**MAT8232: Algebraic Topology II**
Winter 2017: Wednesday 900 – 1030 and 1330–1500.
Sherbrooke pavilion SH-3560.

**Professor: Mark Powell**
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Office hours: by appointment.

**Plan for the course:**

The aim is to introduce a number of techniques in homotopy theory. The tools of algebraic topology are ubiquitous throughout modern mathematics, and the aim of the course is to introduce as broad a selection of them as possible, and equip students with the capabilities to rapidly acquire more when they need them.

Le but du cour est d'introduire les techniques de la théorie d'homotopie. Les utiles de la topologie algébrique sont doué d'ubiquité partout le maths fondamental moderne, et nous allons apprendre la plus grande selection possible.

The central theme is the computation of homotopy sets $[X, Y]$ for spaces $X, Y$. Here is a list of some specific topics that I hope to cover.

Le thème centrale est la ordination des ensembles d'homotopie $[X, Y]$, pour les espace $X, Y$. Voici une liste des sujets spécifiques que je souhaite enseigner.

(i) Introduction to the homotopy category.
(ii) CW complexes.
(iii) Fibrations, cofibrations, fibre and cofibre exact sequences.
(iv) The Whitehead, Freudenthal and Hurewicz theorems.
(v) Obstruction theory.
(vi) Postnikov towers.
(vii) Generalised homology theories and spectra.
(viii) The Hilton-Milnor theorem.
(ix) Classifying spaces.
(x) Spectral sequences.
(xi) Steenrod squares.

**Prerequisites:**

I will assume that you know, or can quickly recall, the basics of algebraic topology as in the first 2 chapters of Hatcher: fundamental group and covering spaces, singular homology, homotopy invariance of homology, relative homology groups, long exact sequences of a pair and Mayer-Vietoris, excision.

J'attend que vous savez, ou que vous vous souviendrez vite, les éléments de la topologie algébrique, comme les deux premiers chapitres de Hatcher.

**Problem sheets and problem sessions:**

There will be weekly problem sheets, and a problem session in between (or after?) the two lectures to discuss the problems.

Il y aura des feuilles de problèmes chaque semaine, et un séance de problème entre (ou après?) les deux cours, histoire de parler des problèmes.

**Student exposés:**

Students will give talks on a project, presenting a lecture and producing lecture notes on an interesting topic or theorem related to the course.

Les étudiants donneront les exposés sur un petit projet, y compris la production des notes de cours. Vous présenterez un thème ou un théorème intéressant avec une relation au cour.

**Evaluation:**

Problem sheets, including a longer take home final in April: 50 %. You are encouraged to collaborate on the problem sheets, and this component will be based partly on participation. Project talks: 30%. Typing up lecture notes for one Wednesday: 20%.

Feuilles de problèmes: 50%. Exposés: 30%. Redaction de notes du cours: 20 %.

**References:**

Course material at: http://www.math.uqam.ca/∼powell/AlgTopII.html

I will be using the following books. J'utiliserai les livres suivants.

(1) J. P. May: A concise course in algebraic topology.
(2) M. Arkowitz: Introduction to Homotopy Theory.
(3) P. Selick: Introduction to Homotopy Theory.
(4) J. Davis, P. Kirk: Lecture notes on algebraic topology.
(5) A. Hatcher: Algebraic topology.
(6) G. E. Bredon: Topology and Geometry.
(7) J. McCleary: A user's guide to spectral sequences.
(8) J. F. Adams: Algebraic Topology; a student's guide.
(9) H. Baues: Obstruction Theory; on homotopy classification of maps