Physiology 406/506: Extreme Physiology  
Instructor: Amy E. Oakley, Ph.D. (oakley@umich.edu)  
Tu/Th 10:00-11:20am; Location TBA, 3 credits  
Enforced Pre-requisite: Physiology 201 OR 301 OR Biology 225 OR Physiology 502 with a minimum grade requirement of C+

Have you ever wondered why few individuals can survive without oxygen at the summit of Mt. Everest, while some birds regularly migrate across the Himalayas flying at the same or higher altitudes? Why do divers get “the bends,” while sperm whales do not? Is there a limit to human longevity?

This course will cover unique adaptations (anatomical, physiological, and behavioral) to extreme environments and/or lifestyles, with an emphasis on human physiology with comparative animal examples. We will investigate the physiology of human exploration (high altitude, deep ocean, space), senses, gut microbiota, endurance and survival, endocrine disruptors, along with pathophysiological extremes encountered in certain clinical conditions. Discussion of system functions in these extremes will be used to further clarify and consolidate student understanding of the underlying basic principles. In general, these topics relate to the boundaries, limits, and thresholds for physiological systems and physical system components. Students will need to come prepared to interact in groups, present to the class, and read and discuss current scientific literature on these topics.

Select photos from class and our fieldtrip to the UM Obesity Clinic to measure VO$_2$max (pictures used with student permission). Please note that there will be several planned activities/experiments throughout the semester (some after-hours)—participation in them are optional and may vary year-to-year due to availability and class size.
What former students have to say about Extreme Physiology:

• “Extreme Physiology is a fantastic course to take. The class is very engaging, as it is largely discussion-based. The discussions were one of the most beneficial aspects of the class. While they will push you to think critically, they also help you learn as you go, which makes preparing for the exams much easier. The material is also extremely interesting and applicable to many real-life scenarios. If you stay engaged in class, it is hard not to become fascinated by the topic! Lastly, if there are opportunities to take part in the hands-on activities/experiments, definitely do it! Not only are they insanely fun, but they will help you remember the information much better than going over the slides repeatedly.”

• “This was by far the best class I have taken in my educational career. Dr. Oakley is a fantastic lecturer and truly cares about her students. She put an exceptional amount of thought into the lesson plans, and the progression of topics covered was very well-organized…Also, her enthusiasm for the topics was great! It made me excited to learn the material, helped me stay engaged in class, and left me repeatedly wanting to learn more. Overall, Extreme Physiology was a fantastic course, and Dr. Oakley was a phenomenal professor. I would highly recommend this class to others.”

• “This has been such an enjoyable class! I love physiology and it is so cool to learn about how our bodies work…I never felt like I was going to lecture. It felt more like going to learn about cool things with cool people. The combination of the class structure, the class material, and Dr. Oakley made this the best course I have taken so far.”

• “Dr. Oakley is good at assessing the state of her class. She picks up on which topics are confusing and pushes her students to discuss them until they make sense. Exams are fairly written and emphasize critical thinking and application, as one would expect from an upper level course.”