

## **Medicine in Extreme Environments Elective ENRH-151**

❖ **Course Director:** Dr. Benjamin Levine, M.D.

❖ **Student Liaisons:** Jenny Kim MS2, Madeleine Marlar MS2, Gautam Babu MS4, Bradley Upchurch MS3, Will Young MS3

❖ **Requirements**

- Minimum number of participants – 10
- Maximum number of participants - 35

❖ **Rationale:**

- As medical professionals, much of our training focuses on managing sick patients in normal, everyday environments. Understandably, much less emphasis is placed on the issues faced by otherwise healthy individuals in extreme situations. This class aims to enlighten students on what occurs in these situations. Learning about the extremes will help students better understand human physiology and provide practical expertise in certain situations (wilderness emergencies, sports injuries, etc.).

❖ **Objectives**

- After participation in this course students will be able to:
  - Develop an understanding of how microgravity, high altitude, sports, and diving are different from standard human environments
  - Explain the different mechanisms by which the human body adapts to extreme environmental stresses
  - Discuss the systemic pathologic changes that occur when the body can no longer adjust to environmental changes
  - Become familiar with how typical treatments are modified to deal with the various conditions that arise in extreme scenarios
  - Avoid situations that lead to wilderness emergencies and treat simple injuries in remote areas
  - Plan out how to become involved in careers that are related to extreme environments (hyperbaric medicine, sports medicine, aerospace medicine, combat medicine, etc.)

❖ **Format**

- 8 one-hour and 2 two-hour interactive lectures
- Each lecture will have an assigned publication as background pre-reading; these research articles will be discussed in further detail during class

### ❖ **Requirements and Student Evaluations**

- Grading will be Pass/Fail; to receive transcript acknowledgement, students must:
  - Attend 10 of 12 lecture hours
  - Must be present for at least one of the two interactive 2-hour long lectures
  - Complete the online REDCap course evaluation form

### ❖ **Description of Classes**

- Class 1 – Introduction
  - Lecturer: Dr. Benjamin Levine, M.D., Founder and Director of the Institute for Exercise and Environmental Medicine (IEEM)
  - Dr. Levine will give a brief overview of the elective and provide some interesting case studies to give students exposure to the types of topics that will be covered.
- Class 2 – Sports Medicine I: Concussions and Chronic Traumatic Encephalopathy
  - Lecturer: Dr. Hunt Batjer, M.D., Co-chair of the NFL Head, Neck, and Spine Committee
  - The lecture will examine the pathology of CTE and the current research that attempts to diagnose CTE in living individuals. The recent BU study linking concussions to CTE in NFL players will also be discussed
- Class 3 – Sports Medicine II: Heat Stress during Exercise
  - Lecturer: Dr. Craig Crandall, PhD, Professor - Division of Cardiology and Dr. S. Isaacs, MD, Professor – Emergency Medicine
  - This class will focus on heat stress and the body's mechanisms to counter it during rigorous exercise such as marathons.
- Class 4 – Combat Medicine
  - Lecturer: Dr. Alex Eastman, MD, Professor – Trauma Surgery, Dallas SWAT

- This lecture will focus on the most common injuries and treatment strategies seen in the field of combat medicine, specifically for police force and SWAT teams. This lecture will also mostly focus on the physiologic effects of trauma.
- Class 5 – Hyperbaric/Dive Medicine: Decompression Sickness
  - Lecturer: Dr. Renie Guilliod, M.D., US Navy Diving Medical Officer
  - This class will be held at the Institute for Exercise and Environmental Medicine (IEEM) in North Dallas. Students will tour the facility and spend time exploring the hyperbaric chamber. After, the mechanism and systemic effects of decompression sickness and arterial gas embolisms will be discussed. Students will also learn about how hyperbaric oxygen therapy can be used to treat decompression sickness, combat infections, and promote wound healing. Dr. Guilliod will also explain the steps needed to become involved in hyperbaric medicine.
- Class 6 – High Altitude Medicine
  - Lecturer: Dr. Biff Palmer M.D.
  - Dr. Palmer will talk about his ascent of Mt. Everest and the other highest summits on each continent with a specific focus on the physiological and pathological changes that occur with increasing altitude.
- Class 7 – Deep Diving and Hyperbaric Medicine
- Class 8 – Nature Walk: Identifying Poisonous Plants
  - Facilitator: Dr. Wagner
- Class 9 – Wilderness Medicine: Typical Clinical Scenarios + Basic Wilderness Training
  - Lecturer: Bradley Mueller (Education Coordinator- Sim Center UTSW) and Matt Rosemund (Sr. Clinical Technologist- Sim Center UTSW)
  - The first hour will cover basic cases involving wilderness medicine such as dehydration, spider/snake bites, frostbite, etc. and will explain the response to situations that arise in remote areas. During the second hour, students will be taught several basic wilderness medicine techniques. The class will take place at a nearby wilderness area
- Class 10 – Space Medicine I: General Flight

- Lecturer: Dr. Jay C. Buckey, M.D., former Astronaut
  - The physiology of spaceflight will be discussed, with a focus on the cardiovascular, musculoskeletal, and neurological changes. Dr. Buckey will also elaborate on a career in aerospace medicine as a flight surgeon.
- Class 11 – Space Medicine II: Psychological Impact of Isolated Environments
- Lecturer: Dr. Jay C. Buckey, M.D., former Astronaut
  - The psychological challenges and changes that occur in extended isolation (months long stays on the ISS or Antarctic bases) will be explored. Use of the Oculus Rift to create a comforting and natural virtual environment to combat depression and other psychological disorders stemming from isolation will also be discussed
- Class 12 – Student Presentations – What went wrong?
- Facilitators: Jenny Kim MS2, Madeleine Marlar MS2
  - Students will choose a journal article related to one of the topics covered in the class, give a brief 2-3 minute overview of their article, and explain why the author's findings are important/notable