

FLORIDA ATLANTIC UNIVERSITY™

Graduate Programs—NEW COURSE PROPOSAL

UGPC APPROVAL _____
 UFS APPROVAL _____
 SCNS SUBMITTAL _____
 CONFIRMED _____
 BANNER POSTED _____
 ONLINE _____
 MISC _____

DEPARTMENT NAME: EXERCISE SCIENCE & HEALTH
 PROMOTION

COLLEGE OF: EDUCATION

RECOMMENDED COURSE IDENTIFICATION:

PREFIX PET COURSE NUMBER 6363 LAB CODE (L or C) _____

(TO OBTAIN A COURSE NUMBER, CONTACT ERUDOLPH@FAU.EDU)

COMPLETE COURSE TITLE HUMAN SYSTEMS PHYSIOLOGY IN EXERCISE SCIENCE

EFFECTIVE DATE

(first term course will be offered)
FALL 2010

CREDITS: 3

TEXTBOOK INFORMATION: Ganong's Review of Medical Physiology 23rd Edition. Kim E. Barrett, Susan M. Barman, Scott Boitano, Heddwen Brooks. New York, NY McGraw-Hill, 2010. ISBN # 978-0-07-160567-0

GRADING (SELECT ONLY ONE GRADING OPTION) REGULAR X _____ PASS/FAIL _____ SATISFACTORY/UNSATISFACTORY _____

COURSE DESCRIPTION, NO MORE THAN 3 LINES:

A comprehensive examination of the of major organ systems contributing to the physiological response to exercise, both acute and chronic. Specifically, this course focuses on three of these systems: cardiovascular, pulmonary, and neuromuscular.

PREREQUISITES W/MINIMUM GRADE:*

Grade of C or better in PET
 4351 Exerc Phys or equivalent

COREQUISITES:

OTHER REGISTRATION CONTROLS (MAJOR, COLLEGE, LEVEL):

PREREQUISITES, COREQUISITES & REGISTRATION CONTROLS SHOWN ABOVE WILL BE ENFORCED FOR ALL COURSE SECTIONS.

*DEFAULT MINIMUM GRADE IS D-

MINIMUM QUALIFICATIONS NEEDED TO TEACH THIS COURSE:

Ph.D. IN EXERCISE PHYSIOLOGY OR RELATED FIELD

Other departments, colleges that might be affected by the new course must be consulted. List entities that have been consulted and attach written comments from each.

Nursing, Science (Contacted numerous times-no response)

Robert Zoeller, Ph.D. rzoeller@fau.edu
 Faculty Contact, Email, Complete Phone Number

SIGNATURES

SUPPORTING MATERIALS

<p><i>Approved by:</i></p> <p>Department Chair: <u>B. Sue Hanson</u></p> <p>College Curriculum Chair: <u>Linda Wright</u></p> <p>College Dean: <u>F. Allen J. Powell</u></p> <p>UGPC Chair: _____</p> <p>Dean of the Graduate College: _____</p>	<p><i>Date:</i></p> <p><u>11-17-09</u></p> <p><u>11-18-09</u></p> <p><u>11-18-09</u></p> <p>_____</p> <p>_____</p>	<p>Syllabus—must include all details as shown in the UGPC Guidelines.</p> <p>Written Consent—required from all departments affected.</p> <p>Go to: http://graduate.fau.edu/gpc/ to download this form and guidelines to fill out the form.</p>
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Email this form and syllabus to stulks@fau.edu and egino@fau.edu one week **before** the University Graduate Programs Committee meeting so that materials may be viewed on the UGPC website by committee members prior to the meeting.

**FLORIDA ATLANTIC UNIVERSITY
COLLEGE OF EDUCATION
DEPARTMENT OF EXERCISE SCIENCE AND HEALTH PROMOTION
PET 6363 Human Systems Physiology in Exercise Science
Fall 2009**

Instructor:
Office:
Office Hours:
Phone:
Email:
Class Hours:
Location:

Course Description:

A comprehensive examination of the of major organ systems contributing to the physiological response to exercise, both acute and chronic. Specifically, this course focuses on three of these systems: cardiovascular, pulmonary, and neuromuscular.

Required Textbook

Kim E. Barrett, Susan M. Barman, Scott Boitano, Heddwyn Brooks. (2010). *Ganong's review of medical physiology* (23rd ed.). New York, NY: McGraw-Hill. ISBN # 978-0-07-160567-0

The College of Education's Conceptual Framework states that "Informed reflective decision-makers have mastered the subject matter needed for the profession . . ."

Course Objectives:

Upon completion of this course the student will be able to:

- 1) Demonstrate understanding of basic cardiac anatomy.
- 2) Demonstrate an understanding of blood vessel morphology and the relationship between vascular cross-sectional area, velocity of blood flow, and intravascular pressure.
- 3) Describe and explain the phases of the cardiac cycle.
- 4) Demonstrate comprehension of the types of cardiac action potentials, the ionic basis of resting and action potentials.
- 5) Demonstrate an understanding of excitation-contraction coupling as it relates to both cardiac and vascular smooth muscle.
- 6) Describe the factors that determine cardiac contractility
- 7) Describe and explain the neural control of heart rate and contractility.

- 8) Demonstrate an understanding of the determinants of cardiac output including preload and afterload.
- 9) Demonstrate a comprehension of the factors that determine blood flow.
- 10) Explain how pulsatile flow in the arteries is converted to steady flow in the capillaries.
- 11) Demonstrate an understanding of the factors that regulate blood flow and vascular resistance and function.
- 12) Describe the factors that determine the balance between hydrostatic and osmotic forces in the vasculature.
- 13) Demonstrate an understanding of the central and peripheral control of the cardiovascular system in response to an acute bout of exercise and the adaptations that occur with regular exercise training.
- 14) Describe the structure of the pulmonary system and relate it to its function
- 15) Demonstrate an ability to interpret pulmonary function tests including lung volumes/capacities and flow-volume loops
- 16) Demonstrate an understanding of the mechanics of pulmonary ventilation including alveolar ventilation as well as anatomical and physiological dead air space.
- 17) Demonstrate an understanding of the relationship between ventilation and perfusion and regional differences in this relationship within the lung.
- 18) Describe the factors that influence pulmonary vascular resistance and blood flow including lung volume, alveolar pressure, intravascular pressure, posture, and physical activity.
- 19) Demonstrate comprehension of pulmonary gas diffusion..
- 20) Understand the relation between the partial pressure of a gas in the blood and the amount dissolved as well as hemoglobin saturation.
- 21) Describe the physiological consequences of the "oxyhemoglobin dissociation curve".
- 22) Demonstrate an understanding of the Bohr and Haldane effects on the oxyhemoglobin dissociation curve.
- 23) Describe the buffer systems in the body.
- 24) Demonstrate an understanding of the relationships between blood pH, PCO₂, plasma bicarbonate concentration as described by the Henderson-Hasselbach equation.
- 25) Demonstrates an understanding of the mechanisms that regulate breathing.
- 26) Identify the responses of the pulmonary system to acute and chronic exercise.
- 27) Demonstrate a knowledge of the structure and function of the neuron including organelles, cytoskeleton, and axoplasmic transport.

- 28) Demonstrate an understanding of the basis for the resting membrane potential and the generation of the action potential.
- 29) Describe the mechanisms of and factors determining synaptic transmission.
- 30) Demonstrate an understanding of the role of the motor cortex in the formation of motor "strategy" and the neural pathways supporting voluntary movement.
- 31) Skeletal muscle structure and function
- 32) Describe excitation-contraction coupling and the molecular basis of skeletal muscle contraction.
- 33) Describe the role and effects of contractile activity (exercise) in inducing adaptations in skeletal muscle.
- 34) Demonstrate an understanding of the molecular basis of skeletal muscle plasticity including muscular hypertrophy and endurance.
- 35) Discuss the effects of reactive oxygen species (ROS) on skeletal muscle plasticity.

Evaluation

Three (3) written exams 50% of final grade

Three short review papers 30% of final grade (10% each)

Quizzes and other assignments 20% of final grade

Grading Scale

92.0 – 100 % = A 72.0 – 77.9% = C

90.0 – 91.9% = A- 70.0 – 71.9% = C-

88.0 – 89.9% = B+ 68.0 – 69.9% = D+

82.0 – 87.9% = B 62.0 – 67.9% = D

80.0 – 81.9% = B- 60.0 – 61.9% = D-

78.0 – 79.9% = C+ < 60.0% = F

Attendance Policy:

Students are expected to attend all of their scheduled classes and to satisfy all academic objectives as outlined by. The effect of absences upon grades is determined by the instructor, and the University reserves the right to deal at any time with individual cases of nonattendance. Attendance includes active involvement in all class sessions, class discussions, and class activities, as well as professional conduct in class.

Students are responsible for arranging to make up work missed because of legitimate class absence, such as illness, family emergencies, military obligation, court-imposed legal obligations, or participation in University-sponsored activities (such as athletic or

scholastic team, musical and theatrical performances, and debate activities). It is the student's responsibility to give the instructor notice prior to any anticipated absence, and within a reasonable amount of time after an unanticipated absence, ordinarily by the next scheduled class meeting. Instructors must allow each student who is absent for a University-approved reason the opportunity to make up work missed without any reduction in the student's final course grade as a direct result of such absence.

Course Requirements

- You will be required to write three short (2-3 pages) review papers; one each on a topic related to the three systems covered in this course. It should be typed, double spaced, using 12 point type or equivalent, and have margins no larger than 1". Each paper should have at least 3 current articles (preferably within the last 10 years) referenced. You should use the same referencing format as that used in *Medicine and Science in Sports and Exercise*. You may not use direct quotes. Grammar and spelling errors will count off heavily (use the spell & grammar checks but don't rely on them exclusively). These papers should be your original thoughts and not just a rewording of another author.
- Students are expected to read assigned material prior to the lecture. Quizzes will be based on material assigned for that particular class. If the student has read/studied the assigned material, this should represent no problem or undue hardship.
- **Assignments handed in after the due date will not be accepted.** Adequate time will be given for the completion of all assignments. Students are expected to take quizzes and exams as scheduled.
- **Prior approval by course instructor is prerequisite for make-up quizzes and exams.**
- **Assignments not handed in will result in a deduction equal to total possible points for that particular lab or assignment.**

Bibliography

1. Berne, R.M. and Levy, M.N. (2001). *Cardiovascular physiology* (8th ed.). St. Louis, MO: Mosby Inc. ISBN # 0-323-01127-6.
2. D. Purves, G.J. Augustine, D. Fitzpatrick (Ed.). (2008). *Neuroscience* (4th ed.). Sunderland, MA: Sinauer Associates, Inc. ISBN# 978-0-87893-697-7.
3. Duchateau J., Semmler J.G., Enoka R.M. . (2006). Training adaptations in the behavior of human motor units. *101*. 1766-1775.
4. Guyton, A.C. and Hall, J.E. (1996). *Textbook of medical physiology* (9th ed.). Philadelphia, PA: W.B. Saunders Co. ISBN # 0-7216-5944-6.
5. Joyner, M.J. and Green, D.J. (2009). Exercise protects the cardiovascular system: Effects beyond traditional risk factors.
6. Klabunde, R. E. (2005). *Cardiovascular physiology concepts* . Philadelphia, PA: Lippincott, Williams, and Wilkins.
7. Latash, M. L. (2008). *Neurophysiological basis of movement* (2nd ed.). Champaign, IL: Human Kinetics. ISBN-10# 0-7360-6367-6
8. Levitzky, M. G. (2007). *Pulmonary physiology* (7th ed.). New York, NY: McGraw-Hill. ISBN# 0-07-143775-2.

9. Lilly, L. S. (2003). *Pathophysiology of heart disease – A collaborative project of medical students and faculty* (3rd ed.). Philadelphia, PA: Lippincott, Williams, and Wilkins.
ISBN # 0-7817-4027-4.
10. Mohrman, D.E. and Heller, L.J. (1997). *Cardiovascular physiology* (4th ed.). New York, NY: McGraw-Hill. ISBN # 0-07-028025.
11. Smith, J.J. and Kampine, J.P. Kampine. (1990). *Circulatory physiology – the essentials* (3rd ed.). Baltimore, MD: Williams and Wilkins. ISBN # 0-683-07775-9.
12. West, J. B. (1995). *Respiratory physiology – the essentials* (5th ed.). Baltimore, MD: Williams & Wilkins. ISBN# 0-683-08937-4.

In compliance with the Americans with Disabilities Act (ADA), students who require special accommodations due to a disability to properly execute coursework must register with the Office for Students with Disabilities (OSD) located in Boca Raton - SU 133 (561-297-3880), in Davie - MOD 1 (954-236-1222), in Jupiter - SR 117 (561-799-8585), or at the Treasure Coast - CO 128 (772-873-3305), and follow all OSD procedures.

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty, including cheating and plagiarism, is considered a serious breach of these ethical standards, because it interferes with the University mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the University community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see http://www.fau.edu/regulations/chapter4.4.001_Honor_Code.pdf

Proposed Schedule of Classes

Week 1	Basic cardiac structure and function, vascular morphology, cardiac cycle, cardiac action potentials (part 1)
Week 2	Cardiac action potentials (part 2), excitation-contraction coupling, control of heart rate and contractility
Week 3	Determinants of cardiac output, blood flow, and vascular resistance
Week 4	Cardiovascular responses to exercise, acute and chronic
Week 5	Exam 1
Week 6	Basic pulmonary structure and function, mechanics of pulmonary ventilation, measures of respiratory volumes/capacities.
Week 7	Ventilation and perfusion, pulmonary vascular resistance and blood flow, pulmonary gas diffusion
Week 8	Gas transport in the blood, principles of the oxyhemoglobin-dissociation curve, buffer systems, mechanisms that regulate breathing
Week 9	The pulmonary response to exercise
Week 10	Exam 2
Week 11	Neuronal structure and function, ionic basis of the neuronal action potential and synaptic transmission, role of motor cortex
Week 12	Skeletal muscle structure and function, excitation-contraction coupling
Week 13	Neuromuscular adaptations to chronic exercise
Week 14	Mechanisms of adaptations to exercise; muscle plasticity
Week 15	Exam 3

Sue Graves

Curriculum change - Comments for PET 6363

From: Irene H. Johnson Ph.D. ([johnso9@fau.edu])
Sent: Thursday, October 08, 2009 11:00 AM
To: Sue Graves
Subject: RE: New Course for ESHP Department--Systems physiology

Sue:
This course does not conflict with courses offered in the Counselor Education Program.

Irene

From: Sue Graves [mailto:sgraves@fau.edu]
Sent: Thursday, October 01, 2009 8:06 AM
To: ijohnso9@fau.edu; Mike Brady; Robert Shockley; Barbara Ridener; Anne Boykin; H. James McLaughlin; Deena Louise Wener
Cc: Rod Murphey
Subject: New Course for ESHP Department--Systems physiology

The attachment is a new course we want to offer Fall 2010. We are combining our cardiovascular and respiratory physiology courses into one course and adding a neuro-muscular component. As usual, I need to make sure that your department does not have any conflicts with this course. Please email me back, if possible by October 9, so our department can move this forward.

Thanks, Sue

B. Sue Graves, Ed.D., FACSM, HFS, FISSN
Chair, Department of Exercise Science
and Health Promotion
Florida Atlantic University
777 Glades Road, FH-11
Boca Raton, Florida 33431
561-297-2938 (Olga Duron, administrative assistant)
561-297-2790 (direct)
561-297-2839 (fax)
www.coe.fau.edu/eshp

Sue Graves

From: Anna Boykin
Sent: Thursday, October 01, 2009 4:02 PM
To: Sue Graves; ijohnso9@fau.edu; Mike Brady; Robert Shockley; Barbara Ridener; H. James McLaughlin; Deena Louise Wener
Cc: Rod Murphey
Subject: RE: New Course for ESHP Department--Systems physiology

Importance: High

Hi Sue--the Christine E Lynn College of Nursing Faculty do not see any conflict with this course being offered through ESHP. Thank you for asking for our thoughts. Anne Boykin

*Anna Boykin, PhD, RN
Dean and Professor
Christine E. Lynn College of Nursing
Florida Atlantic University
Tel: (561) 297-3206
E-Mail: boykina@fau.edu*

From: Sue Graves
Sent: Thursday, October 01, 2009 8:06 AM
To: ijohnso9@fau.edu; Mike Brady; Robert Shockley; Barbara Ridener; Anne Boykin; H. James McLaughlin; Deena Louise Wener
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Sue Graves

From: H. James McLaughlin [jmc1au17@fau.edu]
Sent: Thursday, October 01, 2009 2:44 PM
To: Sue Graves
Subject: Re: New Course for ESHP Department—Systems physiology

Sue:

Our department sees no conflict with the course you are proposing. Take care.

Yours,

Jim McLaughlin

H. James McLaughlin, Ph.D.
Professor and Chair
Department of Curriculum, Culture, and Educational Inquiry
338 Education Building
Florida Atlantic University
Boca Raton, FL 33431
561-297-3965



On 10/1/09 8:06, "Sue Graves" <sgraves@fau.edu> wrote:

The attachment is a new course we want to offer Fall 2010. We are combining our cardiovascular and respiratory physiology courses into one course and adding a neuro-muscular component. As usual, I need to make sure that your department does not have any conflicts with this course. Please email me back, if possible by October 9, so our department can move this forward.

Thanks, Sue

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www.coc.fau.edu/eshp <<http://www.coc.fau.edu/eshp>>

Sue Graves

From: Deena Louise Wener [wener@fau.edu]
Sent: Thursday, October 01, 2009 1:17 PM
To: Sue Graves
Subject: RE: New Course for ESHP Department--Systems physiology

Dear Dr. Graves,

Thank you for giving me the opportunity to review the new course submission on systems physiology in ESHP. Looks like a very rigorous course. The course does not duplicate or overlap with any course taught currently in the graduate program in Communication Sciences and Disorders.

Good luck as you progress through the approval process.

With best regards,
Deena Louise Wener

Deena Louise Wener, Ph.D., CCC-SLP
Associate Professor and Chair
Department of Communication Sciences and Disorders
Florida Atlantic University
College of Education
777 Glades Road
Boca Raton, Florida 33431-0991

Office phone: 561-297-2259
FAX: 561-297-2268
E-mail: wener@fau.edu



Dr. Deena Louise Wener

From: Sue Graves [mailto:sgraves@fau.edu]
Sent: Thursday, October 01, 2009 8:06 AM
To: ijohnso9@fau.edu; Mike Brady; Robert Shockley; Barbara Ridener; Anne Boykin; H. James McLaughlin; Deena Louise Wener
Cc: Rod Murphey
Subject: New Course for ESHP Department--Systems physiology

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Thanks, Sue

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Chair, Department of Exercise Science
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Florida Atlantic University
777 Glades Road, FH-11

Sue Graves

From: Mike Brady [mbrady@fau.edu]
Sent: Thursday, October 01, 2009 12:06 PM
To: Sue Graves
Subject: RE: New Course for ESHP Department--Systems physiology

I've reviewed your syllabus for **Human Systems Physiology in Exercise Science**. I do not see any conflict with the coursework or curriculum in ESE. This looks like a good course, and I wish you well with it.

Michael P. Brady, PhD
Professor & Chair
Department of Exceptional Student Education
Florida Atlantic University
777 Glades Road
Boca Raton, FL 33431
(561) 297-3281
mbrady@fau.edu

From: Sue Graves [mailto:sgraves@fau.edu]
Sent: Thursday, October 01, 2009 8:06 AM
To: ijohnso9@fau.edu; Mike Brady; Robert Shockley; Barbara Ridener; Anne Boykin; H. James McLaughlin; Deena Louise Wener
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Thanks, Sue

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Sue Graves

From: Barbara Ridener
Sent: Thursday, October 01, 2009 10:15 AM
To: Sue Graves
Subject: RE: New Course for ESHP Department--Systems physiology

Teaching and Learning does not see any conflicts.

Good luck!

Barbara

From: Sue Graves
Sent: Thursday, October 01, 2009 8:06 AM
To: ijohnso9@fau.edu; Mike Brady; Robert Shockley; Barbara Ridener; Anne Boykin; H. James McLaughlin; Deena Louise Wener
Cc: Rod Murphey
Subject: New Course for ESHP Department--Systems physiology

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Thanks, Sue

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