BIOL3833 Fall 2014 Exam 2 **Name:** _____

Important instructions:
1. Even if you can't answer a question completely, write down whatever you know about it. Partial credit is better than no credit!
2. For many of the questions, there is more than one correct answer.
3. A thoughtful explanation is worth partial credit even if the answer isn't exactly correct.

Short essay questions (15 points each)

1. (7.5 points) Pick one of the visual illusions we encountered in class and explain what it reveals about the neural processing of visual information.

2. (7.5 points) Explain the features of NMDA receptors that make them effective receptors for governing synaptic plasticity.

3. (7.5 points) Unlike sodium and potassium which serve very few functions in the nervous system, calcium is important in a large number of neural functions. Name and briefly explain four of the functions that calcium serves in neural and synaptic function.

4. (7.5 points) How is it possible for a receptor that depolarizes the membrane to be inhibitory?

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Long essay questions (15 points each)

5. (15 points) Describe, compare, and contrast the cellular and molecular mechanisms of LONG-term memory for nonassociative sensitization in Aplysia's gill-withdrawal reflex and the LONG-term memory encoded by LATE long-term potentiation in the hippocampus.

6. (15 points) You are recording membrane potential from a neuron that has a resting potential of -59 mV. When you apply a very brief dose of GABA to the cell, the membrane hyperpolarizes to -65 mV then returns to resting potential. You have the ability to inject a steady current to hyperpolarize or depolarize the cell as you deliver GABA. You also have the ability to change the concentration of any ion outside the cell. Explain three tests you could run to establish whether the receptor is a potassium channel or a chloride channel and how you would interpret the outcome of those tests. You can assume that EK is -95 mV and ECl is -75 mV.