

MCB 401 Cellular Physiology – General Syllabus

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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

Cellular Physiology and Plasticity of Neurons

Neuronal Physiology

Mechanisms of Bursting and Tonic Firing in Thalamocortical Neurons

Glial Cells

Synaptic Transmission in the Central Nervous System

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 calculation as the equivalent of a certain number of correct iClicker questions (exact values will be given for each activity).