In General

The exam will consist of 50 multiple choice questions with 4 alternatives each. To successfully answer the questions you may be required to incorporate information from more than 1 slide or even 1 lecture. This means that you should not try and memorize the information, rather <u>understand</u> it. Physiology cannot be memorized (as with Anatomy). The exam shall consist of the following lectures:

• Respiration I, II, III, Renal I, II.

Bring your student ID, a good eraser and at least 1 pre-sharpened dark pencil to the exam.

<u>Disclaimer</u>: This study guide is NOT meant to be a comprehensive list of everything you need to know but it gives you a very good start.

The Specifics

Respiration I

- 1. Understand what is meant by partial pressure of a gas and what gases are in what abundance in air.
- 2. Know the order of gas solubility between the alveoli and the pulmonary capillaries.
- 3. Know the composition of gases in the alveoli and why it is different than the atmosphere.
- 4. Know the gas pressure gradients in the pulmonary and systemic circuits and why they change.
- 5. Understand the importance in surface area to optimizing gases in the lungs.
- 6. Understand ventilation-perfusion coupling.
- 7. Understand how hemoglobin (Hb) works to transport both O_2 and CO_2 .
- 8. Understand the O_2 saturation curve and factors that can decrease O_2 ability to bind to Hb.
- 9. Know the different types of hypoxia.
- 10. Understand the different ways that CO_2 is transported in whole blood and the chemistry behind it.

Respiration II

- 1. Know the anatomy and functions of the conductive and respiratory pathways.
- 2. Know the pleural layers of, and surrounding the lungs.
- 3. Understand how the lungs are ventilated by negative intrapulmonary pressure.
- 4. Know what is meant by transpulmonary and intrapleural pressure.
- 5. Understand what causes resistance of air into the lungs and how to alter it. Know the equation given in the lecture.
- 6. Understand how you can change the pressure between the atmosphere and the alveoli to allow more air to enter the lungs.
- 7. Understand what is meant by lung compliance.
- 8. Understand how a respirometer is used to gather pulmonary function data in humans, and define and understand each of the variables obtained from a pulmonary function test.
- 9. Know what the different types of dead space are and how they relate to lung efficiency.

Respiration III

- 1. Know how to calculate alveolar ventilation rate, what factor affects it the most and why.
- 2. Know what part of the nervous system controls respiration and how it operates.
- 3. What gas controls respiration depth and rate? How are changes in the level of this gas detected?
- 4. What is the normal respiratory reflex called and how is it controlled?
- 5. What are an increase in PCO_2 and a decline in PO_2 called?

Renal I

- 1. Know the different functions of the human kidney.
- 2. Know the anatomy of the human kidney and the nephron.
- 3. Know what is meant by filtration, reabsorption and secretion and how each process operates at the cellular level.
- 4. Know what substances are filtrated, reabsorbed and secreted.
- 5. Understand how filtration operates and what layers a substance has to penetrate in order to be filtered into the nephron.
- 6. Know how much of the fluid entering the nephron is filtered and secreted.
- 7. Understand how blood pressure changes within the vasculature of the kidney.
- 8. Know how glomerular filtration rate (GFR) is measured and the equation on how to calculate GFR.
- 9. Know the structures within the juxtaglomerular apparatus and how they operate to regulate GFR.
- 10. Know all of the mechanisms that regulate GFR.
- 11. Understand how the nephron operates via countercurrent multiplication to produce both concentrated <u>and</u> dilute urine. Know <u>all</u> the hormones involved.
- 12. Know what urea is and it role in urine concentration.
- 13. Understand the role of the vasa recta in allowing the nephron to concentrate urine.
- 14. Understand what is meant by the U/P ratio.
- 15. Be able to describe micturition.

Renal II

- 1. Understand the physiological mechanisms of water input and output.
- 2. Understand the importance of regulating electrolytes in the human body.
- 3. Know the physiological mechanism of Na^+ is regulation by the kidney.
- 4. Understand the importance of maintaining acid-base balance and how buffers accomplish this task.
- 5. Understand the physiological mechanisms of how the human nephron regulates plasma pH, including at the level of the cell.