

# ENGR 533

## SPACEFLIGHT AND BIOLOGICAL SYSTEMS

Offered in the Spring of  
odd numbered years

*Prereqs: None*

### DESCRIPTION

Starting with an understanding of the different components of gravity, explore spaceflight's direct and indirect impact on all major biological systems, culminating with a consideration of how spaceflight can be made more sustainable.

### BENEFITS

Biomedical engineering is, in some ways, systems engineering as it applies to living organisms. From bacteria to Bactrian camels, living systems comprise multiple subsystems, each of which is differentially affected by environmental factors. In space, there are many environmental factors, including loss of buoyancy, convection, and sedimentation and high levels of radiation. For larger organisms, stress, noise, fatigue, fluid redistribution, and unloading of the musculoskeletal system are additional factors. This course will provide insights about and corresponding strategies for remediating these environmental factors. These insights will help the student address a wide variety of environmentally-dependent human ailments, and potentially help humankind to survive and thrive in space.

### COURSE OBJECTIVES

- Describe the major processes that are dependent on gravitational fields
- Describe the impact of these processes on biological systems
- Describe risks to neurovestibular, cardiovascular, musculoskeletal, & blood systems
- Identify spaceflight experiments on biological systems yet to be performed
- Analyze the direct and indirect effects of spaceflight on human beings
- Evaluate how spaceflight stages might be made more sustainable
- Create project proposal for research on the biological effects of spaceflight

