Texas A&M University
Departmental Request for a New Course
Undergraduate • Graduate • Professional

Submit original form and 2 copies. Attach a course syllabus to each.

1. This request is submitted by the Department of Health and Kinesiology

2. Course prefix, number and complete title KINE 646
   Fundamentals of Space Life Sciences

3. Course description (not more than 50 words) Integrate nutrition, physiology, and radiation biology to define major biological problems in long duration space flight; provide an overview of the problems of bone loss, muscle wasting, and radiation-enhanced carcinogenesis along with potential countermeasures; focus on nutritional interventions and exercise protocols.

4. Prerequisite(s) None
   Cross-listed with NUTR 646 & NUEN 646
   Cross-listed courses require the signatures of both department heads.

5. Is this a variable credit course? □ Yes □ No If yes, from ______ to ______.

6. Is this a repeatable course? □ Yes □ No If yes, this course may be taken ______ times. Will the course be repeated within the same semester/term? □ Yes □ No

7. Has this course been taught as a 489/689? □ Yes □ No If yes, how many times? ______ Indicate the number of students enrolled for each academic period it was taught. ______

8. This course will be:
   a. required for students enrolled in the following degree program(s) (e.g., B.A. in history)
   Texas A&M University Ph.D. Training Program in Space Life Sciences
   b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)
   An elective for M.S./Ph.D. students in Nutrition, Kinesiology, and Nuclear Engineering (Health Physics)

9. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. Attach approval letters.

10. Prefix Course # Title (exclude punctuation)
    KINE 646 Fundamentals of Space Life Sciences

    | Lect. | Lab | SCH | Subject Matter Code | Admin. Unit | Acad. Year |
    |-------|-----|-----|---------------------|-------------|------------|
    | 03    | 0   | 31  | 0031,05050,014      | 14           | 0208-09    |
    | 003632|     |     |                     |              |            |

    Do not complete shaded area.

Approval recommended by:

Head of Department 11/8/07

Head of Department (if cross-listed course) 11/9/07

Submit to Coordinating Board by:

Director of Academic Support Services 11-8-07

To have this form reviewed, please send to Linda F. Lacey, Mail Stop 1265 or fax to 847-8737.
OAR/AS-5/04
Nutrition, Nuclear Engineering, Kinesiology 646  
(NUTR/NUEN/KINE 646, Section 600)  
Fundamentals of Space Life Sciences  
Course Syllabus, Fall, 2007

Instructor: Nancy D. Turner, Ph.D.  212 Kleberg, 847-8714  
n-turner@tamu.edu

Time/Location: 9:30 – 10:45, Rm. 213 Kleberg

Textbook: All materials will be from original journal articles,  
supplemented with references to text books as appropriate.  
All reading materials will be posted on the web and  
students are required to access these materials through the  
Texas A&M web based system.

Course Description: This course is designed to integrate nutrition, biochemistry,  
physiology and radiation biology to define the major  
biological problems encountered in long duration space  
flight. It will provide an overview of each of these  
problems with potential countermeasures against the  
problems. Countermeasure development will focus  
primarily on nutrition and exercise protocols to counter  
problems of bone loss, muscle wasting, and radiation-  
enhanced carcinogenesis. Experts in each of these areas  
will have a good understanding of the major biological  
problems facing long duration space flight, and their  
countermeasures.

Prerequisites: An undergraduate degree in Nutrition, Kinesiology or  
Health Physics or similar qualifications. Contact instructor  
for further guidance in this area.

Course Objectives: With successful completion of the course, you will have  
achieved:  
1. An integrated understanding of the major life science problems encountered during  
long duration space flight.  
2. An integrated understanding of the primary agencies involved in long duration space  
flight (NASA, NSBRI, ESA) and the types of research models used to assess the severity  
of physiological changes occurring during long duration space flight and the potential of  
countermeasures to ameliorate these problems.  
3. An integrated understanding of countermeasures against the critical problems of long  
duration space flight and history of what has and has not worked to date.
Evaluation: Exams - 3 (100 points each)  
Oral presentation on a problem of long duration space flight and a proposed countermeasure (choose a topic outside of your own graduate degree program)  
Paper describing the topic of oral presentation  
TOTAL  
300 points  
150 points  
150 points  
600 points

Grading Scale:  
90-100% A  70-79 C  
80-89 B  60-69 D  
59% and below F

Make-up Policy: Make-up examinations will be given only for university authorized absences. It is the student's responsibility to arrange a date and time with the instructor. If possible, students should make arrangements prior to the scheduled examination time.

The oral presentation will be given during the last two weeks of regular classes. Papers will be due the week before finals. The papers need to be 10-12 double spaced pages (1 inch margins and 12 point font) and the information presented should be supported by results from original research articles (n > 15) and review articles (no more than 5).

Americans with Disabilities Act (ADA) Policy Statement: The Americans with Disabilities Act (ADA) is a federal antidiscrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Services for Students with Disabilities in Room B118 of Cain Hall, call 845-1637 or visit: http://disability.tamu.edu.

Academic Integrity Statement: All syllabi shall contain a section that states the Aggie Honor Code and refers the student to the Honor Council Rules and Procedures on the web (http://www.tamu.edu/aggiehonor/index.html). All students should make themselves aware of correct citation techniques by reviewing the Academic Integrity Tutorials available on the library web site (http://library.tamu.edu/portal/site/Library).

Aggie Honor Code: "An Aggie does not lie, cheat, or steal or tolerate those who do."
LECTURE SCHEDULE

8/27  Introduction to the course, content and methods of evaluation. The role of NASA and NSBRI in space life sciences. (Turner)

8/29  **Space physiology, overview.** The space environment and how it differs from earth. Major research methods and techniques to study space-related problems and their countermeasures. (Bloomfield)

9/3   Bone loss and risk of fracture and renal stones I (Bloomfield)

9/5   Bone loss and risk of fracture and renal stones II (Bloomfield)

9/10  Sleep disruptions, impact on performance (Dinges – video)

9/12  Skeletal muscle atrophy, changes in muscle function (Fluckey)

9/17  Altered muscle protein synthesis and degradation (Lawler)

9/19  Cardiovascular changes: orthostatic intolerance, distribution of blood flow and impact on aerobic work capacity (Woodman)

9/24  **Exam: Space physiology**

9/26  **Space Nutrition:** Space flight and ground based research in nutrition and review of space food, intake patterns (Turner)

10/1  Depressed food intake and its consequences (Lupton)

10/3  Protein and amino acid turnover - relationship to loss of muscle mass (Wu)

10/8  Lipid metabolism – role in signaling pathways (Chapkin)

10/10 Mineral requirements, balance studies and other measures of turnover, e.g. Calcium (Smith)

10/15 Antioxidants and other vitamin roles in space (Walzem/Turner)

10/17 Interaction of nutrition with radiation (Turner)

10/22 **Exam: Space Nutrition**

10/24 **Space Radiation:** Radiation and radiation production (Braby)

10/29 The space radiation environment, solar cycle and regions of space (Braby)

10/31 Radiation detection and measurement (Braby)

11/5  Physical countermeasures against radiation (Braby)

11/7  Radiation chemistry and DNA damage and repair (Ford)

11/12 Biological effects of high and low LET radiation, synergistic effects of microgravity/altered gravity and radiation (Ford)

11/14 Biological effects of space radiation observed in astronauts, radiation protection and regulations for space flight (Ford)

11/19 Biomedical countermeasures to radiation exposure (Ford)
11/21  EXAM: Space Radiation
11/26  Student presentations
11/28  Student presentations
12/3   Redefined day – Friday classes (could use this time instead of 12/10)
12/5   Reading day, no classes
12/10  Student presentations, class evaluation