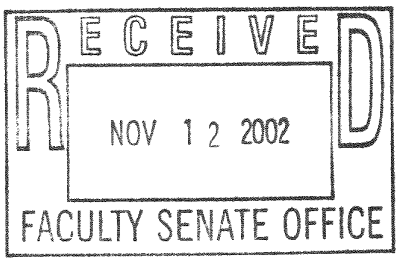
IN/OUT KL RH F C

UNIVERSITY OF Miami

FACULTY SENATE



MEMORANDUM

To: Donna E. Shalala, President

From: Jane E. Connolly
Chair, Faculty Senate

Date: 4 November 2002

Subject: Faculty Senate Legislation #2002-06(B) – Exercise Physiology Major in the School of Education

****

The Faculty Senate, at its 23 October 2002 meeting, voted to approve the establishment of an Exercise Physiology Major in the School of Education. The proposal is attached for your reference.

This legislation is now forwarded to you for your action.

JC/kl

cc: Luis Glaser, Executive Vice President and Provost
Sam Yarger, Dean, School of Education
Arlette Perry, Chair, Exercise and Sport Science

Faculty Senate
325 Ashe Admin. Bldg.
Coral Gables, Florida 33124
Phone: (305) 284-3721 Fax: (305) 284-5515
http://www.miami.edu/FacultySenate
e-mail: facsen@miami.edu

CAPSULE: Faculty Senate Legislation #2002-06(B) – Exercise Physiology Major in the School of Education

PRESIDENT'S RESPONSE

APPROVED: _____ DATE: 11-6-02
(President's Signature)

OFFICE OR INDIVIDUAL TO IMPLEMENT: Provost

EFFECTIVE DATE OF LEGISLATION: _____
(if other than June 1 next following)

NOT APPROVED AND REFERRED TO: _____

REMARKS (IF NOT APPROVED): _____

MEMORANDUM

DATE: **October 17, 2002**

TO: ***Faculty Senate***

FROM: ***Dr. Arlette Perry, Chair***
Department of Exercise and Sport Sciences

SUBJECT: **Changes and Additions required of the Exercise Physiology Proposal**

Find enclosed changes/additions to the initial Exercise Physiology proposal. As recommended by the Faculty Senate, and Welfare Committees these changes are highlighted throughout the manuscript and as indicated, referenced in the Appendices. In addition, I have added a cover letter to the Faculty Senate on page 6.

UNIVERSITY OF Miami

Office of the Dean

MEMORANDUM

August 12, 2002

TO : Jane Connoly, Chair, Faculty Senate

FROM: Sam J. Yarger, Dean

RE : Exercise Physiology Undergraduate Program

The purpose of this memorandum is to offer enthusiastic support for the Exercise Physiology Undergraduate Program. The program has been thoroughly researched by the faculty and staff of the Exercise and Sport Sciences Department, and approved at every level in the School of Education. The Academic and Student Services Committee voted approval of the program on April 24, 2002, and referred it to the School Council. The School Council approved the program on May 6th.

As Dean of the School of Education, I certify as accurate the budget projections supplied in this proposal. Succinctly, the School will cover the costs necessary to support this major.

Should the Faculty Senate require any further information, please don't hesitate to contact me.

C: Luis Glaser, Executive Vice President and Provost
Arlette Perry, Chair, Exercise and Sport Science
Liz Rothlein, Associate Dean, School of Education

School of Education
P.O. Box 248065
Coral Gables, Florida 33124-2040
305-284-3711
Fax: 305-284-3003

NCATE
Accredited Teacher Education Programs

APA
Accredited Doctoral Program in Counseling Psychology

MEMORANDUM

DATE: **October 1, 2002**

TO: **Dean Sam Yarger**

FROM: **Arlette Perry**

SUBJECT: **Proposed Exercise Physiology Major**

This memo is to confirm the fact that at the department meeting held by Exercise and Sport Sciences on Feb. 20, 2002, the proposed undergraduate major in Exercise Physiology was unanimously supported. As Chair of the Department of Exercise and Sport Sciences, I look forward to working with you toward the accomplishment of this goal.

UNIVERSITY OF Miami

MEMORANDUM

To: Dr. Arlette Perry

From: Jeanne Shay Schumm

Re: Exercise Physiology Major

Date: October 14, 2002

The Department of Teaching and Learning has voted to approve the undergraduate exercise physiology major.

Cc: Sam Yarger, Dean
Liz Rothlein, Associate Dean

School of Education
P.O. Box 248065
Coral Gables, Florida 33124-2040
305-284-3711
Fax: 305-284-3003

NCATE
Accredited Teacher Education Programs

APA
Accredited Doctoral Program in Counseling Psychology

UNIVERSITY OF Miami

October 16, 2002

To: Arlette Perry, Chairperson
Dept. of Exercise and Sport Sciences

From: Margaret Crosbie-Burnett, Chairperson MCB
Department of Educational & Psychological Studies

Re: Proposed Exercise Physiology Major

At our departmental meeting today, the faculty of the Department of Educational and Psychological Studies voted unanimously to support the proposal for a new undergraduate major in Exercise Physiology.

Thank you.

School of Education
P.O. Box 248065
Coral Gables, Florida 33124-2040
305-284-3711
Fax: 305-284-3003
www.education.miami.edu

October 7, 2002

Dear Faculty Senate,

Find enclosed, a copy of our proposed major in Exercise Physiology. Graduates of this major will receive a Bachelor of Science degree in the School of Education.

Please note that while, historically, there has been a requirement for a second major in the Teaching and Learning (TAL) department of the School of Education, this has not been the case for the Exercise and Sport Sciences (ESS) department. In TAL, a dual major in the College of Arts and Sciences is in the best interests of their students as most of their graduates pursue careers in the public or private school teaching sector. Thus, in addition to pedagogy and education, it is necessary for TAL students to receive supplemental education in their respective areas of interest, i.e., Math, Science, or English. Such is not the case for ESS majors who typically do not become teachers. Given the comprehensive requirements of our profession, it is NOT in the best interests of our students to have a dual major.

The American College of Sports Medicine (ACSM) is the professional organization of Exercise Physiologists. They are currently placing rigorous academic demands and more stringent guidelines that colleges and universities are expected to follow. In order to comply with the growing academic requirements of our profession, a single major in Exercise Physiology is proposed. The current demands of our field are quite evident as there is not one other Biology/Exercise Physiology double major that exists in the entire country. Thus, schools such as Pepperdine, Malibu, CA, George Washington University, Washington DC, University of Florida, Gainesville, FL, University of North Carolina, Greensboro, NC, University of Massachusetts, Amherst, MA, Rutgers University, Rutgers, NJ, Tulane University, New Orleans, LA, University of Buffalo, Buffalo, NY, represent a few of the numerous cooperating institutions that have undergraduate majors in Exercise Physiology.

This request is for our Exercise Physiology major to be reviewed based upon its own academic merit and potential for endorsement by its professional organization.

Sincerely,

Dr. Arlette Perry, Chair
Department of Exercise and Sport Sciences

INTRODUCTION AND BACKGROUND

Exercise Physiology is the "study of the chemistry and/or physics of the body in response to acute and/or chronic exercise." This field currently thrives as a highly active group of exercise scientists, exercise clinicians, health professionals and educators continue to work under the umbrella of the American College of Sports Medicine (ACSM), our parent organization. The huge growth of the field may be due, in part, to the vast accumulation of scientific data attesting to the benefits of exercise in improving health, wellness and quality of life, as well as the need to understand on a more basic, scientific level, the role of human movement on cellular and systemic function.

Historically, undergraduate exercise physiology majors consisted of pre-medical students, biochemists, biologists, and physical educators who went on to graduate programs in these or related fields. With the advent of the health and fitness industry, the student constituency changed to include those interested in corporate fitness, hospital-based wellness, commercial fitness, biomechanics, and graduate-level exercise physiology. The health and fitness industry, as well as other industries, helped to amass a diversity of job opportunities in commercial exercise enterprises, in community and recreational positions, in the hospital setting, in the exercise sporting goods industry, in public school and professional athletics, and in various related research endeavors (See Appendix A).

Undergraduate exercise physiology majors have been featured in the ACSM undergraduate program directory with many programs topped out at 600 undergraduate students, or more. The number of students and the number of universities and colleges offering undergraduate majors in exercise physiology continue to grow.

Typically, exercise physiology majors are housed in Schools of Health Sciences. There are, however, some majors housed in the Medical School, the College of Arts and Sciences, and the School of Education. The University of Texas, Austin, TX, Ohio State University, Columbia, Ohio, Syracuse University, Syracuse, NY, University of Toronto, Toronto, Canada, Texas A & M, College Station, TX, Brooklyn College, Brooklyn, NY, and

Baylor University, Waco, TX are just a few of the institutions housing Exercise Physiology in their Schools of Education. Our School of Education and Allied Health Professions, as it was termed many years ago, housed our graduate program in Exercise Physiology. In subsequent years "Allied Health Professions" was dropped from the title thus shortening the title to the School of Education. The graduate program in Exercise Physiology simply remained in the School of Education and actually flourished receiving grants, publications, graduate student achievement awards, private donations, and national recognition. Today, the program benefits from being in the School of Education because of its strong pediatric physiology emphasis, its alliance with the Educational and Psychological Studies department for the integration of Research Methods and Statistical Analyses instruction, and its scientific work with the Miami Dade County Public School System. Furthermore, the exercise physiology program has since developed an extensive network with many other departments at the University thus, its central location in the School of Education, remains ideal for collaborative research.

NEED FOR THE PROGRAM

In an effort to maintain quality control over the proliferation of undergraduate majors, the ACSM offers four certifications open to graduates: 1) Group Exercise Leader, 2) Health and Fitness Instructor, 3) Exercise Specialist, and 4) Registered Clinical Exercise Physiologist. Certifications 1) and 2) are applicable to undergraduate studies. The ACSM will also be intensifying their efforts to collaborate with those schools housing exercise physiology undergraduate programs, to maintain quality control over program content. Knowledge, skills, and areas of application (KSA's) have been developed by the ACSM Committee on Licensure and Registration (See Appendix B) to further define for universities and colleges, those competencies required for certification. The ACSM is also developing a subcommittee to oversee reported programs in the field to ensure they meet the standards and criteria necessary to sit for certification examinations.

Direct contact has been made with ACSM officials to ensure the proposed undergraduate major meets ACSM standards and competencies. Furthermore, it would be important for

our program of study to take the lead as one of the first universities to be in compliance with the latest ACSM certification standards.

Although we currently have a Biology/Exercise Physiology double major in place, the double major does not possess the necessary content to meet ACSM standards and competencies and is therefore not recognized by the ACSM. This may be one of the reasons for the lack of growth in this major contrary to what is occurring elsewhere. Currently, there are no other institutions possessing biology/exercise physiology double majors except ours. A table of courses offered as part of the Biology/Exercise Physiology double major are compared to the proposed exercise physiology major in Table 1. Shaded courses indicate those courses in the proposed exercise physiology major, that are not contained in the Biology/Exercise Physiology double major.

Table 1

Biology/Exercise Physiology double major			**Proposed Exercise Physiology Major**		
Course #	Title	Cr.	Course #	Title	Cr.
ESS 221	Intro to Exercise: Bioenergetics & Skeletal Muscle	3	ESS 155	Biological & Health Related Bases of Exercise	3
ESS 245	Anatomy & Kinesiology	3	ESS 156	Laboratory Application to Health & Exercise	1
ESS 222	Exercise Physiology Lab: Neuromuscular	3	ESS 221	Intro to Exercise: Bioenergetics & Skeletal Muscle	3
ESS 321	Intro to Systemic Exercise Physiology	3	ESS 222	Exercise Physiology Lab: Neuromuscular	2
ESS 322	Exercise Physiology Lab: Cardiorespiratory	2	ESS 232	Basic Human Physiology	3
ESS 384	Athletic and Sport Injuries	3	ESS 245	Anatomy & Kinesiology	3
ESS 421	Systemic Exercise Physiology	3	ESS 321	Intro to Systemic Exercise Physiology	3
ESS 495/496	Field Experience	3	ESS 322	Exercise Physiology Lab: Cardiorespiratory	2
ESS 477	Advanced Nutrition for Sport and Fitness	3	ESS 365	Principles of Exercise Prescription and Program Management	3
			ESS 384	Athletic and Sport Injuries	3

Biology/Exercise Physiology Double Major			Proposed Exercise Physiology Major		
			ESS 457/458	Field Experience (See Appendix C)	3
			ESS 421	Systemic Exercise Physiology	3
			ESS 431	Lab Experiences in Systemic Exercise Physiology	2
			ESS 477	Advanced Nutrition for Sport and Fitness	3
			ESS 540	Exercise Psychobiology	3
	Total	**22**		**Total**	**40**

FEASIBILITY OF THE PROGRAM

There is no reason why our proposed major should not move forward in accordance with the growth and direction of the ACSM. We have all the tools necessary to be a leader in this field: a) we have the professors and staff available to teach a core of excellent courses, b) we have the support system in place in the College of Arts and Sciences and the Medical School to assist in the scientific education of students, c) we have a fully equipped physiology laboratory with some of the finest equipment and advanced level instrumentation, d) we have the research status in our own field having amassed a huge amount of research and publications, grants, and clinical trials (faculty and students totaled eight national presentations at this years' ACSM meeting in St. Louis), and e) we have the necessary adjunct faculty and assistants to offer supervision, clinical field experiences, internships and instruction to prospective students (See Appendix C).

In the South Florida area, Barry and FIU University currently offer undergraduate majors in exercise physiology, however, neither one possess our level of scientific merit and expertise. They just do not possess the professorial expertise with advanced level publications, the support system with the Medical School and College of Arts and Sciences, nor the laboratory facilities to do so. Neither Nova University nor St. Thomas University offers an undergraduate major exercise physiology at the present time.

With the new direction taken by the ACSM, it is clear that undergraduate exercise

physiology majors across the country, have to undergo some transformation and redevelopment in accordance with the current standards and requirements of our profession. Our proposed undergraduate major in exercise physiology could place us at the forefront of South Florida schools. This proposal is to request approval for a program of courses leading to an undergraduate major in Exercise Physiology, and subsequently to a Bachelor of Science Degree in Education. We also propose to leave the current double major in Biology/Exercise Physiology in place, given the fact that not all students wish to pursue ACSM certification.

STRUCTURE OF THE PROGRAM

The major consists of a core of 15 courses designed to meet all KSA criteria proposed by the ACSM (See Appendix D). The core courses have a strong focus in exercise physiology that is well rounded and complete with four laboratories essential to the hands-on clinical experiences required of our field. In addition to a strong foundation in basic human physiology and human biology, which is fundamental to the sciences, students will be able to apply their scientific education to human health, longevity, quality of life and behavior. Exercise psychobiology, the only five hundred level course, is a culmination of scientific information designed to enable students to understand human behavior, theoretical strategies, and motivational techniques to enhance exercise participation and health. Furthermore, the undergraduate field experience selected from a diversity of community and university-based operations (See Appendix C) enables students' to obtain first-hand experience with programs already in place and research already in progress. This is relevant for direct application of instructional information thereby putting theory into practice. Several of our field experiences enable students to work with our adjunct medical faculty in their facilities (See page 10).

The KSA's (Appendix B) required for ACSM certification are divided into 10 areas: a) **Anatomy and Biomechanics**, b) **Exercise Physiology**, c) **Human Development and Aging**, d) **Pathophysiology/Risk Factors**, e) **Human Behavior and Psychology**, f) **Health Appraisal and Fitness Testing**, g) **Safety, Injury Prevention and Emergency**

Care, h) **Exercise Programming**, i) **Nutrition and Weight Control**, and j) **Program and Administration/Management**.

a) **Anatomy and Biomechanics** (K.S.A. 1.1.0-2.1.1)
- ESS 245 Anatomy and Kinesiology
- ESS 431 Laboratory Experiences in Systemic Exercise Physiology

b) **Exercise Physiology** (K.S.A. 1.2.0-2.2.22)
- ESS 221 Introduction to Exercise Bioenergetics and Skeletal Muscle
- ESS 222 Exercise Physiology Lab: Neuromuscular
- ESS 232 Basic Human Physiology
- ESS 321 Introduction to Systemic Exercise Physiology
- ESS 322 Exercise Physiology Lab: Cardiorespiratory
- ESS 421 Systemic Exercise Physiology

c) **Human Development and Aging** (K.S.A. 1.3.0-2.3.0.6)
- ESS 321 Introduction to Systemic Exercise Physiology
- ESS 365 Principles of Exercise Prescription and Program Management
- ESS 421 Systemic Exercise Physiology

d) **Pathophysiology/Risk Factors** (K.S.A. 1.4.0-2.4.7)
- ESS 155 Biological and Health Related Bases of Exercise
- ESS 156 Lab Applications to Health and Exercise

e) **Human Behavior and Psychology** (K.S.A. 1.5.0-2.5.2)
- ESS 540 Exercise Psychobiology

f) **Health Appraisal and Fitness Testing** (K.S.A. 1.6.1-2.6.0.19)
- ESS 155 Biological and Health Related Bases of Exercise
- ESS 156 Lab Applications to Health and Exercise
- ESS 365 Principles of Exercise Prescription and Program Management

g) **Safety, Injury Prevention and Emergency Care** (K.S.A. 1.7.0-2.7.6)
- ESS 384 Athletic and Sport Injuries

h) **Exercise Programming** (K.S.A. 1.8.0-2.8.0.20)
- ESS 155 Biological and Health Related Bases of Exercise
- ESS 156 Lab Applications to Health and Exercise
- ESS 365 Principles of Exercise Prescription and Program Management
- ESS 421 Systemic Exercise Physiology
- ESS 431 Lab Experiences in Systemic Exercise Physiology

i) **Nutrition and Weight Control** (K.S.A. 1.9.0-2.9.0.6)
- ESS 477 Advanced Nutrition for Sport and Fitness

j) **Program and Administration/Management** (K.S.A. 2.10.0-2.10.0.9)
ESS 365 Principles of Exercise Prescription and Program Management
ESS 421 Systemic Exercise Physiology

In order to provide reviewers with the essential elements of our field, a sample of the core courses in exercise physiology are provided in Appendix D. In addition to core courses, students must complete their GENERAL EDUCATION REQUIREMENTS (39-51 cr). These include English Composition, Foreign Language, Social Science, Humanities, Mathematics, and Natural Sciences (See Appendix E).

The natural sciences include a predominance of courses from Biology and Chemistry necessary to establish a solid scientific foundation from which to build upon. Electives should include University Physics I or other science-related courses as necessary to obtain 120 credits in the program. For those students interested in attending medical school, the ADVANCED STUDIES TRACK can be followed, which also fulfills the Natural Sciences requirements. For pre-med students, courses should include College Physics I, College Physics Lab I in addition to other science-related courses as necessary to obtain 120 credits in the program.

ANTICIPATED STUDENT INTEREST

The potential is great for enrollment in a strong program in Exercise Physiology. The growth and popularity of this area of study has increased tremendously in the past 10 years. This has resulted in the development and establishment of a complete set of guidelines created by the ACSM Committee on Licensure and Registration for Colleges and Universities to follow. These guidelines are issued nationwide and at our national and regional meetings so that institutions can, provide for their students', the academic background required of the field and the critical information necessary for obtaining ACSM certification. Once recognized by the ACSM, the program enters into the ACSM directory reaching an overwhelming number of high schools and colleges in the

continental United States and worldwide. In addition, as one of the first schools to comply with the most recent ACSM guidelines and criteria for certification, the University of Miami will be featured at national and regional conferences, workshops, and seminars, for other schools to follow suit. Such a strong undergraduate component would be particularly attractive for students interested in pursuing similar studies on the graduate level and help to facilitate their acceptance into strong graduate programs. Some of the careers reported by our graduate students are included in Appendix F. These are reported since many of our graduate students hire undergraduates with B.S. degrees in Exercise Physiology and ACSM certification.

RESOURCES AND EXPENDITURES

An undergraduate major in Exercise Physiology would place only moderate demands on the University's fiscal budget (See Appendix G). The School of Education already has a strong M.S. and Ph.D. in Exercise Physiology as well as a fully equipped exercise physiology laboratory. Initially, an overload stipend for both the Director of the Program and the Staff Associate would be necessary. The Dean has agreed to pay these costs as well as the added costs of clerical supplies, technical supplies, etc. as necessary to support this program (See Appendix G). As the undergraduate major shows its anticipated growth, a laboratory director would be necessary during the second year. This person would handle the increasing supplies and equipment to support a bigger influx of students as well as to ensure the proper operation, coordination and function of a laboratory possessing a good deal of traffic. One graduate assistant would also be hired to assist the laboratory director in all laboratory classes. A part time secretary would be needed during the second year to assist the Staff Associate in executing the administrative aspects of the major.

Since the major already possesses four tenure track professors teaching the core courses, as well as two adjunct professors, no new professors would be necessary initially. It is expected that as the major shows big increases in enrollment, adjunct

faculty would be replaced with full time faculty.

The Dean has pledged his support in the administration of this major both initially and during its anticipated growth during the next five years. Since a very active graduate program is already in place, initial costs for starting the major are relatively low. In addition, as growth of students occurs during the five-year period, the revenues generated greatly outweigh the costs of the program.

The Richter Library has been in communication with the Exercise and Sport Sciences Department to increase the amount of scientific journals and books relevant to the field of Exercise Physiology. Jane Schillie, Head, References & Instructional Services Department, has been particularly helpful in ensuring that the Department of Exercise and Sport Sciences has an adequate amount of journals and books for our students to use.

The following is a list of journals relevant to the Exercise Physiology major and available at the Richter Library;

Sports Medicine
Richter 1985 (v.2) to present, RC1210 .S67
Calder 1984 (v.1) to present

Obesity Research
Richter 1995 (v.3) to present, RC628 .O294

Physician and Sports Medicine
Calder 1973 (v.1) to date

American Journal of Clinical Nutrition
Richter 1954 (v.2) - 1987 (v. 45), RC584 .A5
Calder 1954 (v.2) - present

Pediatrics
Calder 1948 (v.1) to present

Medicine and Science in Sport and Exercise
Richter 1980 (v. 12) to present, RC1200 .M44

Calder 1969 (v.1) to 1979 (v.11) under old title Medicine and Science in Sport 1980 (v. 12) to present.

Journal of Strength and Conditioning Research
Richter 2001 (v. 15) to present, GV557 .C36

Canadian Journal of Applied Physiology
Richter 1994 (v.19) to present GV557 .C36
Calder 1987 (v.12) to 1992 (v. 17) under old title Canadian Journal of Sports Science

International Journal of Sports Medicine
Richter 1983 (v. 4) to present, RC1200 .I68
Calder 1980 (v. 1) to present

Research Quarterly for Exercise and Sport
Richter 1980 (v. 51) to present
<http://129.171.32.28/search/cGV201+.R4/cgv++201+r4/-5,-1,,E/browse> GV201 .R4

International Journal of Sport Nutrition
Richter 2001 (v.11) to present

Pediatric Exercise Science
Calder 1989 (v.1) to present

International Journal of Eating Disorders
Richter 1981 (v.1) to present, RC552 .A72
Calder 1981 (v. 1) to present

Aging and Physical Activity
Human Kinetics, 1989 – Present
Requested from Jane Schillie November 2001

PROFESSORS IN EXERCISE PHYSIOLOGY

Dr. Arlette Perry – Ph.D. New York University
Fellow, ACSM, Registered Clinical Exercise Physiologist
Director: Laboratory of Clinical and Applied Physiology
Chair ESS Department
Specialty: Lipid biochemistry, women's health, obesity, pediatric physiology
Dr. Joseph Signorile – Ph.D. Texas A & M University
Director: Exercise Training, Stein Gerontological Institute
Specialty: Muscle cell physiology, physiology of aging, biomechanics
Dr. Bobby Robertson – Ed.D. Oregon State University, Eugene, Oregon
Director: Sports Medicine Graduate Program
Specialty: Gross anatomy, kinesiology, injury assessment, and prevention

Dr. Gianluca Del Rossi – Ph.D. University of Florida, Gainesville
NATA Certified Trainer
Director: Athletic Training Graduate Program
Specialty: Sports medicine, injury rehabilitation, prevention, and assessment, safety and emergency care of athletes

ADJUNCT FACULTY

Dr. Dennis Lobstein, Ph.D. – Purdue University
Director: New Mexico Highlands University Wellness Center
Specialty: Exercise Psychobiology, Neurobiology, Research Design and Statistics, Health Science/Exercise Prescription
Dr. Janet Brill, PhD., R.D. – University of Miami
Specialty: Nutrition, Dietetics, Obesity, Pediatric physiology and nutrition

MEDICAL ADJUNCT FACULTY

Dr. Keith Hechtman, M.D
Professor, Sports Medicine; American Board of Orthopedic Surgery; primary appointment, Voluntary Associate Professor, University of Miami School of Medicine, secondary appointment, School of Education. Team Physician for Miami-Dade County Senior High Schools, FIU and St Thomas University. He has agreed to serve as mentor/supervisor to students pursuing their field experience off campus at HealthSouth Doctors' Hospital and to provide guest lectures in relevant courses.

Nilza P Kallos, M.D.

Professor, Women's Health; American Board of Internal Medicine; primary appointment, Voluntary Associate Professor, School of Medicine; secondary appointment, School of Education. Director of the Center for Integrative and Holistic Medicine in Women's Health, Gynecology, Nuclear Medicine. She has agreed to serve as mentor/supervisor to students pursuing their field experience off campus at the "WITHIN" women's center and to provide guest lectures in relevant courses.

John Uribe, M.D.

Professor, Sports Medicine; American Board of Orthopedic Surgery; primary appointment, Voluntary Associate Professor, University of Miami School of Medicine; secondary appointment, School of Education. University of Miami Team Physician. He has agreed to serve as mentor/supervisor to students pursuing their field experience off campus at HealthSouth Doctors' Hospital and to provide guest lectures in relevant courses.

John Zvijak, M.D.

Professor, Sports Medicine; American Board of Orthopedic Surgery; primary appointment, Voluntary Associate Professor, University of Miami School of Medicine; secondary appointment, School of Education. Team Physician for Tampa Bay Bucaneers, University of Miami, FIU and St. Thomas University. He has agreed to serve

as mentor/supervisor to students pursuing their field experience off campus at HealthSouth Doctors' Hospital and to provide guest lectures in relevant courses.

APPENDIX A

EMPLOYMENT OPPORTUNITIES

Exercise Physiology – Undergraduate – B.S. degree required, ACSM Certification strongly recommended or required.

1. Research with companies designed to determine the effectiveness of their product (i.e. running shoes, jumping ability).

2. Supervising corporate exercise programs for major industry and business (Florida Power and Light, Inc., Burger King Corporation).

3. Supervising exercise programs for the Cruise Line Industry (Royal Caribbean, Carnival Cruise Lines).

4. Group leadership in cardiac rehabilitation and pulmonary rehabilitation in the hospital setting.

5. Setting up wellness programs for hospital employees and other health professionals.

6. Managerial position for implementation of fitness evaluations and training programs in commercial enterprises; Ensuring safety and appropriate monitoring for all clients.

7. Personal Trainer.

8. Designing exercise programs for primary care physicians in private practice (cardiac, pulmonary, obesity, OB/GYN).

9. Teaching – High school, private school.

10. Computer technology – Equipment development, technology appraisal, and program accuracy.

11. Supervising parks and recreation after-school programs in fitness and exercise, managerial position.

12. Supervising community, recreation, and fitness programs; managerial position.

APPENDIX B

KNOWLEDGE, SKILLS, AND ABILITIES (KSAS) FOR ACSM GROUP EXERCISE LEADER$_{SM}$ AND ACSM HEALTH/FITNESS INSTRUCTOR$_{SM}$ CERTIFICATIONS

KSA Numbering System. The first number in the sequence denotes the certification level of the KSA. KSAs numbered "1.—" are specific to Group Exercise Leader; KSAs numbered "2.—" are specific to Health/Fitness Instructor.

The second number in the sequence denotes the content matter of the KSA. For example, KSAs numbered "—.1" are related to Anatomy and Biomechanics; KSAs numbered "—.2" are related to Exercise Physiology. The second numbers denote content matter as follows:

—.1 Anatomy and Biomechanics
—.2 Exercise Physiology
—.3 Human Development and Aging
—.4 Pathophysiology and Risk Factors
—.5 Human Behavior and Psychology
—.6 Health Appraisal and Fitness Testing
—.7 Safety and Injury Prevention
—.8 Exercise Programming
—.9 Nutrition and Weight Management
—.10 Program and Administration/Management

Example. A KSA numbered "1.3.—" is a KSA for an Exercise Leader that relates to Human Development and Aging. A KSA numbered "2.4.—" is for a Health/Fitness Instructor that relates to Pathophysiology and Risk Factors.

This numbering system allows exact determination of KSAs specific to the level of certification and the content matter.

KSA: Health and Fitness Track

KSA Number	Anatomy and Biomechanics
1.1.0	Knowledge of anatomy as it relates to exercise and health.
1.1.0.1	Knowledge of the basic structures of bone, skeletal muscle, and connective tissues.
1.1.0.2	Knowledge of the basic anatomy of the cardiovascular system and respiratory system.
1.1.0.3	Ability to identify the major bones and muscles. Major muscles include but are not limited to the trapezius, pectoralis major, latissimus dorsi, biceps, triceps, rectus abdominis, internal and external obliques, erector spinae, gluteus maximus, quadriceps, hamstrings, adductors, abductors, and gastrocnemius.
1.1.0.4	Definition of the following terms: supination, pronation, flexion, extension, adduction, abduction, hyperextension, rotation, circumduction, agonist, antagonist, and stabilizer.
1.1.0.5	Ability to identify the joints of the body.
1.1.1	Knowledge of biomechanical aspects of exercise participation.
1.1.1.1	Ability to identify the plane in which each muscle action occurs.
1.1.1.2	Knowledge of the interrelationships among center of gravity, base of support, balance, stability, and proper spinal alignment.
1.1.1.3	Ability to describe the following curvatures of the spine: lordosis, scoliosis, kyphosis.
1.1.1.4	Knowledge of and skill to demonstrate exercises designed to enhance muscular strength and/or endurance of specific major muscle groups.
1.1.1.5	Knowledge of and skill to demonstrate exercises for enhancing musculoskeletal flexibility.
1.1.1.6	Knowledge to describe the myotatic stretch reflex.
1.1.1.7	Knowledge to identify the primary action and joint range of motion for each major muscle group.
2.1.0	Knowledge of functional anatomy and biomechanics.
2.1.0.1	Knowledge of the structure and ability to describe movements of the major joints of the body.
2.1.0.2	Ability to locate the anatomical landmarks for palpation of peripheral pulses.
2.1.0.3	Ability to locate the brachial artery and correctly place the cuff and stethoscope in position for blood pressure measurement.
2.1.0.4	Ability to locate common sites for measurement of skinfold thicknesses and circumferences for determination of body composition and waist-to-hip ratio.
2.1.1	Knowledge of biomechanical principles that underlie walking, jogging, running, swimming, cycling, weight lifting, and carrying or moving objects.

KSA Number	Exercise Physiology
1.2.0	Basic knowledge of exercise physiology as it relates to exercise prescription.
1.2.1	Ability to define aerobic and anaerobic metabolism.
1.2.2	Knowledge of the role of aerobic and anaerobic energy systems in the performance of various activities.
1.2.3	Knowledge of these terms: ischemia, angina pectoris, tachycardia, bradycardia, arrhythmia, myocardial infarction, cardiac output, stroke volume, lactic acid, oxygen consumption, hyperventilation, systolic blood pressure, diastolic blood pressure, and anaerobic threshold.
1.2.4	Knowledge of the role of carbohydrates, fats, and proteins as fuels for aerobic and anaerobic metabolism.
1.2.5	Knowledge of the components of fitness: cardiorespiratory fitness, muscular strength, muscular endurance, flexibility, and body composition.
1.2.6	Knowledge to describe normal cardiorespiratory responses to static and dynamic exercise in terms of heart rate, blood pressure, and oxygen consumption.
1.2.7	Knowledge of how heart rate, blood pressure, and oxygen consumption responses change with adaptation to chronic exercise training.
1.2.8	Knowledge of the physiological adaptations associated with strength training.
1.2.9	Ability to identify and apply to both groups and individuals methods used to monitor exercise intensity, including heart rate and rating of perceived exertion.
1.2.10	Knowledge of the physiological principles related to warm-up and cool-down.
1.2.11	Knowledge of the common theories of muscle fatigue and delayed onset muscle soreness.
2.2.0	Knowledge of exercise physiology, including the role of aerobic and anaerobic metabolism, muscle physiology, cardiovascular physiology, and respiratory physiology at rest and during exercise. In addition, understanding of the components of physical fitness, the effects of aerobic and strength and/or resistance training on the fitness components, and the effects of chronic disease.
2.2.1	Knowledge of the physiological adaptations that occur at rest and during submaximal and maximal exercise following chronic aerobic and anaerobic exercise training.
2.2.2	Knowledge of the differences in cardiorespiratory response to acute graded exercise between conditioned and unconditioned individuals.
2.2.3	Knowledge of the structure of the skeletal muscle fiber and the basic mechanism of contraction.
2.2.4	Knowledge of the characteristics of fast- and slow-twitch fibers.
2.2.5	Knowledge of the sliding filament theory of muscle contraction.
2.2.6	Knowledge of twitch, summation, and tetanus with respect to muscle contraction.
2.2.7	Ability to discuss the physiological principles of gains in muscular strength and endurance.
2.2.8	Ability to define muscular fatigue as it relates to task, intensity, duration, and the accumulative effects of exercise.
2.2.9	Knowledge of the relation between the number of repetitions, intensity, number of sets, and rest with regard to strength training.
2.2.10	Knowledge of the properties of cardiac muscle and the normal pathways of conduction in the heart.
2.2.11	Knowledge of the response of the following variables to acute exercise: heart rate, stroke volume, cardiac output, pulmonary ventilation, tidal volume, respiratory rate, and arteriovenous oxygen difference.
2.2.12	Knowledge of the differences in the cardiorespiratory responses to static exercise compared with dynamic exercise, including hazards and contraindications.
2.2.13	Ability to describe how each of the following differs from the normal condition: premature atrial contraction and premature ventricular contractions.
2.2.14	Knowledge of blood pressure responses associated with acute exercise, including changes in body position.
2.2.15	Knowledge of and ability to describe the implications of ventilatory threshold (anaerobic threshold) as it relates to exercise training and cardiorespiratory assessment.
2.2.16	Knowledge of and ability to describe the physiological adaptations of the respiratory system that occur at rest and during submaximal and maximal exercise following chronic aerobic and anaerobic training.
2.2.17	Ability to describe how each of the following differs from the normal condition: dyspnea, hypoxia, hypoventilation.
2.2.18	Knowledge of and ability to discuss the physiological basis of the major components of physical fitness: flexibility, cardiovascular fitness, muscular strength, muscular endurance, and body composition.
2.2.19	Ability to explain how the principle of specificity relates to the components of fitness.
2.2.20	Ability to explain the concept of detraining or reversibility of conditioning and its implications in fitness programs.
2.2.21	Ability to discuss the physical and psychological signs of overtraining and provide recommendations for the problems.
2.2.22	Ability to describe the physiological and metabolic responses to exercise associated with chronic disease (heart disease, hypertension, diabetes mellitus, and pulmonary disease).

KSA Number	Human Development and Aging
1.3.0	Knowledge of the benefits and risks associated with exercise training in prepubescent and postpubescent youth.
1.3.1	Knowledge of the benefits and precautions associated with resistance and endurance training in older adults.
1.3.2	Ability to describe specific leadership techniques appropriate for working with participants of all ages.
2.3.0	Knowledge of the changes that occur during growth and development from childhood to old age.
2.3.0.1	Ability to modify cardiovascular and resistance exercises based on age and physical condition.
2.3.0.2	Knowledge of and ability to describe the changes that occur in maturation from childhood to adulthood for skeletal muscle, bone structure, reaction time, coordination, heat and cold tolerance, maximal oxygen consumption, strength, flexibility, body composition, resting and maximal heart rate, and resting and maximal blood pressure.
2.3.0.3	Knowledge of the effect of the aging process on the musculoskeletal and cardiovascular structure and function at rest, during exercise, and during recovery.
2.3.0.4	Ability to characterize the differences in the development of an exercise prescription for children, adolescents, and older participants.
2.3.0.5	Knowledge of and ability to describe the unique adaptations to exercise training in children, adolescents, and older participants with regard to strength, functional capacity, and motor skills.
2.3.0.6	Knowledge of common orthopaedic and cardiovascular considerations for older participants and the ability to describe modifications in exercise prescription that are indicated.

KSA Number	Pathophysiology and Risk Factors
1.4.0	Knowledge of cardiovascular, respiratory, metabolic, and musculoskeletal risk factors that may require further evaluation by medical or allied health professionals before participation in physical activity.
1.4.0.1	Ability to determine risk factors that may be favorably modified by physical activity habits.
1.4.0.2	Knowledge to define total cholesterol, high-density lipoprotein (HDL) cholesterol, ratio of total cholesterol to HDL cholesterol, low-density lipoprotein (LDL) cholesterol, triglycerides, hypertension, and atherosclerosis.
1.4.0.3	Knowledge of plasma cholesterol levels for adults as recommended by the National Cholesterol Education Program.
2.4.0	Knowledge of the pathophysiology of atherosclerosis and how this process is influenced by physical activity.
2.4.1	Knowledge of the risk factor concept of coronary artery disease and the influence of heredity and lifestyle on the development of coronary artery disease.
2.4.2	Knowledge of the atherosclerotic process, the factors involved in its genesis and progression, and the role of exercise training in treatment.
2.4.3	Ability to discuss in detail how lifestyle factors, including nutrition, physical activity, and heredity, influence lipid and lipoprotein profiles.
2.4.4	Knowledge of cardiovascular risk factors or conditions that may require consultation with medical personnel before testing or training, including inappropriate changes in resting or exercise heart rate and blood pressure; new onset of discomfort in chest, neck, shoulder, or arm; changes in the pattern of discomfort during rest or exercise; fainting or dizzy spells; and claudication.
2.4.5	Knowledge of respiratory risk factors or conditions that may require consultation with medical personnel before testing or training, including asthma, exercise-induced bronchospasm, extreme breathlessness at rest or during exercise, bronchitis, and emphysema.
2.4.6	Knowledge of metabolic risk factors or conditions that may require consultation with medical personnel before testing or training, including body weight more than 20% above optimal, body mass index above thyroid disease, diabetes or glucose intolerance, and hypoglycemia.
2.4.7	Knowledge of musculoskeletal risk factors or conditions that may require consultation with medical personnel before testing or training, including acute or chronic back pain, osteoarthritis, rheumatoid arthritis, osteoporosis, tendinitis, and low back pain.

KSA Number	Human Behavior and Psychology
1.5.0	Ability to identify and define at least five behavioral strategies to enhance exercise and health behavior change (i.e., reinforcement, goal setting, social support).
1.5.1	Ability to list and define the five important elements that should be included in each counseling session.
1.5.2	Knowledge of specific techniques to enhance motivation (e.g., posters, recognition, bulletin boards, games, competitions). Define extrinsic and intrinsic reinforcement and give examples of each.
1.5.3	Knowledge of the stages of motivational readiness.
1.5.4	Ability to list and describe three counseling approaches that may assist less motivated clients to increase their physical activity.
2.5.0	Ability to list and describe the specific strategies aimed at encouraging the initiation, adherence, and return to participation in an exercise program.
2.5.1	Knowledge of symptoms of anxiety and depression that may necessitate referral.
2.5.2	Knowledge of the potential symptoms and causal factors of test anxiety (i.e., performance, appraisal threat during exercise testing) and how it may affect physiological responses to testing.

KSA Number	Health Appraisal and Fitness Testing
1.6.1	Knowledge of the importance of a health and medical history.
1.6.2	Knowledge of the value of a medical clearance prior to exercise participation.
1.6.3	Skill to measure pulse rate accurately both at rest and during exercise.
2.6.0	Knowledge, skills, and abilities to assess the health status of individuals and the ability to conduct fitness testing.
2.6.0.1	Ability to obtain a health history and risk appraisal that includes medical history, family history of cardiac disease, orthopaedic limitations, prescribed medications, activity patterns, nutritional habits, stress and anxiety levels, and smoking and alcohol use.
2.6.0.2	Ability to describe the categories of participants who should receive medical clearance prior to administration of an exercise test or participation in an exercise program.
2.6.0.3	Ability to identify precautions and contraindications to exercise testing or participation.
2.6.0.4	Ability to discuss the limitations of informed consent and medical clearance prior to exercise testing.
2.6.0.5	Ability to obtain informed consent.
2.6.0.6	Ability to explain the purpose and procedures for monitoring clients before, during, and after cardiorespiratory fitness testing.
2.6.0.7	Skill in instructing participants in the use of equipment and test procedures.
2.6.0.8	Ability to describe the purpose of testing, select an appropriate submaximal or maximal protocol, and conduct an assessment of cardiovascular fitness on the cycle ergometer or the treadmill.
2.6.0.9	Skill in accurately measuring heart rate, blood pressure, and obtaining rating of perceived exertion at rest and during exercise according to established guidelines.
2.6.0.10	Ability to locate and measure skinfold sites, skeletal diameters, and girth measurements used for estimating body composition.
2.6.0.11	Ability to describe the purpose of testing, select appropriate protocols, and conduct assessments of muscular strength, muscular endurance, and flexibility.
2.6.0.12	Skill in various techniques of assessing body composition.
2.6.0.13	Knowledge of the advantages, disadvantages, and limitations of the various body composition techniques.
2.6.0.14	Ability to interpret information obtained from the cardiorespiratory fitness test and the muscular strength and endurance, flexibility, and body composition assessments for apparently healthy individuals and those with stable disease.
2.6.0.15	Ability to identify appropriate criteria for terminating a fitness evaluation and demonstrate proper procedures to be followed after discontinuing such a test.
2.6.0.16	Ability to modify protocols and procedures for cardiorespiratory fitness tests in children, adolescents, and older adults.
2.6.0.17	Knowledge of common drugs from each of the following classes of medications and ability to describe the principal action and the effects on exercise testing and prescription:
2.6.0.17.1	Antianginals
2.6.0.17.2	Antihypertensives
2.6.0.17.3	Antiarrhythmics
2.6.0.17.4	Bronchodilators
2.6.0.17.5	Hypoglycemics
2.6.0.17.6	Psychotropics
2.6.0.17.7	Vasodilators
2.6.0.18	Ability to identify the effects of the following substances on exercise response: antihistamines, tranquilizers alcohol, diet pills, cold tablets, caffeine, and nicotine.
2.6.0.19	Skill in techniques for calibration of a cycle ergometer and a motor-driven treadmill.

KSA Number	Safety, Injury Prevention, and Emergency Care
1.7.0	Knowledge of and skill in obtaining basic life support and cardiopulmonary resuscitation certification.
1.7.1	Knowledge of appropriate emergency procedures (i.e., telephoning, written emergency procedures, personnel responsibilities) in the group exercise setting.
1.7.2	Knowledge of basic first aid procedures for exercise-related injuries, such as bleeding, strains, sprains, fractures, and exercise intolerance (dizziness, syncope, heat injury).
1.7.3	Knowledge of basic precautions taken in a group exercise setting to ensure participants' safety.
1.7.4	Ability to identify the physical and physiological signs and symptoms of overtraining.
1.7.5	Ability to list the effects of temperature, humidity, altitude, and pollution on the physiological response to exercise.
1.7.6	Knowledge of the terms shin splints, sprain, strain, tennis elbow, bursitis, stress fracture, tendinitis, patellar femoral pain syndrome, low back pain, plantar fasciitis, and rotator cuff tendinitis.
1.7.7	Skill to demonstrate exercises used for people with low back pain.
1.7.8	Knowledge of hypothetical concerns and risks that may be associated with the use of exercises such as straight leg sit-ups, double leg raises, full squats, hurdlers stretch, yoga plough, forceful back hyperextension, and standing bent-over toe touch.
2.7.0	Skill in demonstrating appropriate emergency procedures during exercise testing and/or training.
2.7.1	Knowledge of safety plans, emergency procedures, and first aid techniques needed during fitness evaluations, exercise testing, and exercise training.
2.7.2	Ability to identify the components that contribute to the maintenance of a safe environment.
2.7.3	Knowledge of the health and fitness instructor's responsibilities and limitations and the legal implications of carrying out emergency procedures.
2.7.4	Ability to describe musculoskeletal injuries (e.g., contusions, sprains, strains, fractures), cardiovascular and pulmonary complications (e.g., tachycardia, bradycardia, hypotension, hypertension, tachypnea) and metabolic abnormalities (e.g., fainting, syncope, hypoglycemia, hyperglycemia, hypothermia, hyperthermia).
2.7.5	Knowledge of the initial management and first aid techniques associated with open wounds, musculoskeletal injuries, cardiovascular and pulmonary complications, and metabolic disorders.
2.7.6	Knowledge of the components of an equipment maintenance and repair program and how it may be used to evaluate the condition of exercise equipment to reduce the risk of injury.

KSA Number	Exercise Programming
1.8.0	Knowledge of the recommended intensity, duration, frequency, and type of physical activity necessary for development of cardiorespiratory fitness in an apparently healthy population.
1.8.1	Ability to differentiate between the amount of physical activity required for health benefits and the amount of exercise required for fitness development.
1.8.2	Ability to describe exercises designed to enhance muscular strength and/or endurance of specific major muscle groups.
1.8.3	Knowledge of the principles of overload, specificity, and progression and how they relate to exercise programming.
1.8.4	Skill to teach and demonstrate appropriate exercises used in the warm-up and cool-down of a variety of group exercise classes.
1.8.5	Ability to teach the components of an exercise session (i.e., warm-up, aerobic stimulus phase, cool-down, muscular strength and endurance, flexibility).
1.8.6	Knowledge of the terms progressive resistance, isotonic, isometric, concentric, eccentric, atrophy, hypertrophy, sets, repetitions, plyometrics, Valsalva maneuver.
1.8.7	Skill to teach class participants to monitor intensity of exercise using heart rate and rating of perceived exertion.
1.8.8	Skill to teach participants to use rate of perceived exertion and heart rate to adjust the intensity of the exercise session.
1.8.9	Ability to calculate training heart rates using two methods: percent of age-predicted maximum heart rate and heart rate reserve (Karvonen).
1.8.10	Skill to teach and demonstrate appropriate modifications in specific exercises for older adults, pregnant and postnatal women, obese persons, and persons with low back pain.
1.8.11	Ability to recognize proper and improper technique in the use of resistive equipment, such as stability balls, weights, bands, resistance bars, and water exercise equipment.

1.8.12	Ability to recognize proper and improper technique in the use of cardiovascular conditioning equipment (e.g., steps, cycles, slides).
1.8.13	Skill to teach and demonstrate appropriate exercises for improving range of motion of all major joints.
1.8.14	Ability to modify exercises in the group setting for apparently healthy persons of various fitness levels.
1.8.15	Ability to teach a progression of exercises for all major muscle groups to improve muscular strength and endurance.
1.8.16	Knowledge to describe the various types of interval, continuous, and circuit training programs.
1.8.17	Knowledge to describe various ways a leader can take a position relative to the group to enhance visibility, participant interactions, and communication.
1.8.18	Ability to communicate effectively with exercise participants in the group exercise session.
1.8.19	Knowledge to describe partner resistance exercises that can be used in a group class setting.
1.8.20	Ability to demonstrate techniques for accommodating various fitness levels within the same class.
1.8.21	Knowledge of the properties of water that affect the design of a water exercise session.
1.8.22	Knowledge of music fundamentals, including downbeat, 8 count, and 32 count.
1.8.23	Skill to use verbal and nonverbal cues in the group exercise setting, including anticipatory, motivational, safety, and educational cues.
1.8.24	Skill to demonstrate the proper form, alignment, and technique in typical exercises used in the warm-up, stimulus, muscle conditioning, and cool-down phases of the group session.
1.8.25	Ability to evaluate specific exercises in terms of safety and effectiveness for various participants.
1.8.26	Ability to demonstrate familiarity with a variety of group exercise formats (e.g., traditional, step, slide, muscle conditioning, flexibility, indoor cycling, water fitness, walking).
2.8.0	Knowledge, skills, and abilities to prescribe and administer exercise programs for apparently healthy individuals, those at higher risk, and those with known disease.
2.8.0.1	Ability to design, implement, and evaluate individual and group exercise programs based on health history and physical fitness assessments.
2.8.0.2	Ability to modify exercises according to age and physical condition.
2.8.0.3	Knowledge, skills, and abilities to calculate energy cost, oxygen consumption, metabolic equivalents, and target heart rates and to apply the information to an exercise prescription.
2.8.0.4	Ability to convert weights from pounds to kilograms and speed from miles per hour to meters per minute.
2.8.0.5	Ability to convert metabolic equivalents to oxygen consumption expressed as milliliters per kilogram per minute, liters per minute, and/or milliliters per kilogram of fat free weight per minute.
2.8.0.6	Ability to calculate the energy cost in metabolic equivalents and kilocalories for given exercise intensities in stepping exercise, cycle ergometry, and during horizontal and graded walking and running.
2.8.0.7	Knowledge of approximate metabolic equivalents for various sport, recreational, and work tasks.
2.8.0.8	Ability to prescribe exercise intensity based on oxygen consumption data for various modes of exercise, including graded and horizontal running and walking, cycling, and stepping exercise.
2.8.0.9	Ability to explain and implement exercise prescription guidelines for apparently healthy clients, increased-risk clients, and clients with controlled disease.
2.8.0.10	Ability to adapt frequency, intensity, duration, mode, progression, level of supervision, and monitoring techniques in exercise programs for patients with controlled chronic disease (heart disease, diabetes mellitus, obesity, hypertension), musculoskeletal problems, pregnancy and/or postpartum period, and exercise-induced asthma.
2.8.0.11	Ability to understand the components of an exercise session and the proper sequence (i.e., pre-exercise evaluation, warm-up, aerobic stimulus phase, cool-down, muscular strength and/or endurance, and flexibility).
2.8.0.12	Skill in the use of various methods for establishing and monitoring levels of exercise intensity, including heart rate, rate of perceived exertion, and metabolic equivalents.
2.8.0.13	Knowledge of special precautions and modifications of exercise programming for participation at altitude, various ambient temperatures, humidity, and environmental pollution.
2.8.0.14	Ability to design resistive exercise programs to increase or maintain muscular strength and/or endurance.
2.8.0.15	Ability to evaluate flexibility and prescribe appropriate flexibility exercises for all major muscle groups.
2.8.0.16	Knowledge of the importance of recording exercise sessions and performing periodic evaluations to assess changes in fitness status.
2.8.0.17	Knowledge of the advantages and disadvantages of implementation of interval, continuous, and circuit training programs.
2.8.0.18	Ability to design training programs using interval, continuous, and circuit training programs.
2.8.0.19	Ability to discuss the advantages and disadvantages of various commercial exercise equipment in developing cardiorespiratory fitness, muscular strength, and muscular endurance.
2.8.0.20	Knowledge of the types of exercise programs available in the community and how these programs are appropriate for various populations.

KSA Number	Nutrition and Weight Management
1.9.0	Knowledge to define the following terms: obesity, overweight, percent fat, lean body mass, anorexia nervosa, bulimia, body fat distribution.
1.9.1	Knowledge of the relation between body composition and health.
1.9.2	Knowledge of the effects of diet plus exercise, diet alone, and exercise alone as methods for modifying body composition.
1.9.3	Knowledge of the importance of an adequate daily energy intake for healthy weight management.
1.9.4	Ability to differentiate between fat-soluble and water-soluble vitamins.
1.9.5	Ability to describe the importance of maintaining normal hydration before, during, and after exercise.
1.9.6	Knowledge of the USDA Food Pyramid.
1.9.7	Knowledge of the importance of calcium and iron in women's health.
1.9.8	Ability to describe the myths and consequences associated with inappropriate weight loss methods (e.g., saunas, vibrating belts, body wraps, electric simulators, sweat suits, fad diets).
1.9.9	Knowledge of the number of kilocalories in 1g carbohydrate, fat, protein, and alcohol.
1.9.10	Knowledge of the number of kilocalories equivalent to losing 1 pound of body fat.
2.9.0	Knowledge, skills, and abilities to provide information concerning nutrition and the role of diet and exercise on body composition and weight control.
2.9.0.1	Ability to describe the health implications of variation in body fat distribution patterns and the significance of the waist-to-hip ratio.
2.9.0.2	Knowledge of the guidelines for caloric intake for a person desiring to lose or gain weight.
2.9.0.3	Knowledge of common nutritional ergogenic aids, the purported mechanism of action, and any risks and/or benefits (e.g., carbohydrates, protein, amino acids, vitamins, minerals, sodium bicarbonate, creatine, bee pollen).
2.9.0.4	Knowledge of nutritional factors related to the female athlete triad syndrome (i.e., eating disorders, menstrual cycle abnormalities, and osteoporosis).
2.9.0.5	Knowledge of the National Institutes of Health consensus statement regarding health risks of obesity, Nutrition for Physical Fitness position paper of the American Dietetic Association, and the ACSM position stand on proper and improper weight loss programs.
2.9.0.6	Knowledge of National Cholesterol Education Program guidelines for lipid management.

KSA Number	Program and Administration or Management
2.10.0	Knowledge, skills, and ability to administer and deliver health and fitness programs.
2.10.0.1	Knowledge of the health and fitness instructor's supportive role in administration and program management within a health and fitness facility.
2.10.0.2	Ability to administer fitness-related programs within established budgetary guidelines.
2.10.0.3	Ability to develop marketing materials for the purpose of promoting fitness-related programs.
2.10.0.4	Ability to use various sales techniques for prospective clients.
2.10.0.5	Ability to describe and use the documentation required when a client shows signs or symptoms during an exercise session and should be referred to a physician.
2.10.0.6	Ability to create and maintain records pertaining to participant exercise adherence, retention, and goal setting.
2.10.0.7	Ability to develop and administer educational programs (e.g., lectures, workshops) and educational materials.
2.10.0.8	Knowledge of management of a fitness department (e.g., working within a budget, training exercise leaders, scheduling, running staff meetings).
2.10.0.9	Knowledge of the importance of tracking and evaluating member retention.

APPENDIX C

Available Clinical Field Experiences / Internships

(Outside Laboratory of Clinical and Applied Physiology) for Exercise Physiology Students

George A. Smathers Wellness Center

The George A. Smathers Wellness Center is a state of the art facility designed to enhance the fitness, health and wellness of University of Miami students. The facility houses state of the art equipment for both resistance and aerobic training and is responsible for recreational sports programs and the supervision of on-campus indoor and outdoor recreational facilities. This Wellness Center is an 114,000 square feet $13.8 million facility, which opened in January 1996. Many of our sports and recreation programs are hosted in the center, which includes a swimming pool, 10,000 sq. ft. fitness room, racquetball and squash courts, aerobics/martial arts rooms, basketball/volleyball gymnasium with elevated jogging track and wellness suite. There are numerous opportunities to work with students, professors, staff, and alumni to enhance their education, fitness and exercise potential. The Wellness Center is located on the main campus within walking distance of our own Physiology Laboratory. If interested, please contact Dr. Arlette Perry for more information or e-mail or phone Rhonda DuBord: rrdubord@miami.edu or (305) 284-6523.

Women's Health Center

The Women's Health Center is a specialized facility, dedicated to the research and understanding of Women's Health Issues. There are opportunities for involvement in studies related to proper nutrition of women across their lifespan, gynecological health, bone density health, and hormone replacement therapy. The Women's Health Center is located in the downtown Miami campus right next to the University of Miami Medical School. There are convenient opportunities to do collaborative work with the medical school at this location. If interested, please contact Dr. Arlette Perry or call Dr. Linda Parker at (305) 243-5687.

HealthSouth Doctors' Hospital Fitness Center

The HealthSouth Doctors' Hospital Fitness Center represents a huge fitness facility in a hospital environment. Participants include outpatients wishing to improve their health and fitness level through aerobic exercise and resistance training. There are also group sponsored events such as walk-a-thons and mall walks sponsored by the hospital. Opportunities exist for group-related research. HealthSouth Doctors' Hospital is conveniently located directly across the street from our own Physiology Laboratory. For more information, contact Dr. Arlette Perry or Lynn McCauley at (305) 669-3377.

Diabetes Research Institute

Clinical field experiences exist for those interested in working in the area of Diabetes prevention and follow-up care. The Diabetes Research Institute at the University of Miami is internationally recognized and known for its work on obese Type II diabetics as well as its work in Pediatric Diabetes. There are also opportunities to work in their sophisticated applied biochemistry laboratory, and in the area of exercise and fitness training for the treatment of Diabetes. The Diabetes Research Institute is located in

downtown Miami in the heart of the medical school campus. For more information, please contact Dr. Arlette Perry or Ronald Goldberg, M.D. at (305) 243-6574.

HealthSouth Doctors' Hospital Department of Orthopedics and Rehabilitation
For those students interested in doing research related to injury prevention and rehabilitation in active populations, HealthSouth Doctors' Hospital provides an excellent opportunity to work with our University of Miami team orthopedists; Doctors Uribe, Hechtman, and Zvijak. Focus will be on trends in the type and etiology of sports-related injuries, gender differences in sports-related injuries and methodological issues in training and biomechanics. There are also opportunities to investigate different modes of rehabilitation with a therapeutic facility available right on the premises. This facility is conveniently located right across the street from our own physiology laboratory. For more information please contact Dr. Arlette Perry or Keith Hechtman, MD at (305) 669-3327.

Stein Gerontological Institute
The Stein Gerontological Institute of the Miami Jewish Home and Hospital is a research training facility-conducting studies designed to reduce the impact of the aging process on frail older individuals. The institute has continuing studies incorporating multi-dimensional testing and training. It is one of the few facilities on the planet with computer-interfaced machines designed to evaluate movement-by-movement changes during training. These machines allow researchers to not only measure the impact of specific training protocols on performance, but also allow researchers to obtain detailed analysis of time-course change in strength, force, and power essential for proper exercise prescription and periodization cycling. The facility promotes one-on-one training between the intern and older exercisers. This is a rare opportunity to work in a research environment featuring collaboration between gerontologists, exercise physiologists, psychologists and computer education experts. For further information contact Dr. Joe Signorile at (305) 284-3105 or by e-mail at jsignorile@miami.edu.

The Miami Project to Cure Paralysis
This is one of the premier research centers in the country devoted to the study of neuro-electrical stimulation of skeletal muscles for individuals afflicted with spinal cord injuries. Spearheaded by the leadership and fundraising of former football great, Nick Buoniconti, this program houses some of the most sophisticated equipment available in the field of neuromuscular stimulation, research on paralysis, and exercise training. The Miami Project to Cure Paralysis is located in downtown Miami in the heart of the medical school campus and is approximately 20-minutes from the main campus. For more information, contact Dr. Patrick Jacobs (305) 243-7121at the Lois Pope LIFE Center or email at pjacobs@miami.edu.

WITHIN
The Women's Institute of Total Health in Nature (WITHIN) Women's Wellness Center offers women a chance to integrate mind, body, and spirit as it serves to complement

traditional medical treatment. The program is especially sensitive to the needs of women as she ends her reproductive years and enters menopause. Women have opportunities to enhance their physical fitness, receive nutritional education, learn more about self-healing, relaxation techniques, relieve stress, and self-help. The women's center is open to women seeking complimentary treatments for various medical problems and conditions and helps women to receive a more holistic approach to health issues specific to women. Men are also welcome to attend. For more information, contact Nilza Kallos, M.D. or Cari Sherman, M.A.T. at (305) 668-0570 or visit their website at www.withinwellness.com.

APPENDIX D

UNIVERSITY OF MIAMI **SCHOOL OF EDUCATION**

COURSE SYLLABUS

A. Designation:

Department and Number: ESS 221

Credits: 3

Title: Introduction to Exercise; Bioenergetics and Skeletal Muscle Physiology

B. Prerequisites: None

C. Bulletin Description: The structure and function of human skeletal muscle as a biological machine. Biological energy systems as they function during exercise, fatigue and recovery. The contractile process in skeletal muscle and the specific changes resulting from variations in the training stimulus.

D. Faculty Member(s): Joseph Signorile, Ph.D.

E. Goal Objectives:

1. To understand the concepts of work and energy as they relate to exercise.
2. To develop a functional understanding of the energy systems of the body and their interplay during various changes in exercise patterns.
3. To examine the structure of skeletal muscle and how it relates to function.
4. To examine the concept of muscle as an organ of movement.
5. To apply basic laws of physics to the understanding of muscle contractile force and training.
6. To understand the biochemical and bioelectric events necessary for muscle contract.
7. To understand the relationship between specific training regimens, structural changes and functional improvements or decrements in skeletal muscle.
8. To understand the concept of exercise prescription from the point of view of training specificity and proper sequences of training.
9. To examine specific training patterns with respect to time course changes and effective targeting of sports- and activity-specific goals.
10. To understand the theory and application of periodization.
11. To understand the classification of skeletal muscle fiber types and their relationship to performance.

F. Course Content:

DATE	LECTURE TOPIC	READINGS
W1-D2	1. Class introduction, Training and exercise: overload, adaptation and exercise specificity.	
W2-D1	2. Amino Acids, peptides, and proteins and protein expression.	Houston: pp. 3-12
W2-D2	3. Enzyme structure, function and activity	Houston: pp. 15-26
W3-D1	4. Nucleotides, DNA, and RNA	Houston: pp. 29-35
W3-D2	5. Transcription, protein synthesis, and degradation.	Houston: pp. 155-169; Houston: pp. 171-182
W4-D1	6. The bioenergetics of muscle contraction: The concepts of energy, work and power. Enzymes and isoenzymes: catalytic function and modification with training.	McComas: pp. 3-24; Houston: pp. 39-53
W4-D2	7. Anaerobic pathways for exercise: High energy phosphates and adenine nucleotide metabolism in skeletal muscle	Houston: pp. 42-45; McComas: pp. 215-226; McComas: pp. 216-216
W5-D1	8. Anaerobic pathways continued: Anaerobic glycolysis.	Houston: pp. 81-97; McComas: pp. 216-217
W5-D2	9. Oxidation-reduction, lactate production and removal	Houston: pp. 97-110
W6-D1	**EXAMINATION #1.**	
W6-D2	10. Aerobic pathways for exercise: the Krebs cycle	Houston: pp. 55-62; McComas: pp. 217-219
W7-D1	11. The electron transport chain: Mitochondrial shuttles.	Houston: pp. 65-78; McComas: pp. 219-226
W7-D2	12. Aerobic pathways for exercise: Beta-oxidation, The electron transport chain: Mitochondrial shuttles.	Houston: pp. 113-138; McComas: pg. 219
W8-D1	13. Amino acid metabolism; Amino acid use during exercise	Houston: pp. 129-138;
W8-D2	14. Muscle structure overview from gross to ultrastructural anatomy.	
W9-D1	15. The nerve impulse: membrane electrochemistry and ion flux.	McComas: pp. 93-146
W10-D1	16. The nerve impulse: the action potential, ion channels pumps, motor units, coding.	McComas: pp. 203-213

W10-D2	17. The neuromuscular junction: acetylcholine as a neurotransmitter.	McComas: pp. 37-46; 147-160
W11-D1	18. Excitation-contraction coupling: theories, the calcium signal.	McComas: pp. 171-182
W11-D2	19. Changes in the motor nerve and recruitment patterns with training. Changes in the neuromuscular junction with training. Excitation-contraction coupling and the calcium signal: potential changes with training.	Selected Articles
W12-D1	**EXAMINATION #2**	
W12-D1	20. The contractile cycle.	McComas: pp. 161-182
W12-D2	21. Muscle fiber typing: metabolic methodology and functional differences, myosin and troponin isomers and their relation to muscle typing.	Staron article McComas: pp. 183-201
W13-D1	22. Changes in fiber types with training	Staron article
W13-D2	23. The growth of skeletal muscle: hypertrophy versus hyperplasia.	Miller: pp. 69-70 McComas: pp. 16-20; 307-319; 299-310.
W14-D1	24. The stretch reflex; the inverse stretch reflex; reciprocal inhibition.	McComas: pp. 50-53, 244-245.
W14-D2	**THANKSGIVING**	
W15-D1	23. The length-tension curve; angle specificity; the force-velocity curve; speed-specificity	McComas: pp. 8, 163, 165-166; 175-179.
W15-D2	24. Fatigue mechanisms	McComas: pp. 229-246
	READING DAYS	
	FINAL EXAMINATION	

G. Course Requirements:

It is the responsibility of the student to read all materials provided for them in class. They are required to take all exams and to demonstrate a competitive perspective.

H. Methods of Evaluation:

Exam #1 ..... 25%
Exam #2 ..... 25%
Final Exam 50%
100%

I. Textbooks:
Required texts:

Houston, M.E. Biochemistry Primer for Exercise Science. Human Kinetic Publishers, 2001.

McComas, A.J. Skeletal Muscle: Form and Function. Human Kinetic Publishers, 1996.

Supplemental Materials: Supplied by professor

J. Date of Syllabus: August 2002

UNIVERSITY OF MIAMI **SCHOOL OF EDUCATION**

COURSE SYLLABUS

A. Designation:

Department and Number: ESS 321

Credits: 3

Title: Introduction to Systemic Exercise Physiology,

B. Prerequisites:

C. Bulletin Description: The structure, function, and training of the cardio-respiratory system. Special emphasis on structural changes in the systems with exercise and their influence on cardiovascular performance, body composition, exercise efficiency and health.

D. Faculty Member(s): Joseph Signorile, Ph.D.

E. Goal Objectives:

1. To understand the concepts of work, energy and power as they relate to the exercise and work.
2. To be able to compute work, power, exercise efficiency, and other related factors used to quantify performance.
3. To examine the structure and function of the respiratory system including the mechanics of breathing, ventilation and respiratory gas exchange.
4. To examine the structure of the heart.
5. To understand the structure/function relationships within the heart and how they change with exercise and training.
6. To recognize the specific changes in the structure/function relationship of the heart as dictated by different training stimuli.
7. To understand the structure of the vascular system as it relates to blood distribution and gas exchange at the pulmonary and muscle levels.
8. To develop a thorough understanding of the theories of training and their effects on both healthy and diseased populations.
7. To examine the interaction of environmental and exercise stress on the respiratory an, cardiovascular and neuromuscular systems.
8. To examine the chronic and acute effects of exercise on the endocrine system.

F. Course Content:

DATE	LECTURE TOPICS	READINGS
W1-D2	1. Class introduction, Introduction, Homeostasis, Stress, adaptation, Exercise, acute & chronic impact.	Powers: pp15-20
W2-D1	2. Energy Systems review. CP and anaerobic glycolysis.	Powers: pp. 25-46; Miller: pp. 1-16
W2-D2	3. Energy systems review. Aerobic metabolism of sugar and fat.	Powers: pp. 46-60; Miller: pp. 17-19; pp. 35-39;
W3-D1	4. Measurements of Energy, Work and Power, Definitions, tools, methods. Fuel sources and their energy equivalents	Miller: pp. 23-35
W3-D2	5. Computation of the energy costs of work.	Powers: pp. 109-119
W4-D1	6. Computation of the energy costs of work.	Handouts
W4-D2	7. Computation of the energy costs of work.	Handouts
W5-D1	**EXAMINATION #1.**	
W5-D2	8. The Pulmonary System - morphology/function, ventilatory mechanics.	Powers: pp. 201-209
W6-D1	9. Gas Diffusion and Transport.	Powers: pp. 211-228
W6-D2	10. Acid-Base Balance and Buffering, Respiratory Threshold	Powers: pp. 245-258; Handouts
W7-D1	11. Cardiac Structure	Handouts
W7-D2	12. The heart as a pump, Mechanical and Physical factors controlling cardiac output	Powers: pp. 171-183
W8-D1	13. Training related changes in cardiac structure and function.	Handouts
W8-D2	14. The vasculature. Structural changes throughout the circulatory tree.	Powers: pp. 183-188
W9-D1	15. The structure/function relationship of blood vessels.	Handouts
W9-D2	16. The physiology of circulation: Autonomic controls	Powers: pp.188-194
W10-D1	17. The physiology of circulation: Local controls	Powers: pp. 235-242

W10-D2	18. The relationship between oxygen consumption, respiration and circulation.	Handouts
W11-D1	19. Excess Post-exercise Oxygen Consumption versus Oxygen Debt and Oxygen Deficit	Handouts
W11-D2	**EXAMINATION #2**	
W12-D1	20. Hormonal response to exercise	Powers: pp. 69-100
W12-D2	21. Hormonal response to exercise	Powers: pp. 69-100
W13-D1	22. Training Technique: Responses to exercise (Acute)	Handouts
W13-D2	23. Responses to exercise (Chronic)	Handouts
W14-D1	24. Training and Health-related issues.	Handouts
W14-D2	**THANKSGIVING**	
W15-D1	25. Training and Health-related issues.	Handouts
W15-D2	26. Interval versus steady state training: comparative results	Selected Readings
	READING DAYS	
	FINAL EXAMINATION	

G. Course Requirements:

Three exams will be given. Examinations will cover (1) reading in the text, (2) additional assigned reading, (3) class lectures.

H. Methods of Evaluation:

Student Evaluation:

Examination #1	25%
Examination #2	25%
Final examination	50%
	100%

I. Textbooks:

Powers, S.K. and Howley, E.T. Exercise Physiology: Theory and application to Fitness and Performance. Wm. C. Brown Co., 1994.

Miller, W.C. The Biochemistry of Exercise and Adaptation. Brown and Benchmarks, 1992.

J. Date of Syllabus: September 2001

UNIVERSITY OF MIAMI **SCHOOL OF EDUCATION**

COURSE SYLLABUS

A. Designation:

Department and Number: ESS 421

Credits: 3

Title: Systemic Exercise Physiology

B. Prerequisites:

C. Bulletin Description: Physiological reactions and adaptation to chronic vs. acute exercise stress in healthy individuals with selected references to the pathological state.

D. Faculty Member(s): Dr. Janet Brill

E. Course Goals:

1. To understand the physical adaptations (acute and chronic) to human motion.
2. To develop an appreciation for the body's physical adaptation to exercise.
3. To understand and appreciate the beneficial effects of exercise on the circulatory system.
4. To develop an understanding of the latest research that is central to the field of exercise physiology.
5. To develop an appreciation and understanding of the direction that exercise physiology is taking.
6. To provide athletic trainers with an overview of the field of exercise physiology

F. Course Content:

Week 1 & 2

Lecture: Homeostasis

1. Negative and positive feedback mechanisms and servomechanisms.
2. Activation and desensitization of baroreceptors and chemoreceptors.
3. Function of baroreceptors and chemoreceptors during exercise as they relate to negative and positive feedback systems.
4. Function of muscle chemoreceptors in the positive and negative feedback cycle.

5. Effect of training on baroreceptor sensitivity. Use of lower body negative pressure (LBNP) to assess baroreceptor reflex failure. Desensitization if baroreceptor reflex activity in elite athletes.

Week 3 & 4

Lecture: Musculoskeletal System

1. Basic anatomy and physiology.
2. Significance of the neuromuscular junction (NMJ), structure, function and role in the excitation of muscles; exercise related changes in fast and slow twitch fibers; age related degeneration of the NMJ.
3. Excitation contraction coupling - Calcium induced calcium release; Electrical (dipole) Theory and IP^3 theory of excitation contraction coupling.
4. Sliding Filament Theory.
5. Physiology of isometric, isotonic (concentric, eccentric) and isokinetic exercise.
6. Generation of muscle contractile force; muscle size, moment arm length, sarcomere length.

Week 5 & 6

Lecture: Muscle Cell Embryology - development and differentiation

1. Rate coding and motor unit recruitment patterns.
2. The "Size Principle"; violation of the size principle of recruitment order.
3. Hypertrophy vs. Hyperplasia; The "Satellite Cell" theory of activation; Determining factors of strength.
4. Physiology of fiber typing.
5. Force velocity curves; application to eccentric and concentric muscle activity.
6. Biochemical mechanisms of fatigue, Na^+/K^+ pump, fatigue, dehydration, depletion of energy substrate, central vs. peripheral fatigue.

Week 7

Lecture: Physiology of Stretching

1. Physiological advantages of increased tissue temperature in facilitating skeletal muscle contraction. Are there any?
2. Properties of viscoelastic tissue; conditions that favor static vs. dynamic stretching.
3. Muscle spindle physiology; conditions that favor activation of bag and chain fibers.
4. Characteristics of Golgi Tendon Organs.
5. Principles of Proprioceptive Neuromuscular Facilitation (PNF). Contract-Relax, Hold Relax, Slow Reversal Hold Relax methods. Comparison of PNF vs. static stretching methods.
6. Physiology of Soreness.
    a. Acute - ischemia activation of A-Delta and C nociceptors, Melzacks Gate Control Theory of Pain.
    b. Delayed onset muscle soreness (DOMS) - Physiology of the inflammatory process.
    c. Effect of nonsteroidal anti-inflammatory drugs (NSAIDs) on DOMS. What are the consequences?

MIDTERM

Week 8 & 9

Lecture: Energy Systems

1. The Phophagens (ATP·PC).
    a. Training induced adaptations of the ATP-PC systems. Increased storage capacity and enzymatic activity of the phosphagens.
    b. Inverse relationship between intensity and duration (time) of training.

2. Anaerobic Glycolysis
    a. Biochemistry of the anaerobic glycolytic pathways.
    b. Training-induced biochemical adaptations of the anaerobic glycolytic pathway.
    c. Fates of lactic acid accumulation; Glucose paradox pathway; Gluconeogenesis (Cori-Cycle), Lactate Shuttle.
    d. Dependence on Glycogenolysis; Phosphorylase activity, epinephrine cAMP, and Ca^{2+}-mediated (cAMP-independent) mechanisms.
    e. Role of insulin in carbohydrate transport. Effect of skeletal muscle contraction on Glut 1 and Glut 4 transporter activity.

Week 10

Lecture: Aerobic energy pathways.

1. Biochemistry of the Aerobic Energy Pathway; Krebs Cycle and Electron Transport Chain; Oxidative Phosphorylation; Number of ATP from a glucose molecule.
2. Effects of training on skeletal muscle mitochondria.
3. Beta-oxidation cycle; carbohydrate-lipid interactions.
4. Integration of the three energy systems during exercise; contributions of anaerobic and aerobic energy during sequential and cumulative periods of exercise.
5. Factors affecting recovery from exercise O_2 deficit and O_2 debt; rapid recovery phase (alactacid oxygen debt) and slow recovery phase (lactacid oxygen debt).
6. Factors affecting muscle glycogen resynthesis.

Week 11

Lecture: Respiratory Physiology

1. Principles of gas exchange; calculation of partial pressures, Boyles Law, Charles Law, Henrys Law, Daltons Law.
2. Importance of pulmonary volumes and capacities; Static and Dynamic lung volumes.
3. Ventilation and anaerobic threshold, VEO_2, $VECO_2$.
4. Ventilation - Perfusion ratios. Regional differences in the lung.
5. Gas Exchange and Transport - Dissolved oxygen, Oxyhemoglobin dissociation curve, at rest, during exercise.
6. Transport of CO_2 in blood; dissolved CO_2, transport of CO_2 in chemical combination (carbonic acid bicarbonate ion, carbamino compounds, CO_2 dissociation curve).
7. Special considerations - high altitude training, lung volumes in swimmers,

increased 2,3 DPG.

Week 12

Lecture: Cardiovascular Physiology

1. The heart as a pump; basic anatomy and physiology.
2. Frank Starlings Law of the Heart; Cardiovascular hemodynamics.
3. Cardiovascular function during exercise. Neural factors, circulatory hemodynamics.
4. Chronic effects of cardiovascular training; comparison to control subjects; physiological differences at rest during submaximal (steady state) exercise and maximum exercise.
5. The effects of cardiovascular training on health and longevity; changes in serum lipoproteins ($\uparrow HDL_2$, $\downarrow$TG's, $\downarrow$ atherogenic index), improved insulin sensitivity, increased bone density, improved body composition.
6. Detraining and retention of training induced adaptations.
7. Physiology of aerobic training - Exercise Prescription.

G. Course Requirements:

It is the responsibility of the student to read all materials provided for them in class. They are required to take the midterm and final exam and to demonstrate a competency in this subject area.

H. Methods of Evaluation:

Midterm exam.....50%
Final exam.....50%
100%

I. Textbook(s):

Required: Powers, Scott K. and Howley, Edward T. Exercise Physiology, Chicago. 3rd Ed. Brown and Benchmark, 1997.

Supplemental Books:

Astrand, Per Olaf and Rodahl, Kaare. Textbook of Work Physiology.

Brooks and Fahey. Physiology of Exercise.

Lamb, David. Physiology of Exercise: Responses and Adaptations.

Shaver, Larry. Essentials of Exercise Physiology.

Bove and Lowenthal. Exercise Medicine: Physiological Principles and Clinical Applications.

Morehouse and Miller. Physiology of Exercise.

Shephard, Roy. Exercise Physiology.

Berger, Richard A. Applied Exercise Physiology.

Appenzeller and Atkinson. Sports Medicine, 2nd edition.

Supplemental Materials:

Medicine and Science in Sports and Exercise
Journal of Applied Physiology
American Journal of Physiology
Journal of General Physiology
Journal of American Medical Association
New England Journal of Medicine
Research Quarterly for Exercise and Sport
International Journal of Sports Medicine
Sports Medicine
National Strength and Conditioning Association Journal
Physician and Sports Medicine

J. Date of Syllabus: August 2002

APPENDIX E

University of Miami
School of Education
Dept. of Exercise and Sport Sciences

Name _____

I.D.# _____

EXERCISE PHYSIOLOGY MAJOR

Degree Requirements: Bachelor of Science in Education

GENERAL EDUCATION REQUIREMENTS (39-51 cr.)

A.	English Composition		(6 cr.)	
ENG	105	Composition I	3	
ENG	106	Composition II	3	
B.	Foreign Language		(3-9 cr.)	
			3	
			3	
			3	
C.	Social Science		(9 cr.)	
D.	Humanities		(9cr.)	
Fine Arts			(3 cr.)	
Literature			(3 cr.)	
Philosophy / Religion			(3 cr.)	
E.	Mathematics		(3-6 cr.)	
F.	Natural Sciences		(16 cr.)	
BIL	109	Human Biology	3	
BIL	150	General Biology	4	
BIL	151	Biology Lab	1	
CHM	103	Chemistry for Life Sciences I	3	
CHM	104	Chemistry for Life Sciences II	3	
CHM	105	Chemistry for Life Sciences I (Lab)	1	
CHM	106	Chemistry for Life Sciences II (Lab)	1	

NOTE: **Students are required to take 4 writing oriented courses.**

EXERCISE PHYSIOLOGY MAJOR (40 cr.)

ESS	155	Biological & Health Related Bases of Exercise	3	
ESS	156	Lab Application to Health and Exercise	1	
ESS	221	Intro to Exercise: Bioenergetics & Skeletal Muscle	3	
ESS	222	Exercise Physiology Lab: Neuromuscular	2	
ESS	232	Basic Human Physiology	3	
ESS	245	Anatomy & Kinesiology	3	
ESS	321	Intro to Systemic Exercise Physiology	3	
ESS	322	Exercise Physiology Lab: Cardiorespiratory	2	
ESS	365	Principles of Exercise Prescription and Program Management	3	
ESS	384	Athletic and Sport Injuries	3	
ESS	457/458	Field Experience	3	
ESS	421	Systemic Exercise Physiology	3	
ESS	431	Lab Experiences in Systemic Exercise Physiology	2	
ESS	477	Advanced Nutrition for Sport and Fitness	3	
ESS	540	Exercise Psychobiology	3	

MINOR (15-18 cr.)

ADVANCED STUDIES

[For Pre-Med track]

CHM	201	Organic Chemistry (Lecture)	3	
CHM	202	Organic Chemistry II (Lecture)	3	
CHM	205	Organic Chemistry (Lab)	1	
CHM	206	Organic Chemistry (Lab II)	1	
BIL	250	Genetics	3	
BIL	251	Genetics Laboratory	1	
BIL	255	Cellular & Molecular Biology	3	
BIL	550	Cell Metabolism: Structure & Function	3	
BCH	401	Biochemistry for the Medical Sciences	3	

ELECTIVES (to bring total to 120 credits)

PHY	205	University Physics I	3	
PHY	101*	College Physics I	3	
PHY	106*	College Physics Lab I	3	

* Recommended Elective for Advanced Studies

Student Signature _____ Date of Review _____

Advisor Signature _____ Date of Review _____

Revised: June 02(MAE)

28

APPENDIX F

Where Have Our Graduate Students Gone?*

1. Exercise Physiology Professor – Appalachian State University, Boone, North Carolina
2. Exercise Physiologist – Olympic Ski Team, Colorado
3. Director, Athletic Training Program – Pacific College, California
4. Physicians Assistant - Miami, Florida
5. Registered Dietician – Ft. Lauderdale, Florida
6. Director, Corporate Fitness Program – American Bankers Corp., Miami, Florida
7. Professor of Exercise Physiology – University of Nevada, Reno, Nevada
8. Post-doctoral Fellow – Visiting Scholar, Division of Neurophysiology, Panum Institute, U. of Copenhagen; Post-Doctoral Fellow, Department of Neurology, UCLA; Post-Doctoral Fellow, Department of Electrical Engineering, U. of Washington; Assistant Professor, Department of Movement Science and Department of Biomedical Engineering, University of Michigan.
9. Director, Cardiac Rehabilitation Research Division, McGill Medical School, Montreal, Canada
10. Cardiac Rehabilitation – Exercise Physiologist – Baptist Hospital, Miami, Florida
11. Dean, Health Sciences Division, Indian River Community College, Ft. Pierce, Florida
12. Information Computer Technologist – University of Washington, Seattle, Washington
13. Biology Teacher – Integrating Exercise Physiology into the Biology Curriculum, Miami, Florida
14. Professor of Exercise Physiology – Elon College, NC
15. Student Fitness Center Coordinator, Florida International University, Miami, Florida
16. Research Assistant Professor, The Miami Project to Cure Paralysis, Miami, Florida
17. Assistant Program Director – Plus One Fitness, N.Y., N.Y.
18. Phase III/IV Cardiac Rehabilitation Director, Towson Wellness Center, Towson University, Towson, MD; Adjunct Professor – Towson University, Towson, MD

* Please note that many of these graduate students have hired undergraduates with Bachelor of Science degrees in Exercise Physiology and ASCM certification.

APPENDIX G

Principal Investigator: Dr. Perry
Budget for Period: 6/1/03-5/31/08

Proposal to: Provost
Budget Created: 7/25/02

Exercise Physiology Expenditures

PERSONNEL	Year 1	Year 2	Year 3	Year 4	Year 5	Total
1. Assoc Prof, Ass't Director AY 10%	6,414	6,607	6,805	7,009	7,220	34,055
2. Ass't Prof, AY 10%	12,501	12,875	13,262	13,660	14,069	66,367
3. Prof., AY 10%	5,432	5,594	5,763	5,936	6,114	28,839
4. TBA Ass't Prof., Lab Director, AY 100%	0	32,958	33,948	34,965	36,018	137,889
5. TBA Ass't Prof, AY 100% (Year 2-5)	0	46,350	47,745	49,176	50,652	193,923
6. TBA Ass't Prof, AY 100% (year 3-5)	0	0	47,745	49,176	50,652	147,573
7.	0	0	0	0	0	0
8.	0	0	0	0	0	0
9. Prof., Director (20% Yr 1 -2 overload)(AY 20% Yr3-5	15,746	16,219	16,706	17,206	17,724	83,601
10. Staff Assoc, (20% overload year 1)(20% AY Yr 2-5)	5,177	5,330	5,491	5,657	5,825	27,480
11. TBA Sr. Staff Assistant, 25%	0	4,986	5,136	5,289	5,448	20,859
12.	0	0	0	0	0	0
13.	0	0	0	0	0	0
14.	0	0	0	0	0	0
15.	0	0	0	0	0	0
16.	0	0	0	0	0	0
17.	0	0	0	0	0	0
18.	0	0	0	0	0	0
19.	0	0	0	0	0	0
20.	0	0	0	0	0	0
21. TBA Lecturer (2 3 cr course per semester)	10,800	10,800	10,800	10,800	10,800	54,000
22. TBA Lecturer (2 3 cr course per semester)	10,800	10,800	10,800	10,800	10,800	54,000
23. TBA Lecturer (2 3 cr course per semester)	10,800	0	0	0	0	10,800
24. GA Ph.D. 12 mo	0	14,667	14,667	14,667	14,667	58,668
25.	0	0	0	0	0	0
26.	0	0	0	0	0	0
Total Salaries	77,670	167,186	218,868	224,341	229,989	918,054
Total Fringe Benefits	14,401	36,265	50,627	53,037	55,544	209,874
TOTAL PERSONNEL	92,071	203,451	269,495	277,378	285,533	1,127,928
OTHER DIRECT COSTS (MTDC)						
1. Clerical Supplies	1,200	1,200	1,200	1,200	1,200	6,000
2. Technical Supplies	2,500	7,000	7,000	7,000	7,000	30,500
3. Minor Equipment	2,500	10,000	10,000	10,000	10,000	42,500
4. Promotional Materials	3,000	2,000	2,000	2,000	2,000	11,000
5. Emp Travel	2,000	2,000	2,000	2,000	2,000	10,000
6. Student Travel	1,000	1,000	1,000	1,000	1,000	5,000
7. Orientation/Guest Speakers Entertainment	1,200	1,200	1,200	1,200	1,200	6,000
8. Insurance	500	500	500	500	500	2,500
9. Reg. Conferences/Seminars	2,000	2,000	2,000	2,000	2,000	10,000
10. Subscription Mag	500	500	500	500	500	2,500
11. Outside services (Maint of Equip)	1,200	1,200	1,200	1,200	1,200	6,000
12. Postage	500	500	500	500	500	2,500
13. LD	600	600	600	600	600	3,000
14. Copy Center	1,000	1,000	1,000	1,000	1,000	5,000
15. Duplicating Manuals etc	2,000	2,000	2,000	2,000	2,000	10,000
16.	0	0	0	0	0	0
17.	0	0	0	0	0	0
18.	0	0	0	0	0	0
19.	0	0	0	0	0	0
20.	0	0	0	0	0	0
21.	0	0	0	0	0	0
22.	0	0	0	0	0	0
TOTAL OTHER (MTDC)	21,700	32,700	32,700	32,700	32,700	152,500
OTHER DIRECT COSTS (NON-MTDC)						
1. Tuition Waiver 18 cr AY @ $1060/cr year 1	0	20,043	21,045	22,097	23,202	86,387
2. Equipment - Lab	10,000	10,000	10,000	5,000	5,000	40,000
3.	0	0	0	0	0	0
4.	0	0	0	0	0	0
5.	0	0	0	0	0	0
6.	0	0	0	0	0	0
7.	0	0	0	0	0	0
TOTAL OTHER (NON-MTDC)	10,000	30,043	31,045	27,097	28,202	126,387
TOTAL DIRECT COSTS	123,771	266,194	333,240	337,175	346,435	1,406,815
INDIRECT COSTS @ 0.00% MTDC	0	0	0	0	0	0
PROJECT TOTAL	123,771	266,194	333,240	337,175	346,435	1,406,815

Principal Investigator: Dr. Perry
Budget for Period: 6/1/03-5/31/08

Proposal to: Provost
Budget Created: 7/25/02

Exercise Physiology - Revenue

PERSONNEL	Year 1	Year 2	Year 3	Year 4	Year 5	Total
1.	0	0	0	0	0	0
2.	0	0	0	0	0	0
3.	0	0	0	0	0	0
4.	0	0	0	0	0	0
5.	0	0	0	0	0	0
6.	0	0	0	0	0	0
7.	0	0	0	0	0	0
8.	0	0	0	0	0	0
9.	0	0	0	0	0	0
10.	0	0	0	0	0	0
11.	0	0	0	0	0	0
12.	0	0	0	0	0	0
13.	0	0	0	0	0	0
14.	0	0	0	0	0	0
15.	0	0	0	0	0	0
16.	0	0	0	0	0	0
17.	0	0	0	0	0	0
18.	0	0	0	0	0	0
19.	0	0	0	0	0	0
20.	0	0	0	0	0	0
21.	0	0	0	0	0	0
22.	0	0	0	0	0	0
23.	0	0	0	0	0	0
24.	0	0	0	0	0	0
25.	0	0	0	0	0	0
26.	0	0	0	0	0	0
Total Salaries	0	0	0	0	0	0
Total Fringe Benefits	0	0	0	0	0	0
TOTAL PERSONNEL	0	0	0	0	0	0
OTHER DIRECT COSTS (MTDC)						
1.	0	0	0	0	0	0
2.	0	0	0	0	0	0
3.	0	0	0	0	0	0
4.	0	0	0	0	0	0
5.	0	0	0	0	0	0
6.	0	0	0	0	0	0
7.	0	0	0	0	0	0
8.	0	0	0	0	0	0
9.	0	0	0	0	0	0
10.	0	0	0	0	0	0
11.	0	0	0	0	0	0
12.	0	0	0	0	0	0
13.	0	0	0	0	0	0
14.	0	0	0	0	0	0
15.	0	0	0	0	0	0
16.	0	0	0	0	0	0
17.	0	0	0	0	0	0
18.	0	0	0	0	0	0
19.	0	0	0	0	0	0
20.	0	0	0	0	0	0
21.	0	0	0	0	0	0
22.	0	0	0	0	0	0
TOTAL OTHER (MTDC)	0	0	0	0	0	0
OTHER DIRECT COSTS (NON-MTDC)						
1. Year 1 - 15 students 18 crs @ $1060	286,200	0	0	0	0	286,200
2. Year 2 - 35 students 18 crs @ $1113	0	701,190	0	0	0	701,190
3. Year 3 - 55 students 18 crs @ $1169	0	0	1,157,310	0	0	1,157,310
4. Year 4 - 75 students 18 crs @ $1227	0	0	0	1,656,450	0	1,656,450
5. Year 5 - 80 students 18 crs @ $1288	0	0	0	0	1,854,720	1,854,720
6.	0	0	0	0	0	0
7.	0	0	0	0	0	0
TOTAL OTHER (NON-MTDC)	286,200	701,190	1,157,310	1,656,450	1,854,720	5,655,870
TOTAL DIRECT COSTS	286,200	701,190	1,157,310	1,656,450	1,854,720	5,655,870
INDIRECT COSTS @ 0.00% MTDC	0	0	0	0	0	0
PROJECT TOTAL	286,200	701,190	1,157,310	1,656,450	1,854,720	5,655,870