PHYSIOLOGY OF EXERCISE

**KINE 3315**

# Summer, 2014

## Instructor: Dr. Judy R. Wilson

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 Maverick Activity Center 229 e-mail: jrwilson@uta.edu

**Meetings:** Lecture Monday - Wednesday (10:30 am to 12:50 pm) in:

University Hall June 4, 6, 11, 16-19, 25-27

Lone Star Auditorium on other days

Laboratory 002 Thursday 10:30a to 1:00p

Laboratory 003 Thursday 1:30p to 4p

**Office Hours:** Monday-Thursday 1 to 3 pm or by appointment

**Credit:** 3 semester credit hours

**Textbook:** Plowman SA and DL Smith. Exercise Physiology for Health, Fitness and Performance (3rd ed) Benjamin Cummings, 2007

 Laboratory Manual: The University of Texas at Arlington

Physiology of Exercise Manual, McKeown, B.C.

The manual must be purchased for $16 by credit or debit card **on the KINE UTA Website under “Undergraduate Programs” heading.**  Here is the link to buy the manual: <https://www.uta.edu/coehp/kinesiology/undergrad/order-manuals-insurance.php>

Print off your receipt and bring to the KINE front desk to receive your manual.

If you do not have a credit or debit card you need to get a $16 cashier’s check or money order (no personal checks or cash) and bring to the KINE front desk.  Make the cashier’s check or money order payable to **UT Arlington Department of Kinesiology.**

**Prerequisites:** KINE 1400 Introduction to Exercise Science; BIOL 2457 and 2458, Human Anatomy and Physiology I and II, MATH 1302 College Algebra.

**Purpose of the Course:**

The classroom and laboratory experiences of this course are intended to provide the student with an opportunity to discuss, observe and become aware of the acute and chronic responses of the human body to physical activity. Mechanisms of neuromuscular, respiratory, cardiovascular, and metabolic control and adaptation during and following activity will be studied.

**Course Objectives:**

**Upon successful completion of this course, the student should have achieved the following:**

1. Developed an understanding of the immediate and long-term responses of the systems of the body to physical activity.
2. Developed an understanding of the body’s physiological abilities and limitations.
3. Developed an understanding of the research processes and limitations, procedures and interpretation of physical performance measurement.
4. Familiarization with the physiological basis of physical training and the practical application of these techniques to teaching and coaching.

**Topics covered:**

1. **Introduction: (Ch 1)**
	1. Sports Medicine
	2. Exercise Physiology
	3. Kinesiology (Exercise and Sport Studies)
	4. Professional Organizations

 i. American College of Sports Medicine (ACSM)

 ii. Association for Worksite Health Promotion (AWHP)

 iii. American Alliance for Health, Physical Education, Recreation and Dance (AAHPERD)

E. Control systems

 i. Homeostasis, control systems, feedback mechanisms

 ii. Neuroendocrine control of exercise

1. **Metabolic System (Ch 2,3,4,5)**
	1. Cellular respiration
	2. Anaerobic metabolism
	3. Aerobic metabolism
	4. Fuel for physical activity
	5. Replenishment of energy stores
	6. Lactic acid reduction
	7. Assessment of energy expenditure, calorimetry
2. **Neuromuscular-skeletal System (Ch 18-20)**
	1. Skeletal muscle system
		1. Myofibril structure and function
		2. Motor unit classifications
		3. Neuronal structure and function
	2. Chemistry and mechanics of muscle contraction
	3. Muscle fatigue and soreness
	4. Local muscular components of physical performance and fitness
3. **Respiratory System (Ch 9,10)**
	1. Pulmonary ventilation and lung mechanics
		1. Standard lung volumes
		2. Anaerobic threshold
		3. Oxygen cost of ventilation
	2. Gas exchange and transport during physical activity

V. **Cardiovascular System (Ch 11-13)**

A Hemodynamic adjustments and blood flow distribution

* + 1. Oxygen transport system
			1. Cardiac output
			2. Arterial-venous oxygen difference
		2. Blood pressure

B. Cardiac adjustments

* + 1. Innervation
		2. Heart rate
		3. Stroke volume

**VI. Conditioning Methods and Effects –referred to throughout course (Ch 5, 13)**

A. Training principles

B. Training methods

* 1. Training effects
		1. Physical performance
		2. Health and fitness

**VII. Body Composition (Ch 7)**

**Principle Learning Activities**:

 A. Class Lecture and Discussion B. Textbook Assignments

 C. Laboratory Experiences\* D. Supplemental Readings

**Evaluation:**

 **A. Written Examinations (60%)**

 **Exam 1 Bioenergetics (20%)**

 **Exam 2 Neuromuscular (20%)**

 **Exam 3 Respiratory/CV/BC (20%)**

 **Final exam Monday, July 7, 2014**

 **B. Quizzes (10%)**

 **C. Laboratory Experiences (20%)**

 **D. Research Paper (10%)**

Assessment of Performance in Course

 **90% = A 80% = B**

 **70% = C 60% = D**

|  |  |
| --- | --- |
| 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. |
| 1.2.10 | 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 (DOMS) |
| 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, demonstrate an 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. |
| 2.2.10 | Knowledge of the basic 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. |
| 2.2.15 | 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. |
| 2.4.0 | Knowledge of the pathophysiology of atherosclerosis and how this process is influenced by physical activity. |
| 2.4.2 | Knowledge of the atherosclerotic process, the factors involved in its genesis and progression, and the potential role of exercise training in treatment. |
| 1.6.3 | Skill to measure pulse rate accurately both at rest and during exercise. |
| 1.7.5 | Ability to list the effects of temperature, humidity, altitude, and pollution on the physiological response to exercise. |
| 1.2.1 | Ability to define aerobic and anaerobic metabolism. |
| 2.2.8 | Ability to define muscular fatigue as it relates to task, intensity, duration and the accumulative effects of exercise. |

Quizzes

These may be open book during which you may use your book and notes. They may also be closed book during which no notes or book may be used. Quizzes will be announced as to when and what type. Please have Scantrons (form 882-E) available for recording your answers.

Exams

The dates for the exams are noted on the schedule. You will need a new scantron, pencil and occasionally a calculator. They will include True/False, multiple choice and essay questions. There will be no make-up opportunities for examinations unless the absence was due to a **university-approved excuse**. If the absence is due to either a university activity or non-university excused absence (e.g. illness) **you must notify me by phone or email prior to the day that you will miss if you wish to make up any work missed.** Then, the documentation for the absence should be presented to the instructor at the next class appearance, BEFORE class begins. All make-up examinations will be administered by arrangement.

Assignments

It is anticipated that all assignments will be completed by the **DUE DATE** and given to the instructor that day at the beginning of class. If an excused absence creates a situation where the assignment cannot be turned in on the due date, the assignment is due to my mailbox in the Kinesiology office (MAC 146) as soon as possible. Grades on late assignments will be reduced by 50% of the actual grade received.

Attendance

If you have to miss a lecture or laboratory session, you are responsible for obtaining class notes from another student. This is important, since considerable material included in examinations will be presented during class sessions. However, to make up any work missed **you must notify me by phone or email prior to the day that you will be absent.** If you miss a laboratory experience, the grade for your lab report will be reduced to 50% of the actual grade received.

**Late assignments, assignments turned in to my mailbox as well as assignments turned in without staying for class will receive no more than 50%,**

 Professionalism-Cell phones are to be off and not used during class. Cell phone use during class will result in loss of any points for that day. Cell phone use during an exam will result in a zero. Laptops can be used to take notes, however, if this becomes a distraction you will be asked to put it away. Ear buds are to be removed during class, including quizzes and exams.

### Department of Kinesiology – Drop Policy

*It is the responsibility of the student to* ***add or drop classes or withdraw from school*** *within the appropriate time frame established by the University Registrar. (The departments are not allowed nor obligated to add or drop students from classes.) Deadlines can be found in the current Schedule of Classes.* ***Deadlines may differ for Graduate Students and Undergraduate Students*. June 23, 2014 is last day to drop classes for Summer I.**

### Americans with Disabilities Act

If you require an accommodation based on disability, I would like to meet with you in the privacy of my office the first week of the semester to be sure you are appropriately accommodated.

### Grade Grievance Deadline Policy

The student has one calendar year from the date a grade is assigned to initiate a grievance. The normal channels are: Department Chair or Program Director; Academic Dean; and the Provost.

### Student Support Services: The University supports a variety of student success programs to help you connect with the University and achieve academic success. They include learning assistance, developmental education, advising and mentoring, admission and transition, and federally funded programs. Students requiring assistance academically, personally, or socially should contact the Office of Student Success Programs at 817-272-6107 for more information and appropriate referrals.

**Academic Dishonesty**: Academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form at The University of Texas at Arlington. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University.

“Academic dishonesty includes, but is not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.” (Regents’ Rules and Regulations, Part One, Chapter VI, Section 3, Subsection 3.2, Subdivision 3.22).

**Bomb Threats**: If anyone is tempted to call in a bomb threat, be aware that UTA will attempt to trace the phone call and prosecute all responsible parties. Every effort will be made to avoid cancellation of presentations/tests caused by bomb threats. Unannounced alternate sites will be available for these classes. Your instructor will make you aware of alternate class sites in the event that your classroom is not available.

**Research Assistance Library:** Suzanne Beckett is the Kinesiology Library liaison. Should you need help researching your topic, contact Mr. Herzog at 817.272.7517 or by email: [sbeckett@uta.edu](file:///D%3A%5CKINE%204300%5CFall%202010%5CDay%201%5Camherzog%40uta.edu) <http://libguides.uta.edu/kinesiology>

The University of Texas at Arlington

College of Education and Health Professions

Mission, Core Values and Professional Dispositions

MISSION: To develop and deliver an educational program that ensures the highest teacher, administrator and allied health science preparation and performance and

To be a recognized contributor in the field of educational and allied health science research and practice through effective teaching, quality research and meaningful service.

The Educator and Administrator Preparation units’ collaboratively developed shared vision is based on these CORE VALUES, dispositions and commitments to:

 • Excellence • Diversity

• Learner-centered environment • Technology

• Research-based Experiences

 • Field • Collaboration • Life-long Learning

Each candidate in the Educator and Administrator Unit of the College of Education of UT-Arlington will be evaluated on PROFESSIONAL DISPOSITIONS by faculty and staff. These dispositions have been identified as essential for a highly-qualified educator. Instructors and program directors will work with
candidates rated as “unacceptable” in one or more stated criteria. The candidate will have an opportunity to develop a plan to remediate any deficiencies.

Demonstrates excellence

• Meets stated expectations of student performance.

• Keeps timelines. Arrives on time for class and other activities.

• Produces significant artifacts of practitioner evidence.

• Possesses a willingness to set goals.

• Attends all classes/trainings and practicum experiences.

• Completes activities as assigned.

• Has appropriate personal appearance and/or hygiene for professional setting.

Participates in a learner centered environment and shows respect for self and others

• Uses appropriate and professional language and conduct.

• Supports a "high quality” learning environment.

• Shows respect and consideration for the thoughts and feelings of others.

Research-based pedagogy

• Has an awareness of and willingness to accept research-based concepts.

• Identifies important trends in education.

• Demonstrates interests in learning new ideas and strategies.

• Relates class discussions and issues to current events in education.

Participates in on-going collaboration with peers and professionals

• Demonstrates kindness, fairness, patience, dignity and respect in working with peers, staff and instructors.

• Works effectively with others.

• Assists others in the university classroom or practicum setting.

• Demonstrates an openness to assistance from others.

• Receives feedback in a positive manner and makes necessary adjustment.

Exhibits stewardship of diversity

• Shows appropriate stewardship and tolerance to diverse people, environments, and situations.

Advocates use of technology

• Uses and applies existing technologies sufficiently in work.

• Shows a willingness to use and apply emerging technologies in work.

Shows interest in the learner and the learning-process

• Demonstrates significant learning improvement over time.

• Shows interest in the learning process and demonstrates the necessary amount of time, energy, and enthusiasm for becoming better learners, teachers, and practitioners.