Application of Digital Technologies for Chronic Cardio-Respiratory Conditions

MY 320

Fall 2023

Purpose of the Course

- Improves access to care and management of chronic cardio-respiratory disorders using digital technologies.
- Provides a deeper understanding of several conditions, including sleep problems, heart disease, lung disease, and opioid's effect on respiratory control.
- Provides, for each condition, the physiological and clinical descriptions of the condition and the recent advances in digital technologies (their limitations and gaps) to manage these disorders.
- Provides basics of user-centered design and health equity as the foundation of developing technologies to improve access to care.

Specific Objectives

Students will have sufficient knowledge and confidence to utilize their expertise to develop new screening, diagnosis, and treatment technologies related to Cardio-respiratory disorders to tackle the current limitations and gaps.

Schedule of Topics

September 13	Overview of the cardiac system (anatomy and physiology) - Pathophysiology of Heart Disease
September 20	Overview of the respiratory system (anatomy and physiology)
September 27	Sleep disorders and cardiorespiratory diseases overlap
October 4	Digital technologies in heart failure
October 11	Big data analysis and their considerations in health care
October 18	Novel technologies for heart failure monitoring
October 25	Equity and access to care
November 1	First presentations
November 8	Reading week
November 15	Wearable technologies to advance the management of cardiorespiratory disorders during sleep
November 22	Digital technologies to diagnose and treat heart diseases and their limitations
November 29	Pathophysiology of Opioids' effect on the body, especially respiratory control
December 6	Textile engineering in wearable technologies
December 13	Final Presentation

Course Style

Different presenters for each session,

Reading assignment prior to the session,

Project/Conference Paper-based course:

- A group of two students is needed for each project.
  - Similar marking for reports
  - Individual marking for presentation (Each group will have one presentation, and it is strongly advised that every student presents the portion assigned to them.)
- Conference papers will be submitted to EUSIPCO (European Signal Processing Conference)

Method of Evaluation

Topic	Instructions	Due date	Grade
10 Reading assignments	**-**	**Before each lecture classes (first session excluded)**	**10%**
Proposal report	**450 words**	**Oct 20th**	**15%**
Proposal presentation	**10-minute presentation and 5 minutes Q&A**	**Nov 1st**	**10%**
Progress report and Paper draft	**1000 words; including introduction of problem, methods, and expected results**	**Nov. 22nd**	**15%**
Final Report/Paper	**3000 words; including abstract, introduction, methods, results and discussion**	**Dec. 10th**	**30%**
Final presentation	**10-minute presentation and 5 minutes Q&A**	**Dec. 13th**	**20%**
Attendance considering UofT time	**Bonus**	**-**	**5%**

Course Contacts

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