MCB110
Final Midterm

May 8, 2012

_____.
Your name and student ID

QUESTION	POINTS
1 (5 points)	
2 (15 points)	
3 (10 points)	
4 (10 points)	
5 (10 points)	
6 (20 points)	
7 (20 points)	
8 (10 points)	
9 (15 points)	
10 (15 points)	
11 (20 points)	

TOTAL (150 points)
WARNING: Due to the time constraints of assigning grades, **there are no regrades for the last exam. The assigned letter grade is final.**
WARNING: Cheating of any sort is an extremely serious offense. In addition to resulting in an F for the course, cheating may result in further punishment including suspension from the University at the recommendation of the Student Conduct Officer.
WARNING: Your exam will be taken apart and each question graded separately. Therefore, if you do not put your name and ID# on every page or if you write an answer for one question on the backside of a page for a different question, you are in danger of irreversibly LOSING POINTS!

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Q1 – Which lipid will more easily flip-flop in the lipid bilayer, a phosphatidylethanolamine or a ganglioside? Why? (5 points)

Q2 – What kind of lipid regions do sphingolipids and cholesterol make in the plasma membrane. Name two properties, one concerning fluidity and one concerning dimensions, that make them distinct. How do they affect integral membrane proteins concerning their localization and diffusion? (15 pts)

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Q3 – State one thermodynamic difference between the mode of operation of a glucose facilitative transporter and the Na+/Glucose cotransporter. State a similarity in their molecular mechanisms of transport concerning the link between conformational states of the transporter and ligand movement (10 pts)

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Q4 – Use thermodynamics to deduce the resting potential in cells containing potassium leaking channels, assuming a concentration of potassium 10 times bigger inside of the cell than outside, and no other leaking channels (10 pts).

Q5 –Describe the steps taking place during a cycle of ATP hydrolysis in the P-type Ca++ pump in the plasma membrane, concentrating on protein conformational states and calcium affinities, and their consequences (10 pts).

Q6 – Describe the order of events in the activation of a postsynaptic cell, starting with the arrival of the action potential at the presynaptic cleft and ending with the activation of a new action potential at in the postsynaptic cell. How can the signaling at the synapse be terminated (two distinct ways) (20 pts)?

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Q7 – What kind of **phenotype** will temperature-sensitive mutants will cause in budding yeast for these different proteins in the membrane trafficking pathways and why (20 points):

Q8 – Describe how resident proteins of the rough ER are retrieved from the Golgi if accidentally incorporated into CopII vesicles. What distinct physical property between the Cis Golgi and the rough ER makes this possible and how? (10 points)

Q9 – Describe the molecular players and steps resulting in the activation of the MAP kinase cascade by EGF (15).

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Q10 – Explain, starting with the activation of phospholipase C, the molecular events leading to the phosphorylation of PKC substrates (15 points)

Q11 – What kind of receptor (type/activity) is responsible for insulin signaling? Describe the role of extracellular and intracellular domains in the receptor? What are IRSs? What protein motifs recognize IRSs? (20 points)