SYLLABUS
BIOLOGY 395 – EXTREME PHYSIOLOGY
INTERSESSION, JANUARY 2015

COURSE: Biology 395 – Extreme Physiology Travel Course
Credit value: 3.0 (Combined Lecture and Laboratory)
Biology Curriculum Course Group Satisfied: Organismal
Prerequisites: General Physiology (Biology 245/245L)
For more information visit: http://sites.scranton.edu/extremephysiology/

LOCATION: Tucson and Flagstaff, AZ, and other locations in Arizona

TEXTS and other INSTRUCTIONAL MATERIALS:
1) Assigned readings and journal articles (sample Bibliography attached)
2) Instructor-provided PowerPoint presentations
3) Quantitative Circulatory Physiology (QCP) Modeling Software (copyright Robert Hester, Biological Simulators, Inc. Jackson MS 39236)

INSTRUCTORS: Dr. Terrence Sweeney; LSC 275; phone: 941-7623; terrence.sweeney@scranton.edu
with Prof. Tara Fay; LSC 254; phone: 941-4395; tara.fay@scranton.edu

COURSE DESCRIPTION:
This travel course will expose the student, serving as both subject and investigator, to the stunning and diverse environments of Arizona, as she/he assesses cardiovascular and respiratory conditioning and tracks his/her improvement through a 25-day period of extreme environmental and physical challenges. Accompanying instruction will explore the ongoing physiological adaptation.

STUDENT LEARNING OUTCOMES:
Upon successful completion of the course, the student will be able to:
• record and analyze quantitative measures of human cardiovascular and respiratory performance;
• demonstrate and document the improvements in personal cardiovascular and respiratory performance that are attainable through a sustained period of aerobic and environmental challenges;
• describe the synergism of nutrition and training in the enhancement of human performance;
• identify the mechanisms of physiological adaptation to the environmental challenges posed by an arid environment or high altitude;
• describe the adaptive mechanisms employed by species native to arid and high altitude environments that allow these species to survive extreme environmental challenges; and
• cogently present information and ideas published in the primary literature.
**COURSE POLICIES:**

**Course Enrollment cap:** 10 students

The grading scale used is as follows:

\[
\begin{align*}
A &= 94 - 100 \\
B &= 84 - 86 \\
C &= 74 - 76 \\
D &= 60 - 64 \\
A^- &= 90 - 93 \\
B^- &= 80 - 83 \\
C^- &= 70 - 73 \\
F &= \text{below 60} \\
B^+ &= 87 - 89 \\
C^+ &= 77 - 79 \\
D^+ &= 65 - 69
\end{align*}
\]

Student grade will be determined from performance on tasks and deliverables described below.

**Final Grade Breakdown:**

<table>
<thead>
<tr>
<th>Description</th>
<th>Contribution to Final Letter Grade (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presentation of Human Performance Data</td>
<td>15</td>
</tr>
<tr>
<td>Presentation of Primary Literature Synopsis</td>
<td>20</td>
</tr>
<tr>
<td>Human Performance Equipment Operation</td>
<td>15</td>
</tr>
<tr>
<td>Final Exam</td>
<td>30</td>
</tr>
<tr>
<td>Personal Performance Journal</td>
<td>10</td>
</tr>
<tr>
<td>Participation/Cooperation in Household Functions</td>
<td>10</td>
</tr>
</tbody>
</table>

**TENTATIVE SCHEDULE:**

**Date:**

- 1/6  Students arrive in Tucson, AZ
- 1/7  Course officially begins
  - Introductory Lecture
  - Recording of Initial Pre-training Cardiovascular and Respiratory Conditioning
  - \( \text{VO}_2 \text{max; Wingate Test Anaerobic Performance Assessment} \)
- 1/8  Completion of Initial Human Performance Testing
  - Resting Parameters, HR, BP, RR, RMV, \( \text{SO}_2 \), body weight
  - Endurance: 1.5-mile timed run
- 1/7 - 1/11 Training & class instruction in Tucson (Dept. of Physiology, UA)
  - Training Schedule
    - Each student is to keep a daily log of exercise regimen and nutritional intake
    - Part I: Mandatory Group Exercise Regimen
      - Varied daily schedule of defined exercise (e.g., cycling, hiking, running, swimming)
    - Part II: Individualized Exercise Regimen
      - Optional additional exercise (logged and perhaps in smaller groups)
  - Tentative Lecture Schedule / Topics
    - Cooking for Nutrition I
    - Exercise Physiology
    - Exercise and its Impact on Immune Function
    - Nutritional Demands of Prolonged Exercise
    - Comparative Physiology of Desert Animals
    - Comparative Physiology of Desert Flora
Group discussions of student conditioning data
Faculty mentoring of students on relevant journal articles/reviews
Trips / Sites (most likely incorporated into daily mandatory exercise)
  Saguaro National Monument
  Arizona Sonoran Desert Museum
  Chiracahua Mountains
  Sabino Canyon Recreational Area
  Mount Lemon

1/11  Pre-High Altitude Update of Conditioning
      Resting Parameters, HR, BP, RR, RMV, SO₂, hematocrit
      Endurance: 1.5-mile run time

1/12  Relocation to Flagstaff, AZ

1/13  Recording of Initial Changes with relocation to high altitude
      Resting HR, BP, RR, RMV, SO₂
      Survey for Acute Mountain Sickness

1/13 - 1/24  Training & class instruction in Flagstaff (Northern Arizona University)
      Training Schedule
      Each student is to keep a daily log of exercise regimen
      Part I: Mandatory Group Exercise Regimen
      Varied daily schedule of defined distance cycling, hiking, X-C skiing, etc.
      Part II: Individualized Exercise Regimen
      Optional additional exercise (logged and perhaps in smaller groups)

Lecture Schedule / Topics
      Cardiovascular Physiology, examined using QCP Modeling Software
      Respiratory Physiology
      Cooking for Nutrition II
      Physiological Adaptations to High Altitude
      Comparative Physiology of High Altitude Animals
      Group discussions of student conditioning data
      Student presentations of relevant journal articles/reviews

Trips / Sites (most likely incorporated into daily mandatory exercise)
  Grand Canyon Hike - overnight stay at Phantom Ranch (1/20 - 1/21)
  Snowbowl Ski Resort
  Sedona / Oak Creek Canyon
  Sunset Crater National Monument/ Walnut Canyon / Wapatke Ruins
  Museum of Northern Arizona

1/24  Update of Conditioning after week in Flagstaff
      Resting Parameters, HR, BP, RR, RMV, SO₂, hematocrit

1/25  Return to Tucson, AZ

1/26  Recording of Initial Changes with relocation to low altitude
      HR, BP, RR, RMV, SO₂, hematocrit
1/26 - 1/27 Final Update of Conditioning
   Resting Parameters, HR, BP, RR, RMV, SO₂, body weight, VO₂max
   Endurance: 1.5-mile run time
1/28 - 1/29 Course Lecture Wrap-up, Exam, Student Presentation of Human Performance Data
1/30 Return to Pennsylvania

**SAMPLE BIBLIOGRAPHY OF PRIMARY LITERATURE ASSIGNMENTS:**


