COURSE SYLLABUS

PHOL 401A & 401B: Physiology and Biophysics of Molecules and Cells
Monday, Wednesdays, and Fridays: 2:30-3:50 PM
E504 School Of Medicine

2014 Schedule

DATE	TOPIC	INSTRUCTOR
	PHOL401A (2 credit hrs)	
13-Jan	Fundamentals of protein structure	Religa
15-Jan	Physical and chemical properties of proteins	Religa
17-Jan	Optical tools for protein characterization	Surewicz
20-Jan	**Martin Luther King Holiday**	
22-Jan	Protein folding – concepts	Surewicz
24-Jan	Protein misfolding with disease ramifications	Surewicz
27-Jan	Protein misfolding with disease ramifications	Surewicz
29-Jan	Protein structure and dynamics – NMR and X-ray crystallography	Religa
31-Jan	Molecular modeling of protein dynamics	Religa
3-Feb	Allostery and cooperativity in proteins	Buck
5-Feb	Protein modifications and proteomics	Chakrapani
7-Feb	**Review**	**All**
10-Feb	**Exam 1**	
12-Feb	Enzymes – chemical catalysis	Buck
14-Feb	Enzymes – Kinetics and Thermodynamics	Buck
17-Feb	Protein specialties I: Mechanochemistry and signal transduction	Buck
19-Feb	Protein specialties II: Molecular machines and multi-enzyme complexes	Buck
21-Feb	Physical properties of lipids and membranes	Ramachandran
24-Feb	Lipid polymorphism, membrane curvature, fission and fusion	Ramachandran
26-Feb	Lipid rafts	Ramachandran
28-Feb	Lipid signaling	Ramachandran
3-Mar	Protein-lipid interactions	Chakrapani
5-Mar	Bioinformatics tools for membrane proteins	Chakrapani
7-Mar	**Review**	**All**
10-Mar	**Exam 2**	
	PHOL401B (2 credit hrs)	
12-Mar	Introduction to Membrane Physiology	Schilling
14-Mar	Facilitated and secondary transport via uniporters, exchangers, and co-transporters	Schilling
17-Mar	Generation of transmembrane ionic gradients: P-type ATPases	Schilling
19-Mar	Membrane potentials and passive membrane electrical properties	Smith
21-Mar	Active membrane electrical properties	Smith
24-Mar	Structure and function of ion channels I: Ca^{2+} channels	Deschenes
26-Mar	Structure and function of ion channels II: Na^{+} and K^{+} channels	Deschenes
28-Mar	Gating and Single channel kinetics I	Chakrapani
31-Mar	Gating and Single channel kinetics II	Chakrapani
2-Apr	Excitability Computer Lab	Jones/Smith

4-Apr	**Review**	**All**
7-Apr	**Exam 3**	
9-Apr	Synaptic transmission--Exocytosis/endocytosis I	Smith
11-Apr	Synaptic transmission--Exocytosis/endocytosis II	Smith
14-Apr	Synaptic transmission—Post-synaaptic mechanisms	Jones
16-Apr	Synaptic Transmission Computer Lab	Jones/Smith
18-Apr	Transmembrane Signaling via GPCRs and Enzyme-linked Receptors	Jones
21-Apr	Ca^{2+} Signaling: STIM, ORAI, and TRP channels	Schilling
23-Apr	Water transport, volume and pH regulation	Cotton
25-Apr	Biophysics and Physiology of Epithelial Transport I	Cotton
28-Apr	Biophysics and Physiology of Epithelial Transport II	Cotton
30-Apr	**Review**	**All**
5-May	**Exam 4**	

EVALUATION AND GRADING

Meetings: Class will meet MFW from 2:30 to 3:50 PM (80 min)

Format: Each session will predominantly involve student-led presentations/discussions of focus questions, problem sets, or original research/journal papers pre-assigned for that session. In addition, some sessions will be computer lab exercises and demonstrations that will reinforce basic concepts. Students will be expected to come prepared to lead and/or participate in the class discussion.

Class Participation: Each student will receive a cumulative evaluation grade (0-3; see below) for his/her preparation and presentations during the class discussion. The cumulative score for class participation will account for 20% of the final grade.

Class Presentation and Participation Scoring Guidelines:

3 = Very strong understanding of material; outstanding preparation; voluntarily generates relevant questions or comments during discussions.

2 = Generally correct answers; has clearly read material in detail; acceptable contribution to discussions.

1 = Inaccurate or incomplete answers; somewhat familiar with study material; participation in open discussion is limited.

0 = Unprepared or unable to contribute to discussion in a way that indicates familiarity or comprehension of the study material. Unexcused absence.

Exams: Two exams will be administered each block. Exams will consist of 5-7 essay type questions that will cover material presented over the previous 10 sessions. Each exam will account for 40% of the final grade.

Policy on Excused Absences: If a student misses a session for a valid reason (illness, family emergency, attendance at a scientific meeting) the course director must be informed by noontime on the missed day (at the latest) to provide an excused absence.

PARTICIPATING FACULTY

Course Directors

401A--Witold Surewicz (Physiology)	368-0139	witold.surewicz@case.edu
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401A

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