

WEBSTER UNIVERSITY

CENTER FOR GRADUATE AND PROFESSIONAL STUDIES

Denver Graduate Center
 9250 East Costilla Avenue, Suite 310
 Greenwood Village, CO 80112

Course Number

SPSM 5760

Course Title

Space Bio-Astronautics

Term

Summer 2005

Location

DTC Metro Campus

Professors

James Russell, Michael Benoit

Phone Numbers

(W) 303-492-1045, (W) 303-735-4294

E-Mail Addressesrusseljrf@colorado.edu michael.benoit@colorado.edu**Day and Time**

Tuesday, 5:30 - 9:30 p.m.

First class meets on Tuesday May 31st, 2005

COURSE SYLLABUS

1. Course Description: Students examine the broad range of environmental stresses on the human element for short- and long-duration space travel, including psychological and physiological effects. Pressure, temperature, g-forces, and radiation are among the specific stresses considered. The capacity for extended space operation and human survivability, considerations that affect spacecraft and spacesuit designs, are studied. Consumables such as food, water, breathable air, and fuel are addressed with respect to manned space travel.

2. Incoming Student Competency as Expected by the Professor: The student should have completed, or through equivalency, SPSM5000 - Space Systems Management. Weekly quizzes will be administered and an oral presentation and written report will be due during the semester. Students should have a thorough understanding of general space system terms (*e.g., launch vehicles, spacecraft, management terms*), and be capable of demonstrating graduate level written and oral communication skills.

3. Course Statement of Objectives: Our goals for this course are to familiarize students with human needs during spaceflight and to provide insight into the design and operation of human space missions.

STUDENTS WILL:

GAIN: A unique engineering insight by addressing the current goals and challenges of NASA's human exploration initiative.

EXAMINE: The basics of human physiology, effects of spaceflight on the human, and countermeasures to support humans for extended missions in space.

DEFINE: Mission objectives and life support technologies for human spaceflight.

REVIEW: Case studies of short and long duration space missions, along with advanced concepts to support these missions

DEMONSTRATE: Graduate level ability to conduct independent research, summarize their findings, and present a space bio-astronautics related research topic at the graduate level, both written (APA) and orally.

4. Schedule of required readings, class preparations and assignments, lectures, discussions, and presentations:

CLASS PREPARATION

**Review the topics and required readings for Week 1
and subsequent weekly discussions prior to class.**

Week	Date	Topic	Reading in Larson and Pranke (1999)
1	31-May-05	Introduction to Human Spaceflight Introduction to Human Physiology	Chapter 1, pp 1-16. Review Table of Contents
2	7-Jun-05	The Space Flight Environment (vacuum, radiation, temperature) Human Physiology During Spaceflight	Chapter 3, pp.53-55, 65-73, 74-75 Chapter 5, pp. 103-125
3	14-Jun-05	Responses to Variable Gravity Environments (SMS, muscle and bone loss, cardiovascular responses) Countermeasures	Section 5.3, pp. 125-132
4	21-Jun-05	Human Factors (crew time, ergonomics) Psychology During Spaceflight (human productivity and crew selection)	Chapter 6, pp. 133-153 Chapter 7, pp. 155-191
5	28-Jun-05	Space Analogs (Aquarius, MDRS, Biosphere II, LMLSTP) Mission Objectives and Critical Requirements	Handout Chapter 2, pp. 17-52
6	5-Jul-05	Spacecraft Life Support Systems (ECLSS)	Chapter 17, pp. 539-562
7	12-Jul-05	Consumables and Trade Study (equivalent mass) Advanced Life Support and Technology Readiness	Chapter 17, pp. 562-573; Chapter 18, pp. 575-586, 593-594, 596-606
8	19-Jul-05	Extravehicular Activity (EVA) Systems Maintenance and Logistics of Human Space Missions (ECLSS)	Chapter 22, pp. 707-738 Chapter 28, pp. 907-932
9	26-Jul-05	Case Studies (Short versus Long duration missions)	Handout

5. Text:

Required:

Human Spaceflight Mission Analysis and Design, Eds: Larson, W. J. and Pranke, L. K., McGraw Hill Companies, Inc., 1999, ISBN 0-07-236811-X.

Publication Manual of the American Psychological Association, 5th Edition, also available for purchase at: <http://www.apa.org/books/4200061.html> on the Internet.

Supplementary reading material:

Spaceflight Life Support and Biospherics by Peter Eckart, Fundamentals of Space Medicine by Gilles Clément, and Bold Endeavors by Jack Stuster.

6. Visual Aids: As required to support lecture and discussions.

7. Course Requirements: Weekly quizzes will be administered and an oral presentation and written report will be due during the semester. Students will use a word editor for writing the report (e.g. Microsoft Word), a spread sheet program for analysis (e.g. Microsoft Excel) and “Passports,” the Eden-Webster Library System (<http://library.websteruniv.edu>).

The following chart illustrates the course evaluation areas and percent weight each carries toward the course grade.

Evaluation Area	Percentage
Seven Weekly Quizzes*	60%
Abstract	5%
Research Paper	15%
Oral Presentation	20%

*The lowest of the weekly quizzes will be eliminated from the grading.

Independent Research: An independent research project will be assigned during the semester. This project will require researching and defining requirements for a 30-day lunar mission. This research project will entail a 250-word abstract, a ten page (double spaced) written report, and a final oral presentation that communicates your findings to your peers. When reviewing and paraphrasing original material, the students will need to clearly identify their ideas or interpretations in contrast to those from the literature (i.e., no plagiarism). The abstract and report will be submitted through www.turnitin.com. Also, the format and style of the research papers must follow the guidelines set forth by the American Psychological Association (APA V5.0) conventions as instructed by your professors.

8. Oral Presentation and Paper Requirements: Students will be provided specific guidance on oral presentation and written report requirements in class.

9. Grades:

Grades for this course are based on a straight grade percentage. No curves will be used. The grade point structure for letter grades is as follows. Students earning the following points will be awarded the appropriate letter grade or a letter grade with + or - emphasis:

Points Earned	Letter Grade
94 - 100 =	A
90 - 93 =	A -
87 - 89 =	B +
83 - 86 =	B
80 - 82 =	B -
70 - 79 =	C
Below 70 =	F
Incomplete =	I

An incomplete may be awarded to a student who has not completed all course requirements. An incomplete grade form is submitted by the instructor at the time grades are due for the scheduled term and identifies what additional work the student must submit for grading, and by a specified date. Before the incomplete grade is converted to a permanent letter grade all work identified on the incomplete grade form must be submitted for grading, by the stated deadline, to receive consideration of a final grade. An incomplete reverts to a letter grade equivalent to the completed work a student has turned in for credit up to the stated deadline.

10. Absences: Absences should be coordinated with the professor(s) as early as possible, but not later than 24 hours prior to class. Failure to coordinate the absence will result in an unexcused absence. See Make-Up Exams, below. Webster University policy states that “*The University reserves the right to drop students who do not attend the first week of the term/semester. Students are expected to attend all class sessions of every course. In the case of unavoidable absence, the student must contact the instructor. The student is subject to appropriate academic penalty for incomplete or unacceptable makeup work, or for excessive or unexcused absences. Generally, a student who misses more than one four-hour course period (per course) without documented military or medical excuse and advanced permission from the instructor should withdraw from the course.*” The professor(s) may award an “I”, or “F” grade - it is highly recommended that students plan their activities so they can attend classes as scheduled. If a student's job requires frequent absences during a semester, it is the student's choice whether to take a course at that time, or coordinate their class schedule with the instructor(s), prior to registration.

11. Testing: Weekly quizzes are used to evaluate and provide feedback to students on their individual progress in learning key information, concepts, or issues associated with human space activities. Partial credit may be granted for partial answers.

12. Make-Up Exams: All makeup exams (i.e., quizzes) must be coordinated with the professor. The student must coordinate their makeup (date/time) with the respective site staff at least 24 hours in advance to ensure the exam has been received and someone can administer it.

13. Computer Lab: Students may have access to the Webster University computer lab to conduct on-line research on space bio-astronautic topics using the Eden-Webster Library "Passports" or Internet resources. You should ask your professor to demonstrate the use of "Passports" and the Webster Internet access capabilities, or attend the student orientation session - check with the office staff as to the date of the next session.

14. Availability of Professors: The professors are practicing professionals and as such may incur travel requirements during the scheduled course. If the professor scheduled for a specific lecture must miss a scheduled class, a make-up method will be employed to ensure all students receive the full number of contact hours scheduled for the course. The professors will make themselves available during the scheduled class sessions, during breaks, after class, or by mutually scheduled appointment. If you want to call one of the professors, use the numbers listed at the top of this syllabus. If unavailable, leave a message (*include your name, the course you are taking, your phone number, and the best time to return your call*) and the respective professor will get in touch with you at his earliest convenience. Students may request a professor meet with them for individual, or group, consultation on a mutually scheduled date/time (*during weeks 2-8 of the course*).

15. Final Grades: Final grades, and all student course materials (exams and lab exercise), will be available at the Graduate Center during the week following completion of the course. Students should pick any returned materials within a couple days following completion of the course. Since grade reports are no longer mailed from the home campus in St. Louis, you may find out your grade by visiting "academics" on Webster's web page at www.webster.edu. After clicking on "academics" proceed to "registration and services online" then click on the BLUE "**Student Logon**" button where you will enter your student ID number and your password.

(Note: your password was mailed to you in a letter from the Registrar's office).

16. Incomplete Grades: Incomplete grade forms are turned in on the same day as final grades. Students should check with the office staff by the first Thursday of the week following completion of the course to get their final grades. If a student receives an "I" for incomplete work - it is the

responsibility of the student to complete the required work, and return all materials and previous grading forms to the professor, via the Graduate Center, in a timely manner. Students should verify if they have makeup work to be accomplished. A date will be assigned for final submission for the makeup work to be considered for credit.

17. Expected Outcomes: Students will gain an understanding of how spaceflight affects humans and the importance of human factors on spacecraft design. Students will also be introduced to NASA's new spiral architecture for human space exploration. Challenges of human space exploration include maintaining crew health and designing robust life support systems. These challenges will be discussed, along with facilities available to conduct relevant testing. Students will complete independent research and demonstrate written and oral presentation skills that should also benefit them in their professional career.

18. Administrative Information:

- A. Students who are interested in a free e-mail account from Webster University should contact the Metro Center office.
- B. Students are strongly encouraged to use Passports, which is Eden-Webster Library's WWW site. It integrates Internet resources and academic on-line databases for student and faculty research. Passports is accessible from campus, home, or office, providing 24 hour access. Go to <http://library.webster.edu>, you will need to use your student ID to access the resources.
- C. No personnel external to the class shall be used in a class exercise unless approved by the instructor. An exercise or demonstration that might overly disrupt the learning environment should be cleared before consideration in the final presentation design.
- D. Students who are discovered cheating or committing plagiarism will be awarded a failing grade for the course, and may be subject to discipline or dismissal.
- E. Grade reports are no longer mailed from the home campus in St. Louis, you may find out your grade by visiting "academics" on Webster's web page at www.webster.edu. After clicking on "academics" proceed to "registration and services online" then click on the **BLUE** "Student Logon" button where you will enter your student ID number and your password.
(Note: your password was mailed to you in a letter from the Registrar's office).
- F. Certain course materials and/or exams may be distributed to students using the Webster University E-Reserves - your professor(s) will inform you as to if/where this material may be found.

Syllabus has been reviewed/approved by: William C. Hoffman, Jr Date: 14April2005