

# Lab Course in Cardiac Physiology

HAPS Institute Graduate Credit Course  
offered in conjunction with Alverno College  
September 4 - October 2, 2018.

## Instructor:

Patrick Eggena, M.D.  
Novateur Medmedia, LLC  
39 Terry Hill Road  
Carmel, NY 10512  
[patrickeggena@yahoo.com](mailto:patrickeggena@yahoo.com)

**Class size:** 5-7 students.

**Prerequisite:** Human Physiology

## Description of this Course:

In this 1 credit hour course participants review basic concepts in cardiovascular physiology by conducting laboratory experiments on themselves during weekly homework assignments. Upon completion of the experiments participants email their results to Dr. Eggena. He, in turn, examines the results and discusses them with participants every Tuesday at 3:00 p.m. EST in a *Google Meet* classroom.

In these sessions Dr. Eggena also considers clinical applications of related physiology concepts from his iBook series, "Cardiac Physiology as a Country Doc". Participants read these clinical scenarios in preparation for these meetings.

## Identification of course outcomes:

Participant will be able to:

- 1) analyze and interpret their EKGs
- 2) relate their EKGs to cardiac action potentials and ionic fluxes
- 3) measure pressure and volume changes in their left ventricles at rest and with exercise.
- 4) relate their heart sounds to their EKGs.
- 5) draw work diagrams for their left ventricles at rest and with exercise.
- 6) compare the energy requirements (and coronary blood flow) of their left ventricles at rest and with exercise.
- 7) determine the effects of exercise on central venous pressure, mean arterial pressure, cardiac output, and total peripheral resistance.
- 8) compare the relationship between cardiac output, venous return and central venous pressure at rest and with exercise.

## Evaluation

Performance is evaluated by Dr. Eggena on the basis of homework assignments and participation in the laboratory/discussion sessions.

All HAPS-I courses follow grading policies on a "credit / no credit" basis. Like many progressive graduate programs, HAPS-I does not use letter grades in our courses. However, a "credit" grade is equivalent to a letter grade of B or better.

A "credit" grade is earned by satisfactorily accomplishing a set of specific goals (at a "B" level or better) as outlined in this course syllabus and in the online course material as determined by the course faculty.

## **Course Schedule: September 4 – October 2, 2018.**

Every Tuesday at 3:00 p.m. EST participants arrive in a "Google Meet" classroom prepared to discuss the experiments they have performed on themselves at home the previous week. They will have emailed their results to Dr. Eggena who has reviewed and organized the results for projection onto their computer screens during the discussion.

In addition, participants will have read the case scenarios in "Cardiac Physiology as a Country Doc" which have been assigned for that week's discussion. Participants are expected to arrive at the first session on September 4th having completed their homework assignments the previous week.

A detailed experimental protocol will be mailed to participants before each session along with a different link that is needed to gain access to the classroom. This link only works with the "Google Chrome" browser which can be downloaded for free from the internet.

Please email me at [patrickeggena@yahoo.com](mailto:patrickeggena@yahoo.com) if you have any questions.

***Tuesday, September 4, 2018, 3:00 p.m. EST Google Meet Classroom.***

### **Homework:**

1. Perform the experiments with the Kardia Mobile EKG, read the cases, and watch the videos in: "Cardiac Physiology as a Country Doc", Episode 1: Electrophysiology, and Episode 2: The EKG

2. Please email the results of your experiments to [patrickeggena@yahoo.com](mailto:patrickeggena@yahoo.com) **before** the September 4th meeting.

### **Discussion:**

Participants analyze and interpret each other's EKGs and relate them to cardiac action potentials and ionic fluxes. They then consider the case of a girl with a rapid heart beat and a veteran with PTSD complaining of chest pain.

**September 11th - 3:00 p.m. EST.**

**Homework:**

1. Perform the experiments with the Kardia Mobile EKG, read the cases, and watch the videos in: “Cardiac Physiology as a Country Doc”, Episode 3: Heart Attack, and Episode 4: Irregular Beats

2. Please email the results of your experiments to [patrickeggena@yahoo.com](mailto:patrickeggena@yahoo.com) for our upcoming discussion group on September 11th.

**Discussion:**

Participants determine their mean QRS axis and superimpose — on copies of their 12-lead EKGs — sketches of common heart conditions. They then consider the case of a farmer with a heart attack and ventricular fibrillation requiring cardiopulmonary resuscitation.

**September 18<sup>st</sup> – 3:00 p.m. (EST)**

**Homework:**

1. Perform the experiments, read the case and watch the videos in: “Cardiac Physiology as a Country Doc”, Episode 5: Excitation-Contraction.

2. Please email the results of your experiments to [patrickeggena@yahoo.com](mailto:patrickeggena@yahoo.com) for our upcoming discussion group on September 18th.

**Discussion:**

Participants relate their heart sounds and blood pressure to left ventricular pressure changes during the cardiac cycle at rest and with exercise. They then consider the case of a woman with atrial fibrillation and a stroke.

**September 25 – 3:00 p.m. (EST)**

**Homework:**

1. Perform the experiments, read the case and watch the videos in: “Cardiac Physiology as a Country Doc”, Episode 6: Heart as a Pump.

2. Please email the results of your experiments to [patrickegggena@yahoo.com](mailto:patrickegggena@yahoo.com) for our upcoming discussion group on September 25th.

**Discussion:**

Participants determine their left ventricular volume changes during the cardiac cycle at rest and with exercise. They then consider a case of a woman in cardiogenic shock.

**October 2 - 3:00 p.m. (EST).**

**Homework:**

1. Perform the experiment, read the case and watch the videos in: “Cardiac Physiology as a Country Doc”, Episode 7: Gallops and Murmurs, and in “Medical Physiology of the Heart-Lung-Kidney”, the chapter on “Graphic Analysis of Cardiac Output and Venous Return”.

2. Please email the results of your experiments to [patrickegggena@yahoo.com](mailto:patrickegggena@yahoo.com) for our last discussion group on October 2nd.

**Discussion:**

Participants draw work diagrams for one of their cardiac cycles, measure their pressure-rate products, calculate their total peripheral resistance, and sketch cardiac output and venous return curves at rest and with exercise. They then consider a case of a woman who has mitral stenosis, is coughing up blood, is in her third trimester of pregnancy, and delivers an infant in respiratory distress.

**Required Course Materials:**

**a) Equipment (current prices)**

- 1) Kardia Mobile EKG recorder (\$99 on Amazon) with App compatible with participant’s mobile phone or iPad.
- 2) Automatic arm blood pressure apparatus (~\$40)
- 3) Stethoscope (~\$15)
- 4) Pulse oximeter (~\$16)
- 5) Copy of participant’s 12-lead EKG (with your permission to use it during our discussions)

**b) Video and Reading Programs**

- 1) “Cardiac Physiology as a Country Doc”, Novateur Medmedia LLC by Patrick Egggena, M.D. – Apple iBooks, seven episodes (ea- \$3.99).
- 2) “Medical Physiology of the Heart-Lung-Kidney”, Novateur Medmedia LLC by Patrick Egggena, M.D. –Apple iBooks (\$14.99).