

Motor Learning & Control PET 3050 (3 credits)  
Dept. of Exercise Science and Health Promotion  
College of Education, Davie Campus  
Florida Atlantic University

**Instructor:** Michael Whitehurst, Ed.D., FACSM  
Professor of Exercise Science & Health Promotion  
Office: Education & Science Bldg. Room 284  
[whitehur@fau.edu](mailto:whitehur@fau.edu)  
954-236-1007 (wk), 561-241-0517 (ho), 561-302-2674 (cell)

**Course Description:** Introduction to the theories, structures and processes of motor learning and control. Prerequisites include: general psychology, anatomy & physiology I&II plus labs; or permission of instructor.

**Textbook:** No Text Required – Go to [www.blackboard.fau.edu](http://www.blackboard.fau.edu) for syllabus (see PowerPoint files for each unit and laboratory assignments (see assignments tab) as well. **NOTE:** I am listing a couple of OPTIONAL textbooks you might purchase (amazon.com). However, you should be able to easily access the information you need from the textbooks that you already have (i.e. Anat/Physiol.) and by going to the internet ([www.wikipedia.com](http://www.wikipedia.com)).

Bear MF, Connors BW, Paradiso MA (2006). Neuroscience: Exploring the Brain, 3rd Ed. Philadelphia, PA: Lippincott, Williams and Wilkins. ISBN: 0-683-30596-4.

Patestas M, Gartner LP. A Textbook of Neuroanatomy (2006). Malden, MA; Blackwell Publishing  
ISBN: 1-4051-0340-x

<b>Evaluation:</b>	Exams 4 @ 45 points each	180 points
	Comprehensive Final Exam	60 points
	Lab Demonstrations 4@ 5 points each	20 points
		<hr/>
		260 points possible

**Grading Scale:**

Grading scale (%): 100-95 = A, 94-91 = A-, 90-87 = B+, 86-82 = B, 81-78 = B-, 77-74 = C+, 73-70 = C, 69-67 = C-, 66-64 = D+, 63-61 = D, 60-58 = D-, <58 = F

**Honor Code**

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](http://www.fau.edu/regulations/chapter4/4.001_Honor_Code.pdf).

**Disabilities**

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 I (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.

**General Guidelines:** In addition to the syllabus, all PowerPoint files and laboratory demonstrations (see assignments) can be found on Blackboard (<http://blackboard.fau.edu>). You are responsible for all information that I ask you to study in the PowerPoint files as well as anything that I say in class. Test questions will come from questions listed within each unit (*trace questions in each unit directly to the PowerPoint files – IF YOU CAN ANSWER THE UNIT QUESTIONS, YOU ARE READY FOR THE EXAMS*).

There are NO make-up examinations and you will not be allowed to take an exam early or later than is specified in the syllabus. Examinations and homework must be completed on time. A late submission of a write-up associated with a laboratory demonstration will result in zero points for that particular requirement. The lab reports are always due on the same day (summer only) or one week after the lab demonstration. Your attendance at laboratory demonstrations is mandatory! Failure to attend the lab will result in a zero for that lab, no exceptions!

**In terms of preparing for exams,** I suggest that you review the questions contained in each unit (e.g. Unit 1: Overview of Research Concepts in Exercise Science). ALWAYS SEE PowerPoint files for each unit for specific information. In other words, trace the answer to the unit questions to the specific PowerPoint file for each unit.

## Topical Outline

Dr. Whitehurst

Date	NOTE: The test questions for your exams will come from the unit questions shown below. <i>Therefore, prepare for exams by connecting the unit questions with specific slides within the PowerPoint files.</i>	Power Point file (#)
6/23	<b>Orientation, expectations, Q&amp;A</b>	
6/23	<p><b>Unit 1: Overview of Research Concepts in Exercise Science</b></p> <ul style="list-style-type: none"> <li>▪ What is the scientific method (observation, experimentation, induction, deduction)?</li> <li>▪ What is a hypothesis?</li> <li>▪ What is an independent variable?</li> <li>▪ What is a dependent variable?</li> <li>▪ What is the purpose of a control group?</li> <li>▪ What is the purpose of random assignment of subjects to groups?</li> <li>▪ What is internal validity and what are common threats?</li> <li>▪ What is external validity and what are common threats?</li> <li>▪ What is the research method?</li> <li>▪ What types of data and scales of measurement (nominal and ordinal = discrete data, interval and ratio = continuous data) are seen in research?</li> <li>▪ What are common measures of central tendency and what information does this provided about a data set?</li> <li>▪ How might you identify relationships between variables of interest (e.g. correlation and differences between group means (t-test, analysis of variance)</li> <li>▪ What does the p value or probability associated with data analysis really mean?</li> <li>▪ How are conclusions drawn based on the data?</li> </ul>	<b>1</b>
6/23	<p><b>Unit 2: The Neuron</b></p> <ul style="list-style-type: none"> <li>▪ What are the units of measurement that are used to give the neuron scale?</li> <li>▪ What are the basic components/functions of the neuron (e.g. soma, cytosol, cytoplasm, nucleus (chromosomes, DNA, mRNA, transcription, translation), endoplasmic reticulum (ER), smooth ER, golgi apparatus, mitochondrion, neuronal membrane, cytoskeleton (microtubules, microfilaments, neurofilaments)?</li> <li>▪ What are the parts of the axon (i.e. axon hillock, axon proper, axon</li> </ul>	<b>2</b>

6/25	<p>terminal) and there functions?</p> <ul style="list-style-type: none"> <li>▪ What is the significance of the two sides of the synapse (i.e. pre, post), the synaptic cleft and the mechanisms for information transfer at the synapse (synaptic transmission)?</li> <li>▪ What are the three general categories of neurotransmitters and describe their mechanism of action?</li> <li>▪ What is axoplasmic transport and anterograde transport?</li> <li>▪ What are dendrites and what is there function?</li> <li>▪ Classify neurons according to number of neurites, dendrites, connections, axon length and neurotransmitter</li> <li>▪ What are glia?</li> <li>▪ What are astrocytes?</li> <li>▪ What are mylinating glia, ependymal cells and microglia?</li> </ul> <p><b>Unit 3: Resting Neuronal Membrane</b></p> <ul style="list-style-type: none"> <li>▪ What are the ions in the cytosol and extracellular fluids that are responsible for resting and action potentials?</li> <li>▪ How is it that the phospholipid bilayer of the neuron can isolate the cytosol from the extracellular fluid?</li> <li>▪ What are the four levels of protein structure?</li> <li>▪ What is the significance of channel proteins in the phospholipid bilayer?</li> <li>▪ Describe the movement of ions via diffusion and an electrical field.</li> <li>▪ What is the membrane potential and do changes in ionic concentrations affect its equilibrium or balance?</li> <li>▪ What are a sodium-potassium and calcium pumps and how do they work?</li> </ul>	3
6/25	<p><b>Unit 4: The Action Potential</b></p> <ul style="list-style-type: none"> <li>▪ What are the phases of the action potential?</li> <li>▪ How are action potentials recorded?</li> <li>▪ Explain how stimuli (e.g. stretching nerve endings, presence of neurotransmitters) leads to action potentials?</li> <li>▪ What is the absolute and relative refractory period?</li> <li>▪ What is the voltage gated sodium channel and how does it work?</li> <li>▪ Explain how a toxin (e.g. tetrodotoxin – TTX) affects the current through a sodium channel</li> <li>▪ What are voltage gated potassium channels and how do they work?</li> <li>▪ What are some factors that influence conduction velocity?</li> <li>▪ What is the underlying cause of multiple sclerosis?</li> </ul>	4
6/25	<p><b>Unit 5: Synaptic Transmission</b></p> <ul style="list-style-type: none"> <li>▪ Synaptic transmission in the mature human nervous system occurs chemically; describe the universal characteristics of the synapse, including the synaptic cleft, synaptic vesicles, secretory vesicles</li> <li>▪ What is the significance of the protein accumulations known as membrane differentiations and postsynaptic density?</li> <li>▪ Can you distinguish synapses based on which part of the neuron is postsynaptic to the axon terminal (e.g. post-synaptic membrane on dendrite = axondendritic, on cell body = axosomatic, on another axon = axonaxonic, or dendrite to dendrite = dendodendritic)</li> <li>▪ Further differentiating the synapse, what is Gray’s type I and type II synapses?</li> <li>▪ What are the three chemical categories of neurotransmitters and how are they alike or different with regard to synthesis and storage?</li> <li>▪ Note the major neurotransmitters (not a test question)</li> <li>▪ What triggers the release of neurotransmitters at the synaptic terminal, explain?</li> </ul>	5

	<ul style="list-style-type: none"> <li>▪ What are transmitter-gated ion channels and how do they work?</li> <li>▪ What causes excitatory postsynaptic potentials (EPSP) and inhibitory postsynaptic potentials (IPSP)?</li> <li>▪ What are G-protein-coupled receptors and how do they work?</li> <li>▪ How is synaptic integration accomplished?</li> <li>▪ Looking at cholinergic neurons: Where is acetylcholine produced (ACh) and what enzyme is required for production?</li> <li>▪ What is the rate limiting step in ACh synthesis?</li> <li>▪ What enzyme degrades ACh?</li> <li>▪ Assuming enzyme degradation was inhibited by certain nerve gases or insecticides, what would be the effect on skeletal muscle and heart muscle?</li> <li>▪ Looking at cholinergic neurons: Where is acetylcholine produced (ACh) and what enzyme is required for production?</li> <li>▪ What is the rate limiting step in ACh synthesis?</li> <li>▪ What enzyme degrades ACh?</li> <li>▪ Assuming enzyme degradation was inhibited by certain nerve gases or insecticides, what would be the effect on skeletal and heart muscle?</li> </ul>	
6/30	<p><b>EXAM 1 Return exam same day - mandatory review</b></p>	1-5
7/2	<p><b>Unit 6: Overview of Neurotransmitter Systems</b></p> <ul style="list-style-type: none"> <li>▶ List the primary components of a neurotransmitter system?</li> <li>▶ Characterize the cholinergic neuron and briefly describe the life cycle of the cholinergic neurotransmitter ACh.</li> <li>▶ How do neurotransmitter transporters work?</li> <li>▶ Using the slides provided, outline the steps associated with the synthesis of catecholamine neurotransmitters (i.e. dopamine, norepinephrine, epinephrine) from tyrosine</li> <li>▶ What is dopamine's role in Parkinson's Disease?</li> <li>▶ What influence does serotonin have on behavior and trace its synthesis from tryptophan</li> <li>▶ Discuss several of the characteristics of the amino acidergic neurotransmitters glutamate, glycine and gamma-aminobutyric acid.</li> <li>▶ What are the basic structures of the transmitter gated channels?</li> <li>▶ Considering that the amino acid channels mediate most of the fast synaptic transmission in the CNS, describe their structure and function</li> <li>▶ Based on slides provided, what are several glutamate-gated channel subtypes and how are they different</li> <li>▶ Given that the GABA-Gated and Glycine-gated channels mediate most synaptic inhibition in the CNS, briefly discuss their structure.</li> <li>▶ Discuss the basic structure of the G-Protein-Coupled receptors and BASIC operation of G-proteins</li> <li>▶ Briefly explain the notion of divergence and convergence in neurotransmitter signaling systems</li> </ul>	6
7/7	<p><b>Unit 7: Overview of Motor Learning Theories, Factors that impact Learning and the Neural Mechanisms Underlying Motor Learning</b></p> <ul style="list-style-type: none"> <li>▪ What is motor learning</li> <li>▪ Differentiate between specific forms of learning (i.e. nonassociative = habituation and sensitization, associative = pairing or associating ideas - classical conditioning, operant conditioning, procedural and declarative learning)</li> <li>▪ Explain Adam's closed loop theory of motor learning</li> <li>▪ Explain Schmidt's schema theory of motor learning</li> <li>▪ Explain Bernstein's systems theory of motor learning</li> </ul>	7

	<ul style="list-style-type: none"> <li>▪ How is it that motor learning progresses from explicit control to a more implicit or automatic control?</li> <li>▪ What are the three phases of motor learning?</li> <li>▪ What is attention and how is attention critical to motor learning?</li> <li>▪ What types of feedback (intrinsic, extrinsic) are available to the learner during motor skill acquisition?</li> <li>▪ What is knowledge of results and how can this information be used by the learner?</li> <li>▪ What kinds of practice conditions promote learning (massed vs. distributed, constant versus variable, random vs. blocked practice (contextual interference)?</li> <li>▪ Define and characterize sensory, short term and long term memory</li> <li>▪ Where do memories reside in the brain (see the work of Hebb and Lashley)?</li> <li>▪ What is transfer of learning (to new task or new environment) and why is this phenomenon so important in everyday tasks and sports?</li> <li>▪ To what extent is the prefrontal cortex activated during the initial stages of explicit motor learning?</li> <li>▪ Is the cingulate cortex activated along with the prefrontal cortex during explicit motor learning and what function does it serve?</li> <li>▪ To what extent and at what stage in the learning process is the pre-supplementary motor area active?</li> <li>▪ Is there an association between the activation of the secondary motor area and phase of learning or practice as well as type of task (e.g. sequential)?</li> <li>▪ At what phase and which hemisphere (s) might the premotor cortex be most active during the early phases of skill acquisition?</li> <li>▪ Discuss the role of the parietal cortex including specific locations (inferior, superior-posterior) in motor learning</li> <li>▪ Explain how the cerebellum is involved in skill acquisition and movement control particularly during visually guided movements</li> <li>▪ At what phases of motor learning are the basal ganglia involved and what specific contributions does the basal ganglia make in terms of memory?</li> <li>▪ What are neural circuits in the context of motor learning and how might they be active during implicit and explicit learning?</li> </ul>	
7/9	<b>Lab Demonstration: Memory of a discrete positioning task</b>	
7/9	<b>Lab Demonstration: Contextual Interference</b>	
7/14	<b>Exam 2 Return exam same day - mandatory review</b>	<b>6-7</b>
7/16	<b>Unit 8: Spinal control of movement</b> <ul style="list-style-type: none"> <li>▪ What is the somatic motor system?</li> <li>▪ What is a lower motor neurons (LMN) and what is the significance of a segmental organization of the LMN</li> <li>▪ What is the alpha motor neuron and how does the AMN allow for graded control of muscular contraction?</li> <li>▪ What are the "types" and properties of motor units?</li> <li>▪ To what extent are the properties of muscle determined by the type of nervous intervention it receives (see crossed-innervation experiment)?</li> <li>▪ Describe the molecular basis of muscle contraction</li> <li>▪ What is amyotrophic lateral sclerosis?</li> <li>▪ What is Myasthenia gravis?</li> <li>▪ What are the sensory feedback or proprioceptive mechanisms for muscles (i.e. muscle spindles, golgi tendon organs) and how do they function?</li> <li>▪ What is the myotatic reflex?</li> </ul>	<b>8</b>

	<ul style="list-style-type: none"> <li>▪ What is muscular dystrophy?</li> <li>▪ What is the role of the gamma motor neuron?</li> <li>▪ Define and describe the function of the golgi tendon</li> <li>▪ What kind of proprioception do we receive from joints?</li> <li>▪ What are spinal interneurons and what is there function/significance?</li> <li>▪ How might the spinal cord generate motor programs for basic locomotion (e.g. walking)?</li> </ul>	
7/16	<p><b>Unit 9: Brain control of movement</b></p> <ul style="list-style-type: none"> <li>▪ What are the three levels of motor control hierarchy?</li> <li>▪ List and characterize the two major groups of pathways that the brain utilizes to communicate with the motor neurons in the spinal cord?</li> <li>▪ What are the divisions within these groups of pathways and characterize each?</li> <li>▪ What would be the effect of a lesion to the lateral pathway?</li> <li>▪ Where is the motor cortex and briefly discuss past research that led to the ID of and our understanding of the motor cortex?</li> <li>▪ Discuss the contributions of the major areas of the brain (pre-frontal cortex, parietal, pre-motor (PMA) and supplementary motor area (SMA) that plan movement?</li> <li>▪ Identify the anatomical features of the basal ganglia and discuss the role of the basal ganglia in executing voluntary movement</li> <li>▪ What is the motor loop (cortex thru basal ganglia)</li> <li>▪ What is Huntington's disease and its etiology?</li> <li>▪ What is Parkinson's disease and its etiology?</li> <li>▪ Identify the anatomical features of the cerebellum</li> <li>▪ What is the primary role of the cerebellum in motor control and describe the motor loop theorized through the cerebellum</li> </ul>	<b>9</b>
7/16	<b>Lab Demonstration: Simple and choice reaction time</b>	
7/21	<b>Exam 3 Return exam same day - mandatory review</b>	<b>8-9</b>
7/23	<p><b>Unit 10: Central Visual System</b></p> <ul style="list-style-type: none"> <li>▪ What is conscious visual perception?</li> <li>▪ What is the retinofugal projection?</li> <li>▪ What are the optic nerve, optic chiasm and optic tract and where do they reside?</li> <li>▪ Explain what is meant by the right and left visual hemifields</li> <li>▪ Assuming projections from the optic tract, what is the lateral geniculate nucleus (LGN) and explain its role in vision?</li> <li>▪ What is optic radiation and why is it significant?</li> <li>▪ How is visual input segregated by the eye and ganglion cell type (synapsing on different layers....)?</li> <li>▪ What is retinotopy and explain how the retinotopy represents a map that ultimately allows for orientation of the head and eyes toward visual stimuli (getting to the fovea)?</li> <li>▪ What is the striate cortex (i.e. primary visual cortex), identify the primary gross anatomical components of the striate cortex the organization of different layers, the innervation of cortical layers and parallel pathways, identify key physiological activity of the striate cortex (i.e. M channel, P-IB channel, orientation columns)?</li> <li>▪ What are the key elements of the dorsal and ventral visual streams as a means of detecting and perceiving visual motion (e.g. navigation, directing eye movements, motion perception) as well as there role in visual perception?</li> <li>▪ What is the relationship between visual reaction time and success in sport?</li> <li>▪ What it tau?</li> <li>▪ What is the significance of visual search strategies when applied to sport</li> </ul>	<b>10</b>

	(e.g. do humans need to observe the flight of an object from origin to intercept in order to resolve visual conflict in route to “catching an object”?) <ul style="list-style-type: none"> <li>▪ What do we mean by parallel processing?</li> </ul>	
7/23	<b>Unit 11: Vestibular systems role in controlling movement</b> <ul style="list-style-type: none"> <li>▪ List three primary roles of the vestibular system (VS) in motor control</li> <li>▪ What is the vestibular labyrinth?</li> <li>▪ What are otolith organs, the macula and how do they provide for motor control?</li> <li>▪ What are semicircular canals and how do they provide for motor control?</li> <li>▪ Explain the organization and functional significance of the central vestibular pathways</li> <li>▪ What is the vestibulo-ocular reflex (VOR)?</li> <li>▪ Trace the vestibular connections mediating horizontal eye movements during VOR</li> </ul>	<b>11</b>
7/23	<b>Unit 12: Developing and losing postural control</b> <ul style="list-style-type: none"> <li>▪ Discuss the emergence of postural/motor control as it relates to the reflex theory</li> <li>▪ Use the systems perspective (remember Bernstein’s system theory) to explain and characterize postural control</li> <li>▪ What is the order (i.e. head to foot, proximal to distal) of control seen in infants according to Gesell &amp; Gesell?</li> <li>▪ At what point, developmentally, can toddlers demonstrate anticipatory behavior and speculate on the significance of this behavior?</li> <li>▪ What are the major motor milestones associated with the development of movement?</li> <li>▪ What changes in gait and basic movement are evident in older persons?</li> <li>▪ What variables are predictors or contribute to increased risk of falling in older adults?</li> <li>▪ Briefly describe the selected systems decline and their contribution to fall risk in older adults</li> <li>▪ What types of compensatory muscular responses are produced by older persons in response to a slip or instability and do these responses differ between young and old subjects?</li> <li>▪ What types of interventions are best in terms of reducing the older persons risk of falling?</li> </ul>	<b>12</b>
7/23	<ul style="list-style-type: none"> <li>▪ <b>Unit 13: Neural Plasticity</b></li> <li>▪ Define neural plasticity</li> <li>▪ Where do memories reside in the brain (see Hebb and Lashley)?</li> <li>▪ Discuss plasticity as it relates to specific forms of learning (i.e. nonassociative = habituation and sensitization, associative = pairing or associating ideas - see classical conditioning, operant conditioning, procedural and declarative learning)</li> <li>▪ Explain several fundamental neural responses to injury that might set the stage for plasticity (e.g. diaschisis, edema, denervation)</li> <li>▪ Explain how neural regeneration occurs (synaptogenesis, collateral sprouting)</li> <li>▪ How does neural regeneration influence changes in cortical mapping, remapping and reorganization?</li> </ul>	<b>13</b>
7/28	<b>Lab Demonstration: Postural Control</b> <b>Class divided into two groups</b>	
7/30	<b>Exam 4</b>	<b>10-13</b>
8/4	<b>Comprehensive Final Exam (regularly scheduled class time)</b>	<b>1-13</b>

**References:**

Findley BW, Brown LE, Whitehurst M, Keating T, Murray DP, Gardner LM. The influence of body position on load range during isokinetic knee extension/flexion. *Journal of Sports Science and Medicine*. 5:400-406, 2006.

Rossi MD, Brown LE, Whitehurst M. Assessment of hip extensor and flexor strength two months after unilateral total hip arthroplasty. *Journal of Strength and Conditioning Research*. 20(2):262-267, 2006.

Rossi MD, Brown LE, Whitehurst M. Knee Extensor and Flexor Torque Characteristics before and after Unilateral Total Knee Arthroplasty. *American Journal of Physical Medicine and Rehabilitation*. 85(9):737-746, 2006.

Rossi MD, Brown LE, Whitehurst M. Early Strength Response of the Knee Extensors During Eight Weeks of Resistive Training Following Unilateral Total Knee Arthroplasty. *Journal of Strength and Conditioning Research*. 2005 Nov;19(4):944-949.

Whitehurst M, Johnson B, Parker C, Brown LE, Ford MA. The Benefits of a Functional Exercise Circuit for Older Adults. *Journal of Strength and Conditioning Research*, 19(3), 647-651, 2005.  
Whitehurst M, Del Rey P.

Effects of contextual interference, task difficulty, and levels of processing on pursuit tracking. *Perceptual and Motor Skills*, 1983,57,619-628.

Whitehurst M, Brown LE, D'Angelo A, Eidelson S. Functional Mobility Performance in an Elderly Population with Lumbar Spinal Stenosis. *Archives of Physical Medicine and Rehabilitation* 2001Apr;82(4):464-7.

Whitehurst M, Groo D and Brown LE: Prepubescent Heart Rate Response to Indoor Play. *Pediatric Exercise Science*. 8(3):245-250, 1996.

Whitehurst M. Reaction Time Unchanged in Older Women Following Endurance Training. *Perceptual and Motor Skills*, 1991, 72, 251-256.

#### Books (BACKGROUND READING):

Espenschade, AS, Eckert HM. *Motor Development*. 2<sup>nd</sup> Edition, Charles E. Merrill Publishing Company, Columbus, Ohio, 1980.

Ganong WF. *Review of Medical Physiology*. 20<sup>th</sup> Edition, Appleton & Lange, Norwalk, Connecticut, 1999.

Kelso JAS. *Dynamic Patterns: The Self-Organization of Brain and Behavior*. MIT Press, Cambridge, Massachusetts, 1999.

Rothwell J. *Control of Human Voluntary Movement*. 2<sup>nd</sup> Edition, Chapman & Hall, London, England, 1994.

Schmidt RA, Lee TD. *Motor Control and Learning: A Behavioral Emphasis*. 3<sup>rd</sup> Edition, Human Kinetics, Champaign, Illinois, 1999.

Strong R, Wood WG, Burke WJ (Editors). *Central Nervous System Disorders of Aging: Clinical Interventions and Research*. Volume 33, Raven Press, New York, 1987.

Thelen E, Smith LB. *A Dynamic Systems Approach to the Development of Cognition and Action*. MIT Press, Cambridge, Massachusetts, 1994.

Welford AT. Ageing and Human Skill. Oxford University Press, London, England, 1958.

Coker CA. Motor Learning and Control for Practitioners. New York, McGraw-Hill, 2004.

Gabbard CP. Lifelong Motor Development. San Francisco, Pearson, 2004.

Shumway-Cook A., Woollacott MH. Motor Control: Theory and Practical Applications, 2<sup>nd</sup> ed. Philadelphia, Lippincott Williams & Wilkins, 2001.

#### Periodicals:

Journal of Motor Behavior  
Perceptual and Motor Skills  
Journal of Gerontology  
Journal of Experimental Psychology  
Research Quarterly for Exercise and Sport  
Journal of Human Movement Studies  
Science

#### Websites

<http://www.medscape.com>  
<http://www.ncbi.nlm.nih.gov/PubMed/>

### **Overview of Write-up for Lab Demonstration**

PET 3050 Motor Learning and Control  
Department of Exercise Science and Health Promc  
Michael Whitehurst, Ed.D., FACSM  
Professor of Exercise Science & Health Promotion



#### Overview:

You will be asked to measure and record outcomes associated with four laboratory demonstrations spanning reaction time to balance and postural control. Your goal is to adhere to the laboratory protocols and to execute the demonstration as precisely as possible. The purpose of the laboratory demonstration is to give you an opportunity to observe and measure aspects of motor performance/control/learning. You and your laboratory partner (s) will conduct an experiment using each other as subjects. You will execute the experiment in accordance with the guidelines provided to you by your instructor. You are to record the results and write a report that will be due that day (summer only) or one week from the date of the laboratory demonstration. You are to use the worksheet provided to record the raw data that you collect during the laboratory demonstration. Using information from the PowerPoint files and class lecture/discussion generate a lab report, including:

#### FOUR SECTIONS to each LAB DEMONSTRATION

- Purpose Statement (simply state what you were to do in the lab (i.e. measure reaction time))
- Methods Section (describe the subject (s) that were tested and precisely how you measured the variables of interest)
- Results Section
  - Report the mean and standard deviation in Tabular form for variables measured
  - Create a chart (s) to visually illustrate the subject's performance on a given task. (see examples provided)
- Conclusion Section (describe what you found and indicate what these findings mean, if anything, including whether the findings are or are not consistent with information we have discussed in class.)

**NOTE:** Each report should include the data sheet and your ONE-TWO PAGE lab report that includes the sections listed above. Each lab report is worth 20 points or five points per section. Points are deducted if your report does not include the requested information, if the information is incorrect or inconsistent with lecture. The report should be written in past tense!. NO COVER PAGE!