

## **MCB 401 Cell and Membrane Physiology – General Syllabus**

Prof. Catherine Christian

A schedule of the material covered in each session, as well as the days of Quizzes, Exams, Journal Clubs, and reviews will be provided as part of a detailed syllabus uploaded to the course Moodle site and available by the first day of class.

*Each of the following four sections will have one Quiz, one Journal Club, one Exam, and a review session before each exam:*

### **Membrane Structure, Signal Transduction, and Solute/Water Transport**

Structure of Biological Membranes, Function of Membrane Proteins  
Cellular Communication & Signal Transduction  
Solute Transport Across Cell Membranes  
Regulation of Intracellular Ion Concentrations  
Water Transport and Regulation of Cell Volume  
Transport of Solutes and Water Across Epithelia

### **Membrane Bioelectricity, Action Potentials, and Ion Channel Physiology**

Ionic Basis of Membrane Potentials  
Electrical Properties of Cell Membranes  
Patch Clamp Electrophysiology and Single-Channel Recordings  
Action Potentials  
Classification of Voltage-Gated Ion Channels  
Voltage-Gated Ion Channel Physiology and Pharmacology

### **Neuromuscular Transmission and Muscle Physiology**

Synaptic Transmission  
Neuromuscular Junction  
Synaptic Vesicle Release  
Neuromuscular Pharmacology  
Cellular Physiology of Skeletal, Cardiac, and Smooth Muscle

### **Central Neurophysiology and Plasticity**

Neuronal Physiology  
Mechanisms of Bursting and Tonic Firing in Thalamocortical Neurons  
Glial Cells  
Central Synaptic Transmission  
Plasticity of Central Synapses  
Emerging Techniques for Manipulating Neuronal Physiology

Journal Club: Selected papers from the research literature and associated questionnaires will be provided on the course Moodle site. Completed written questionnaires are to be uploaded to Moodle prior to the start of class on days designated for the Journal Club. On these days, we will have a general class discussion of the papers.

iClicker questions will be used during lectures to assess how well you are learning and integrating key concepts as the course progresses. Half of iClicker credit will be awarded based on the percentage of questions that are answered (whether or not the answer is correct), and the remaining half will be awarded proportional to the percentage of questions answered correctly. Participation in in-class group activities will be incorporated into this credit calculation as the equivalent of a certain number of correct iClicker questions (exact values will be given for each activity).