In this first study guide I want to make sure that all students understand my objectives and expectations. We covered this in the syllabus and class discussion, but I want to make sure this is absolutely clear to all.

Most of the difficulty that students have if preparing for their first exam in a course is knowing where to concentrate their efforts. What material should I study? Obviously, if I lectured about it, I consider it important and I will likely ask something about it on the exam. This guide will provide you with a list of essay-like questions about my lectures. My first few lectures provided you with historical and neurobiological foundations. This information is not covered in the text, although there is a brief section in Chapter 1 beginning on page 12 for those of you with limited background in neurobiology. Clearly this book section is not at the depth that I would expect on the exam, but it does provide some of the key words in case you missed them in the lecture.

After this introductory lecture material (beginning with Chapter 2) I hope you noticed how the lecture is designed to emphasize and clarify subsections of the chapter. This exam will cover Chapters 2, 12 and 13. You should focus of sections of the chapters that we also covered in class. The back of each chapter has key words and review questions to guide your studying.

Using chapter 2 as an example, I give you the following guidance on how to use the book for exam preparation. For example, will only briefly cover the sections on detecting differences and scaling in chapter 2, so you should get a more thorough understanding of those areas from the book. In addition to my study questions, you should be able to answer study questions on that topic from the book (e.g., questions 10-15 on p. 45) and know those key words (You will notice that some of my study questions will be very similar to those in the book.) This strategy will hold for the entire course. That is, we may talk about a topic in class, but not in the depth that is covered in the text. My objective is to use lecture to emphasize and clarify topic areas presented in the text and to present additional information that is not fully covered in the text. My expectations are that students will understand topic areas to the greatest depth possible by the combination of text and lecture. Once again, the vast majority of questions will be regarding topic areas that I cover in class. If there is a topic area in the book that I do not cover in the lecture at all (for example, subliminal perception in chapter 2), then it highly unlikely that I will ask anything about it on the exam.

Level of detail: Conceptually I expect that students will have a clear and deep understanding. I do not expect students to memorize little facts, but I understand that it is sometimes difficult to know what is “little” in my mind. For example, there is no need to memorize what the Weber Fraction is for heaviness, but I would expect that you would know the concept of the Weber Fraction and explain what it would mean to have a high or low Weber Fraction. You do, however, need to know all the key words and that may require some memorization. One of the goals of my study guide is to help you understand what I think is important.
**Reading assignments:** Chapters 2, 12 and 13. You should also visit the SDT web site that can be surfed to from the “schedule” web page. Follow the links to the tutorial on SDT if you are still having difficulty with this model.

**Lecture Material**

Know AND UNDERSTAND all the key words. A list is posted and you can surf to it from the “schedule” page.

Some of the slides that I used are posted on the web (go to the “schedule” page. They are available in either Acrobat PDF format or in PowerPoint format. The content of the two files is identical so you don’t need them both; just choose your preferred format.

In addition to the relevant study question and keywords from the book chapter:

1. Distinguish between “sensation” and “perception”. What is meant by “labeled line” coding and what is meant by “cross fiber pattern” coding?
2. What part of our body is responsible for hearing; what part of our body is responsible for seeing? What did the ancient Greek philosophers and physicians think about these questions (who thought what)?
3. In what ways did the thinking of Descartes reflect the thinking of some of the ancient Greek philosophers and physicians? Understand Descartes’ major theory. In what way does his theory distinguish between sensation and perception?
4. What did Hobbes think about the distinction between sensation and perception?
5. In what way does sensation and perception take a central role in the theories of Locke?
6. Understand Darwin’s theory of natural selection. What are the important features of this theory?
7. Know the terms used for directions and the major subdivisions of the brain. What is the general ascending flow of sensory information through the brain? Where does sensory information enter the brain?
8. What are the main parts of a neuron and what is the main function of each? What are some common properties of neurons?
9. What is meant when we say that neurons are electrically active? What are the main ions that we discussed and what is their distribution across the cell? What are the forces acting upon these ions? What ions and membrane components are responsible for the resting potential, the synaptic potential and the action potential?
10. Describe the sequence of events involved in the process known as chemical synaptic transmission. Assume that an action potential has started in cell A, what happens in cell A and what happens in cell B to result in a synaptic potential. What is the difference between an excitatory synapse and an inhibitory synapse?
11. What ionic events are associated with the action potential? What type of channels and pumps are involved and when does each have its influence? Where does myelination come from and what does myelination do to the function of neurons?
12. How does the neuron “decide” whether to “fire” and action potential and where does this decision take place?
13. What are some common methods for determining “absolute threshold” and what might be some advantages or disadvantages of each?
14. What is signal detection theory? What data are needed in order to determine the subject’s ability to detect the stimulus? What conditions would change $d'$? What conditions would change the subject’s response bias? If one changes the subject’s response bias, what will happen to $d'$?
15. What changes in the response matrix would be predicted as subjects take on a more liberal or more conservative response bias?
16. What does a ROC curve show? Given that you plotted a point for a particular subject and a particular stimulus, what direction would a data point move if you changed $d'$? What direction would it move if you changed the response bias?
17. What is a JND? What is Weber’s law? Given a Weber fraction, could you calculate how much difference would be needed to detect a difference between stimuli? What is Fechner’s Law and how is it related to Weber’s Law? What is Stevens’ Law? What general shape of curve would you expect if the Stevens’ law exponent = 1, what shape would be expected if it were < 1, what shape would be expected if it were > 1? What does that shape tell you about changes in perception as the stimulus intensity increases? What is a common procedure for determining these exponents?
18. When a speaker moves, what happens to air? What is a sound wave? What are the major parameters of a sound wave and how do they relate to perception? What scales are used for describing sound waves and what scales are used for describing sound perception? What is an audiogram? What is an equal loudness contour; if you see one of these, can you make predictions about which stimulus will sound louder?
19. What is Fourier analysis/synthesis? What is timbre and how can that be explained on the basis of Fourier analysis? What does a sonogram show? What would changing the phase of a sine wave do to Fourier synthesis? What is a “beat” and what causes a beat?
20. What are the main parts of the ear and what is the function of each? How does the cochlea work; describe the sequence of events that transform changes in air pressure to movement of the basilar membrane. How does the hair cell work? Some say that the cochlea does a Fourier analysis; how does it do this? How does bone conduction work? What is the difference between a conductive and a sensorineural hearing loss?

Note: Subject to change. Depending on how far we get in class or the tangents we take, I may add or postpone exam objectives.