Graduate Council Report

February 3, 2012

Special Consideration Item:

Graduate Council approved the College of Agriculture and Life Sciences Department of Nutrition and Food Science certificate in Space Life Sciences-Addition of Biomedical Engineering

SC600

Approved by GC: 7-7-12

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July 28, 2011

TO: Dr. Karen L. Butler-Purry
Associate Vice President for Graduate Studies

THROUGH Dr. Alan Sams
Executive Associate Dean COALS Approved 10/26/11

THROUGH Dr. David W. Reed
Associate Dean for Graduate Programs and Faculty Development for DWR

THROUGH Dr. Jimmy T. Keeton
Head, Nutrition & Food Science Department

THROUGH Dr. Gerald L. Coté
Head, Department of Biomedical Engineering

THROUGH Dr. N.K. Anand
Executive Associate Dean of Engineering

THROUGH Dr. G. Kemble Bennett
Vice Chancellor and Dean of Engineering

FROM: Dr. Nancy D. Turner
Dr. Joanne R. Lupton
Co-Director's of the Space Life Sciences Training Program

SUBJECT: Certificate in Space Life Sciences – Addition of Biomedical Engineering

The Certification in Space Life Sciences currently supports a National Space Biomedical Research Institute (NSBRI)-sponsored training program targeted at the education of Ph.D. students pursuing degrees in Kinesiology, Nuclear Engineering, Nutrition, Genetics and Ph.D. or PH.D./M.D. students in Medical Sciences. We are interested in expanding the program to include Ph.D. students pursuing a degree in Biomedical Engineering.

We appreciate your consideration of this request to expand the Certificate program. If you would like any additional information or have questions or comments, please contact Dr. Nancy Turner by phone (874-8714) or e-mail (n-turner@tamu.edu).

Attachment: Original Certificate Proposal

Paragraph to be added to the Graduate Catalog

Certificate in Space Life Sciences. This cross-disciplinary certificate program is housed in the College of Agriculture and Life Sciences. It is designed to provide students pursuing a Ph.D. in Kinesiology, Nuclear Engineering, Nutrition, Genetics, Biomedical Engineering and those pursuing a Ph.D. or Ph.D./M.D. in Medical Sciences an understanding of critical areas of space life sciences and the countermeasures to these problems. Students gain a respect for the interdisciplinary nature of space life sciences research through participation in KINE, NUEN, and NUTR courses, a space life sciences seminar course, a research program focusing on issues of space life sciences, and experiences at NASA/JSC, Brookhaven National Laboratory and the NASA bed-rest facility.

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September 10, 2007

TO: Dr. Robert C. Webb
Interim Dean of Graduate Studies

THROUGH: Dr. Gene A. Nelson
Executive Associate Dean of COALS

THROUGH: Dr. David W. Reed
Chair, COALS Graduate Program Council

THROUGH: Dr. Michael I. McBurney
Head, Nutrition & Food Science Department

Dr. James M. Eddy
Interim Head, Health and Kinesiology Department

Dr. Raymond J. Juzaitis
Head, Nuclear Engineering Department

FROM: Dr. Joanne R. Lupton

Dr. Nancy D. Turner
Co-Director's of the Space Life Sciences Training Program

SUBJECT: Approved of Certificate in Space Life Sciences

Enclosed is a proposal to create a Certificate in Space Life Sciences. The Certificate supports a National Space Biomedical Research Institute (NSBRI)-sponsored training program targeted at the education of Ph.D. students in critical areas of space life sciences, with an emphasis on cross training in the areas of Kinesiology, Nuclear Engineering and Nutrition. The program is funded for 6 years and we will be pursuing continued funding in the future. The proposal includes the development of two new cross-listed courses: KINE/NUEN/NUTR 689 – Fundamentals in Space Life Sciences, and KINE/NUEN/NUTR 681 – Space Life Sciences Seminar. In addition, students must complete coursework in the two areas outside of their major, an ethics course, participate in experiential learning opportunities off campus, and receive training in communicating with the public at large, for a total of 17 hours additional credits. The specifics of the requirements are outlined in the accompanying proposal.

We appreciate your assistance in the review, approval and subsequent forwarding of these documents through to the Office of Graduate Studies for final consideration. If you would like any additional information or have questions or comments, please contact Dr. Nancy Turner by phone (847-8714) or e-mail (n-turner@tamu.edu).

Proposal

For a

Certificate in Space Life Sciences
Doctoral degree programs in Kinesiology, Nuclear Engineering (Health Physics) and Nutrition ONLY

Department of Kinesiology
College of Education

Department of Nuclear Engineering
College of Engineering

Department of Nutrition and Food Science
College of Agriculture and Life Sciences

Texas A&M University
College Station, Texas

September, 2007

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PART I: Program Description

Purpose

Emphasis has been placed on NASA to explore the solar system and return humans to the Moon by 2020 in preparation for human exploration of Mars and other destinations (NASA, 2004). To send astronauts safely to the Moon and Mars requires a nationally coordinated effort with targeted goals and priorities for achieving those goals. NASA/NSBRI has developed a Bioastronautics Roadmap designed to identify the biomedical and health risk of spaceflight, and to identify research questions that must be answered to reduce those risks (NASA, 2005). Success will require an increase in the community of scientists trained in these critical areas to solve the complex biomedical research questions associated with achieving safe, long-duration space flight (NASA, 2003).

The overall goal of the Certificate in Space Life Sciences is to develop a cadre of scientists capable of performing the work necessary to solve three of the most critical problems in space life sciences that limit long duration space flight: 1) bone loss 2) muscle wasting and 3) effects of cosmic radiation. To fulfill this goal, the Departments of Nutrition and Food Science, Health and Kinesiology, and Nuclear Engineering, propose to create a Certificate in Space Sciences. The four part approach for certification is designed to provide graduates with an integrated global perspective on these major biological problems of long duration space flight and provide the specific training in either nutritional and/or exercise physiology countermeasures against them. Students seeking each of the three degrees will have a broad knowledge of all major issues facing long duration space flight and specific additional knowledge of the other two degrees. This is achieved through several classes that all students will have in common: a required cornerstone course, a joint seminar, ethics class, and required "experiential class" – a rotation at NASA/JSC and a rotation at the University of Texas Medical Branch and/or Brookhaven National Laboratory. Trainees who complete the program will have a solid grounding in research, teaching and service to have successful careers in academia, with NASA, private industry partners in the space initiative, and/or other public or private organizations involved in NASA's space exploration endeavors.

Advisory and Mentoring Committee for the Certificate in Space Life Sciences

The advisory and mentoring committee is comprised of three members of the graduate faculty, each representing the three individual disciplines, Kinesiology, Nuclear Engineering and Nutrition. The committee members are selected from those on the graduate program and complete a three year term before rotating within their particular discipline.

The committee will monitor students' progression through the program, facilitate any issues that may arise between research mentor and graduate student with respect to timeliness, research expectations, etc., review each students degree program, and confirm they satisfy the requirements for the certificate program. Applicants can discuss potential mentors with advisory committee mentors relevant to their research. If a graduate student wishes to seek advice from faculty outside their program, we will provide that opportunity for them.

Award of the Certificate in Space Life Sciences

The Dean for the College of Agriculture and Life Sciences will sign the Certificate in Space Life Sciences. The Certificate will be awarded after the student has completed the requirements for the certificate and the specific degree for which they are involved, Kinesiology, Nuclear Engineering or

Nutrition. Once the student has completed these requirements, a Certificate in Space Life Sciences will be noted on the trainees' official University transcript in addition to grades for the courses taken to fulfill the requirements of the certificate.

PART II: Admission Criteria and Course Requirements

A. Criteria for Selection into the Training Program

The admissions committee consists of faculty from each of the three degree-granting entities. The admissions committee will coordinate with the admissions committees for each of the respective degree-granting departments/faculties. Student selection will be based on the student's academic potential, training, interest, and commitment to entering the Texas A&M University Space Life Sciences Ph.D. Program.

For consideration into the program, a student applicant must have a strong interest in space life sciences and submit the following documents that will be reviewed by the admissions committee: 1) an Application for the Ph.D. Training Program in Space Life Sciences (please see Appendix A), 2) Texas A&M University graduate application, 3) letters of recommendation, 4) university transcripts, 5) letter of support for the applicant from the graduate student's mentor, and 6) a written essay (2 to 3 pages) describing potential research and career goals, and how the Ph.D. program in Space Life Sciences will help them achieve their goals. Students with the highest potential will be invited to campus to meet with teaching and research faculty and with student organizations as appropriate.

Criteria for selection includes completion of a bachelor's or master's degree at an accredited university and a minimum 3.0 GPA on a 4.0 total scale. In addition, all students must be accepted into a doctoral program in one of three disciplines, Kinesiology, Nuclear Engineering, or Nutrition.

B. Requirements to obtain the Certificate in Space Life Sciences

Each of the three Ph.D. degree granting programs has its own requirements for the degree which all students seeking that degree must fulfill. Doctoral students are expected to complete 96 hours beyond a bachelor's degree or 64 hours beyond a master's degree; to pass a qualifying exam; and to defend their dissertation. For a brief description of each degree please see Appendix B.

To meet requirements to obtain a Certificate in Space Life Sciences, students will earn a minimum of 17 credit hours, 11 credit hours from mandatory courses and an additional 6 credit hours from experiential training programs (NASA/JSC, UTMB, Brookhaven National Laboratory) (Table 1). If a student chooses to participate in all three experiential training programs, they could earn a total of 20 credit hours; however, this is not required to obtain the Certificate.

Table 1. Total number of units required to obtain a Certificate in Space Life Sciences	
Mandatory courses/training programs	**Units**
Fundamentals of Space Life Sciences (KINE 689, NUEN 689, NUTR 689)	3
Scientific Ethics (VMID 686)	1
Seminar in Space Life Sciences (KINE 681, NUEN 681, NUTR 681)	1
Two courses outside the students discipline	6
Applied Exercise Physiology (KINE 649)	
Microdosimetry (NUEN 615)	
Nutritional Biochemistry 1 (NUTR 641)	
Two Directed Studies (minimum) (KINE 685, NUEN 685, NUTR 685)	6
NASA/Johnson Space Center	
The University of Texas Medical Branch	
Brookhaven National Laboratory	
Total	**17 units**

Courses. The syllabus for each course, including the two new courses are found in the Appendix C. All trainees will be expected to take two new approved courses, Fundamentals of Space Life Sciences and the Space Life Sciences Seminar (please see Appendix C). In addition to completing a course in Scientific Ethics, students are required to take one course in each of the two disciplines other than the primary degree sought by the student, i.e. NUTR 641 (for NUEN and KINE); KINE 649 (for NUTR and NUEN); and NUEN 615 (for NUTR and KINE).

Research. All trainees must successfully defend a dissertation related to space life sciences. Students will work with a strong research core of space life scientists at Texas A&M, UTMB, NASA/JSC and Brookhaven National Laboratory who are working on issues critical to the success of long duration space flight, i.e. muscle loss, bone loss and radiation-enhanced cancer and countermeasures against these critical problems (diet and exercise).

Experiential Component. KINE 685, NUEN 685, NUTR 685 (3 units each). All trainees must complete the experiential component at NASA Johnson Space Center (JSC) and one of the other two experiential components (i.e., Brookhaven National Laboratory for the degree in Nuclear Engineering; the rotation at UTMB for the degree in Kinesiology or Nutrition). However, participants may select to take part in all three experiential training sessions.

Teaching/Service Component. All trainees must successfully complete a teaching/outreach component which could include giving lectures to middle/high school classes, preparing a streaming video to be used in other classroom settings, and participating in workshops/seminars held by the Center for Teaching Excellence.

PART III: Integrated Components Required by the Texas A&M University Ph.D. Training Program in Space Life Sciences (TAMU-SLS) for a Certificate in Space Life Sciences

A. Mandatory Courses

Trainees obtaining a Certificate in Space Life Sciences will be required to take three mandatory core courses (9 units), plus an ethics course (1 unit) and a seminar (1 unit). In addition, a trainee will participate in a minimum of 2 experiential training programs (6 units). Copies of the syllabi for each mandatory course are shown in Appendix C.

KINE/NUEN/NUTR 689	Fundamentals of Space Life Sciences (new course form, see Appendix D)
KINE/NUEN/NUTR 681	Seminar in Space Life Sciences
VMID 686	Scientific Ethics
KINE 649	Applied Exercise Physiology (NUEN and NUTR students only)
NUEN 615	Theory and Applications of Microdosimetry (KINE and NUTR students only)
NUTR 641	Nutritional Biochemistry I (KINE and NUEN students only)
KINE/NUEN/NUTR 685	Directed Studies

The courses are listed on the Texas A&M University Office of Admission and Records web site at http://courses.tamu.edu.

B. Course Description

Fundamentals of Space Life Sciences. KINE 689, NUEN 689, NUTR 689 (3 units). Provides an introduction to the many space life sciences issues associated with long duration space flight. Students will have an appreciation of the many different issues that do not directly relate to their own particular degree/research program. Topics to be covered include *Space Physiology* (e.g., space environment, musculo-skeletal system, cardiovascular system, exercise and research methods and techniques), *Space Nutrition* (e.g., nutritional requirements, ground based research models, effect of microgravity on specific requirements, role of nutrition in mediating bone and muscle wasting and radiation exposures), and *Space Radiation* (e.g., complex radiation environment, detection, biological effects of low- and high-LET radiation, countermeasures).

Scientific Ethics. VMID 686 (1 unit). The course is an overview of ethical issues encountered by scientists in the conduct and dissemination of their research, in their pursuit of resources, in their interactions with the press and the broad public, and resulting from the extension and technological application of their findings.

Seminar in Space Life Sciences. KINE 681, NUEN 681, NUTR 681 (1 unit). This seminar course "Seminar in Space Life Sciences" will be cross-listed and will be used to further foster opportunities for learning. Students and mentors discuss current research in Space Life Sciences and invited lectures, the most eminent researchers in the field, will lecture to further opportunities for learning and encourage student participation.

One course each in the two degree programs other than the one sought by the Ph.D. Student.

Applied Exercise Physiology. KINE 649 (3 units). Covers how environmental factors (temperature, altitude, microgravity), development, aging, and gender alter the physiological responses to acute exercise and chronic physiological adaptations to exercise training. Students will understand the mechanisms responsible for the physiological responses and adaptations that occur in response to varying environmental conditions, and gain a basic understanding of the pathophysiology of cardiovascular, metabolic, and bone diseases and the physiological role of exercise in prevention and/or treatment of these diseases.

Microdosimetry. NUEN 615 (3 units). Acquire a working understanding of the physical and stochastic nature of radiation exposure at low doses, an appreciation for the significance of these properties as they influence the response of physical and biological systems to low dose and dose rate exposures, and an understanding of the methods used for evaluating energy deposition at low doses. The course will cover the processes involved in energy deposition, the definitions of microdosimetric quantities, mathematical simulation, measurement methods and instrumentation, data analysis, and applications including radiation protection and risk estimation.

Nutritional Biochemistry 1. NUTR 641 (3 units). Covers mechanisms of intestinal absorption of nutrients. Integration of the intermediary metabolism of glucose, amino acids, lipids with nutrition, physiology, and pathophysiology in animals. Regulation of metabolic pathways in cells, tissues, and the whole body under normal and disease conditions. Functions of vitamins and minerals in nutrient metabolism and health.

C. Experiential Components

i. Overview of the Experiential Training

Individuals at NASA/JSC, The University of Texas Medical Branch at Galveston (UTMB) and Brookhaven National Laboratory will facilitate training opportunities using research tools and techniques not available on the Texas A&M campus. Each student will complete a training program at NASA/Johnson Space Center during the summer of their first year in the graduate program. They will then be required to do one other offsite training, the choice depending upon their research program. For example, students in Nuclear Engineering will be required to go to Brookhaven National Laboratory while students majoring in Nutrition and Kinesiology will be required to go to UTMB. During the second summer of the training program, students will need to have taken all mandatory core certificate courses before participating in the experiential learning opportunities (Brookhaven, NASA, UTMB). All students will have the option to do all three rotations.

ii. Facilities

NASA/Johnson Space Center (JSC), Clear Lake, TX. KINE 685, NUEN 685, NUTR 685 (3 units). During the training program, students will have opportunities to work in individual laboratories located at JSC. These laboratories include Exercise

Physiology, Nutritional Biochemistry, and Radiation Biodosimetry. The Johnson Space Center has a variety of formalized Education and Student Programs available to graduate students. If desired, trainees in the Ph.D. program could apply for positions in the Cooperative Education Program and the Graduate Student Researcher Program.

The University of Texas Medical Branch at Galveston (UTMB). KINE 685, NUEN 685, NUTR 685 (3 units). UTMB has a General Clinical Research Center that can house 12 volunteers, and includes full dietary and nursing support. Many bed-rest studies are conducted here, providing an excellent learning environment for graduate students who desire to learn how such studies are conducted. Equipment is available to perform sample isolation, processing, derivations, and analysis using techniques such as gas chromatography/mass spectrometry, isotope ratio mass spectrometry, and liquid chromatography mass spectrometry.

Brookhaven National Laboratory, Upton, NY. KINE 685, NUEN 685, NUTR 685 (3 units). Students will apply to participate in the Brookhaven National Laboratory rotation during their first year of the program. Up to fifteen students are accepted to participate in the NASA Space Radiation Summer School. Graduate students will gain training in the important areas of space radiation biology and protection and simulates space radiation. Students will have access to equipment necessary to monitor cellular and systemic responses to radiation. Course work covers the space radiation environment, charged particle physics, and radiobiology of high LET radiation, as well as other topics determined by the needs of the group in attendance. Laboratory exercises include physical measurement techniques (dosimetry), DNA damage and repair, *in vitro* cell response measurements, *in vivo* chromosome aberration and cell population quantification. Topics include photon and charged-particle irradiation techniques for biochemical samples, cultured cells, and laboratory animals.

D. Research Program

The major advisors of the graduate students are currently educating graduate students in topics related to space life science and have formed collaborative relationships across disciplines. For example, a number of faculty with primary appointments in Kinesiology are also on the Faculty of Nutrition, and a graduate student in Nuclear Engineering is being co-mentored by a faculty member in Nutrition. Faculty members of the Ph.D. program derive from three different colleges – Agriculture and Life Sciences, Education and Human Development, and Engineering. They are supported by NASA, NSBRI, NIH, USDA, and other nationally recognized funding agencies and foundations. Most of the research programs are interdisciplinary in nature, thereby creating synergistic research opportunities that overlap the boundaries of our three critical research areas.

E. Teaching/Service Training Program

Fellows will receive training in how to communicate information on space life sciences to others by participating in the Partnership for Environmental Education and Rural Health (PEER; http://peer.tamu.edu/) and the Science, Technology, Engineering and Mathematics program (STEM). These programs, funded by the National Science Foundation (NSF) and National Institute of Environmental Health Sciences (NIEHS), promote development of the next generation of scientists and workers in biomedical and health-related sciences. Students will be trained on how to make

streaming videos on space life sciences for use in a K-12 classroom. In addition, they will learn from K-12 teachers on how to present materials on space life sciences in the classroom. Trainees will be encouraged to attend the Graduate Teaching Seminar Series offered by the Center for Teaching Excellence. The seminar series covers such topics as: Faculty Professional Development, mentor-Protégé Relationships, Effective Time Management, Writing Effective Research Grant Proposals, Developing a Teaching Portfolio, Peer Review of Teaching, Balancing personal and Professional Life.

Part IV: Model Plan for Ph.D. Students in Kinesiology, Nuclear Engineering, or Nutrition Seeking a Certificate in Space Life Sciences

A. Model Plan for Students Seeking a Ph.D. in Kinesiology and the Certificate in Space Life Sciences (Total number of required hours: 17):

Year One

Fall Semester

- KINE 689 Fundamentals of Space Life Sciences

Spring Semester

- VMID 686 Scientific Ethics
- KINE 681 Seminar in Space Life Sciences

Summer Semester

- KINE 685 NASA/Johnson Space Center (JSC), Clear Lake, TX

Year Two

Fall Semester

- Students can select from the following courses: 1) Nutritional Biochemistry I (NUTR 641) and 2) Microdosimetry (NUEN 615).

Spring Semester

- Classes and workshops coordinated by the Center for Teaching Excellence.
- If desired, apply for a position in the NASA Space Radiation Summer School.
- Abstracts should be submitted for presentations at national meetings.

Summer Semester

- Students can select from the following Directed Studies summer training programs (KINE 685): 1) The University of Texas Medical Branch at Galveston (UTMB) and/or 2) Brookhaven National Laboratory, Upton, NY.

Year Three

Fall, Spring and Summer Semesters

- Students can select from the following courses: 1) Nutritional Biochemistry I (NUTR 641) and 2) Microdosimetry (NUEN 615).
- Students can select from the following Directed Studies summer training programs (KINE 685): 1) The University of Texas Medical Branch at Galveston (UTMB) and/or 2) Brookhaven National Laboratory, Upton, NY.

Year Four
Fall, Spring and Summer Semesters

- Continue research program. Presentations at national meetings are expected as are the first publications generated by the research program.

Year Five
Fall, Spring and Summer Semesters

- When needed, research should be nearing completions, manuscripts published and dissertations written and defended.

B. Model Plan for Students Seeking a. Ph.D. in Nuclear Engineering and the Certificate in Space Life Sciences (Total number of required hours: 17):

Year One
Fall Semester

- NUEN 689 Fundamentals of Space Life Sciences

Spring Semester

- VMID 686 Scientific Ethics
- NUEN 681 Seminar in Space Life Sciences

Summer Semester

- NUEN 685 NASA/Johnson Space Center (JSC), Clear Lake, TX

Year Two
Fall Semester

- Students can select from the following courses: 1) Nutritional Biochemistry I (NUTR 641) and 2) Applied Exercise Physiology (KINE 649).

Spring Semester

- Classes and workshops coordinated by the Center for Teaching Excellence.
- Apply for a position in the NASA Space Radiation Summer School.
- Abstracts should be submitted for presentations at national meetings.

Summer Semester

- Students can select from the following Directed Studies summer training programs (NUEN 685): 1) The University of Texas Medical Branch at Galveston (UTMB) and/or 2) Brookhaven National Laboratory, Upton, NY.

Year Three
Fall, Spring and Summer Semesters

- Students can select from the following courses: 1) Nutritional Biochemistry I (NUTR 641) and 2) Applied Exercise Physiology (KINE 649).
- Students can select from the following Directed Studies summer training programs (NUEN 685): 1) The University of Texas Medical Branch at Galveston (UTMB) and/or 2) Brookhaven National Laboratory, Upton, NY.
- Presentations at national meetings are expected by this year.

Year Four
Fall, Spring and Summer Semesters

- Continue research program. Presentations at national meetings are expected as are the first publications generated by the research program.

Year Five
Fall, Spring and Summer Semester

- When needed, research should be nearing completions, manuscripts published and dissertations written and defended.

C. Model Plan for Students Seeking a. Ph.D. in Nutrition and the Certificate in Space Life Sciences (Total number of required hours: 17)

Year One
Fall Semester

- NUTR 689 Fundamentals of Space Life Sciences

Spring Semester

- VMID 686 Scientific Ethics
- NUTR 681 Seminar in Space Life Sciences

Summer Semester

- NUTR 685 NASA/Johnson Space Center (JSC), Clear Lake, TX

Year Two
Fall Semester

- Students can select from the following courses: 1) Applied Exercise Physiology (KINE 649) and 2) Microdosimetry (NUEN 615).

Spring Semester

- Participate in classes and workshops coordinated by the Center for Teaching Excellence.
- If desired, apply for a position in the NASA Space Radiation Summer School.
- Abstracts should be submitted for presentations at national meetings.

Summer Semester

- Students can select from the following Directed Studies summer training programs (NUTR 685): 1) The University of Texas Medical Branch at Galveston (UTMB) and/or 2) Brookhaven National Laboratory, Upton, NY.

Year Three
Fall, Spring and Summer Semesters

- Students can select from the following courses: 1) Applied Exercise Physiology (KINE 649) and 2) Microdosimetry (NUEN 615).
- Students can select from the following Directed Studies summer training programs (NUTR 685): 1) The University of Texas Medical Branch at Galveston (UTMB) and/or 2) Brookhaven National Laboratory, Upton, NY.

- Presentations at national meetings are expected by this year.

Year Four

Fall, Spring and Summer Semesters

- Continue research program. Presentations at national meetings are expected as are the first publications generated by the research program.

Year Five

Fall, Spring and Summer Semesters

- When needed, research should be nearing completions, manuscripts published and dissertations written and defended.

All students must complete preliminary examinations and have an approved dissertation proposal as part of the Ph.D. requirements.

The degree plan of the Ph.D. student is the responsibility of the student and the student's graduate committee. The purpose of the core is only to provide a minimum number of courses in various disciplines to ensure that students receive a foundational education in Space Life Sciences.

If a student wishes to participate in all three experiential components (9 credit hours) the student will have a total of 20 credit hours to obtain the Certificate.

PART V: Summary of the Steps Required to attain the Certificate.

Introduction

All students applying for the Texas A&M University Ph.D. Training Program in Space Life Sciences must be accepted into one of the three doctoral programs in one of three disciplines, Kinesiology, Nuclear Engineering, or Nutrition.

Step One: Submission of an Application to the Ph.D. Program in Space Life Sciences

For consideration into the program, a student applicant must have a strong interest in space life sciences and submit the following documents that will be reviewed by the admissions committee: 1) an Application for the Ph.D. Training Program in Space Life Sciences (please see Appendix A), 2) Texas A&M University graduate application, 3) letters of recommendation, 4) university transcript, 5) letter of support for the applicant from the graduate student's mentor, and 6) a written essay (2 to 3 pages) describing potential research and career goals, and how the Ph.D. program in Space Life Sciences will help them achieve their goals. Students with the highest potential will be invited to campus to meet with teaching and research faculty and with student organizations as appropriate.

Step Two: Review of the Application

The admissions committee that consists of faculty from each of the three degree-granting entities, will review applications for the Ph.D. Program. The admissions committee will coordinate with the admissions committees for each of the respective degree-granting departments/faculties. Student selection will be based on the student's academic potential, training, interest, and commitment to entering the Texas A&M University Space Life Sciences Ph.D. Program.

Step Three: Advisory Council review and Examination

The Advisory Committee will review each student's degree program and confirm they satisfy the requirements for the certificate program.

Step Four: Issuance of the Certificate

The Dean for the College of Agriculture and Life Sciences will sign the Certificate in Space Life Sciences. The certificate will be awarded after the student has completed the requirements for the certificate and the specific degree for which they are involved, Kinesiology, Nuclear Engineering or Nutrition. Once the student has completed these requirements, a Certificate in Space Life Sciences will be noted on the trainees' official University transcript in addition to grades for the courses taken to fulfill the requirements of the certificate.

PART VI: References

NASA. The Vision for Space Exploration, February 2004. NP-2004-01-334-HQ, Washington, DC, 2004.

NASA. Education Enterprise Strategy, October 2003. NP-2003-10-332-HQ, Washington, DC, 2003.

NASA. Bioastronautics Roadmap. A Risk Reduction Strategy for Human Space Exploration, February 2005. SP-2004-6113, Washington, DC, 2005.