday for Thursday sessions and Thursday for Tuesday sessions). All posters will be uploaded onto "Desire2Learn" for studying purposes.

Suggested Seminar/Poster Topics:

Cardiovascular/Respiratory System	Nervous System Disorders
Aneurisms Arrhythmias Hypotension Hypertension Myocardial Infarction Congestive heart failure Lung changes – alterations in pO ₂ Exercise	Alzheimer's diseases Parkinsonism Dementias (non-Alzheimer's) Stroke Progressive Supranuclear Palsy Amyotrophic Lateral Sclerosis Huntington's Disease
Integument / Skeletal System	Special Senses/ Sleep Disorders
Skin aging / wrinkles Hair growth/loss in aging Osteoporosis (male) Osteoporosis (female) Arthritis Sarcopenia (muscle loss) Skeletal system and balance	Hearing loss Vision impairment Taste/Smell Sleep apnea Insomnia Circadian rhythms
Digestive/Endocrine System	Genetics/Nutrition/Environment
Swallowing / aging esophagus Stomach ulcers / gallstones Type II Diabetes Hormone replacement therapy Thermoregulation Aging neuroendocrine axis	Mitochondrial DNA mutations Epigenetics Specific genes involved in aging Antioxidant micronutrients Caloric restriction Artificial environments Barker hypothesis

You can choose a topic not indicated in the above list. However, you should discuss your proposed topic choice with the instructor or TA before progressing.