KIN 3650 Motor Learning & Performance: LECTURE & LAB SYLLABUS

Lectures: Tues/Thurs 12:30-1:45 pm, COLSM 2043
Lab: Wed 12:00-1:40pm in KINES 231
FINAL EXAM: Due by Wed, Dec 9th, 11:59 pm CT

Instructor: Andrew G. Thompson, MS
Office: KINES 140 **|Office Hours**: Thursdays 10:15-12:15 am
Email: agt0006@auburn.edu

Course Description:

This is a lecture-based course with a practicum component taught in the Motor Learning Laboratory. In this course, we explore theories and research in human motor learning and performance. Emphasis is placed on experiments in which healthy young adults learn complex motor behaviours. We will also delve into different populations (e.g., experts, individuals with motor disorders, older adults) and different levels of analysis to understand learning and performance at psychological and physiological levels.

Required Materials:

Textbook: Schmidt & Lee (2011), Motor Learning and Control: A Behavioural Emphasis (5th Ed.). Champaign, IL: Human Kinetics.

Online lecture materials: You will probably find the online lecture slides relatively sparse and this is by design. These lecture materials are there to facilitate discussion in class and spark your memory while studying. You are welcome to print out these lecture materials and bring them to class, but I caution against studying these slides on their own.

Grading and Assessments:

Grades for this class are based on weekly quizzes, two tests, one final exam, and lab assignments.

The grading scale is as follows:
90.0 – 100.0 = A
80.0 – 89.9 = B
70.0 – 79.9 = C
60.0 – 69.9 = D
0.0 – 59.9 = F
There are absolutely no exceptions!

Pedagogical Quizzes (10% of final grade): These quizzes will be offered online every week as a tool to help you study. You must take these quizzes every week as they will help to space out your studying and identify strengths/weaknesses in your knowledge. For each quiz you will have 2, and only 2 attempts. After the first submission you will receive feedback on what responses were correct and incorrect. Prior to your second attempt, it is highly suggested you go back and read over the corresponding sections of incorrect responses. The highest grade achieved will be recorded as your score.

Midterm Exams (40% of final grade; 20% each): These exams will be offered online and have a flexible time for completion. The reason for this is that I want you to spend time on your answers and really provide the best answer possible. Midterm exams will be a combination of short answer and multiple-choice questions.

Final Exam (30% of final grade): The final exam is quasi-cumulative. Emphasis is placed on material from Unit 3, but will integrate concepts from Units 1 and 2. As with the midterms, the final exam will be a combination of short answer and multiple-choice questions.

Lab Description (20% of final grade):

The goal of this lab is to give you first-hand experience with modern experimental methods, data collection/analysis tools, and the experience of human research participants.

Lab assignments (50% of final lab grade): Half of your grade in the lab is based on the completion of the six lab assignments. These assignments are worksheets that are completed in each lab. The content of the individual lab assignments will vary depending on the topic being covered in lab. See the calendar below for a detailed schedule of the lab topics. Each lab must be typed and submitted online through canvas as either a word or pdf file.

Experience of human research participants (50% of final lab grade): The only way that research in motor learning and performance moves forward is by the voluntary participation of human research participants. Participants are key stakeholders in the research process who sacrificed their time and, in some cases, put their health/safety at varying degrees of risk to advance scientific knowledge. As such, a key part of this lab is to give students a deeper appreciation of the value and experience of human research participants. For our lab, this understanding of the human research experience can be gained in two ways: **(1)** active participation in research or **(2)** reading published experiments and writing a paper explaining the experience of participants in that study.

(1) Participation in research: In order to complete the participation requirement for this course, students must participate in 4 hours of research. Various research projects are being run in the School of Kinesiology and you may participate in any of them. For more information we recommend that you talk to the instructor for your course or visit Auburn University's SONA system for coordinating human research. Upon completing the experiment, please have the researcher fill out a copy of the form attached at the end of this syllabus and return the completed form to your lab instructor. Remember that you need complete 4 total hours of research in order to receive full credit for this part of your lab grade.

   a. This class is participating in the online College of Education research participation system, SONA. If you are under 19 years of age you must get your parents' consent to

participate in each study. Forms are available online. It is your job to make sure that your credit earned through the SONA system goes to the correct course. You can modify this in your student account. If you sign up for a study that has appointments, you are expected to attend. If you need to cancel, follow the directions for cancelling an appointment for that study. ***Please attend to cancellation deadlines for that study.*** If you fail to cancel within the appointed time you will be marked as a "no-show" in SONA. Two "no-show" designations will result in you being locked out of SONA for the semester and you will not be able to receive extra credit through research participation for that semester.

b. You will receive an email with your account information for College of Education SONA system. You can also access the SONA system through this URL: https://auburn-education.sona-systems.com.

(2) Writing a research paper. In some cases, a student may not feel comfortable participating in research, simply choose not to participate, or may be unable to fulfill their research hours due to the inclusion/exclusion criteria of a given study (e.g., a left handed student cannot participate in most neuroimaging studies). As alternative, students have the option of writing a brief research paper that describes the research methods of ***two*** different published experiments in any sub-field of kinesiology. ***All papers must be approved by the lab instructor prior to the student beginning the assignment***. In their paper, students must clearly explain **(a)** what the goal of the research was, **(b)** who the sample of participants was and how they were selected, **(c)** what were the inclusion/exclusion criteria placed on who could participate and why did the experimenters select these criteria, **(d)** what were the experimental methods (in detail), and **(e)** make sure that your answer focuses especially on the participants experience with the methods (e.g., How long were participants in the lab? Were any of the procedures invasive? Did any of the procedures place the participants at risk?). Finally, **(f)** include your personal perspective on the methods used in the study. Focus especially on what you see as the beneficial information gained from the study and any potential risks to which the participants were exposed. Is this an experiment that you would have participated in? Why/why not?

Laboratory Notebook: Any sort of notebook will do, but I would recommend a composition notebook with grid-lined pages. Grid-lines make the reproduction of graphs much easier. This notebook will be useful not only for recreating relevant figures from your readings and lecture but also keeping track of data that you record in the lab sessions. Your lab notebook in no way counts toward your final grade, but keeping an organized and detailed lab notebook is an excellent habit to cultivate.

Course Overview:

UNIT 1| PERCEPTION, MEMORY, ATTENTION AND ACTION

This section of the course focuses on factors that influence the performance of complex motor skills. We stress the integration of perception and action and factors that cause transitory, phasic changes in an individual's capability to perform an action.

Textbook Readings:
Schmidt and Lee Chapters 1, 2, 3, 4, and 5

Research Articles:
Wulf, G., Dufek, J. S., Lozano, L., & Pettirgrew, C. (2010). Increased jump height and reduced EMG activity with an external focus. *Human Movement Science, 29*, 440-448.

UNIT 2| FUNDAMENTALS OF NEUROMOTOR CONTROL

This section of the course focuses on motor control processes. While perception is fundamental to control, emphasis is placed on behavioural outcomes (e.g., what is being controlled) and the underlying physiology (e.g., how is control exerted).

Textbook Readings:
Schmidt and Lee Chapters 5, 6, and 8

Research Articles:
Kornatz, K.W., Christou, E. A., & Enoka, R.M. (2005). Practice reduces motor unit discharge variability in hand muscle and improves manual dexterity in old adults. *Journal of Applied Physiology, 98,* 2072-2080.

UNIT 3| LEARNING AND MEMORY FOR MOTOR SKILLS

This section of the course focuses on how we define and measure learning, variables in the training environment that enable or inhibit learning, and the neurophysiological changes that underlie learning.

Textbook Readings:
Schmidt and Lee Chapters 10, 11, 13, and 14

Research Articles:
Lohse, K. R., Wadden, K. W., Boyd, L. A., & Hodges, N. J. (2014). Motor skills acquisition across short and long time scales: A meta-analysis of neuroimaging data. *Neuropsychologia, 59*, 130-141.

Unit #1| Perception, Memory, Attention and Action.

Date:	Topic:	Read (before class)	Lecture/Lab Content:
T, Aug 18th		SL 1	Syllabus, overview, examples.
R, Aug 20th	Measurement	SL 2	History of motor learning; types of measurement; levels of analysis.
T, Aug 25th	Cognitive Processes	SL 3	Information processing models
W, Aug 26th			***Lab 1. Introduction to terms and experimental methods.***
R, Aug 27th	Memory	SL 3	Signal detection theory, sensation and memory
T, Sept 1st	Anticipation	SL3	Continue with SL chapter 3, focusing on anticipation.
W, Sept 2nd			***Lab 2. Understanding accuracy and precision.***
R, Sept 3rd	Attention	SL 4	Types of attention and general theories of attention.
T, Sept 8th	Attention	SL 4	Attention during movement and the focus of attention
W, Sept 9th			***No lab this week.***
R, Sept 10th	Attention	Wulf et al (2010)	The influence of instructional style on muscle recruitment and performance.
T, Sept 15th	Vision and Audition	SL 5	Visual and auditory systems.
W, Sept 16th			***Lab 3. Eye-tracking in the motor learning lab.***
R, Sept 17th	Vision and Audition	SL 5	Visual processes in motor control.
T, Sept 22nd	Vision and audition	SL 5	Review for Exam 1 (if free).
W, Sept 23rd			***No lab this week.***
***	**Exam #1 assigned.**		

Unit #2| Fundamentals of Neuromotor Control.

Date:	Topic:	Read (before class)	Lecture/Lab Content:
T, Sept 29h	Proprioception	SL 5	The vestibular system and mechanoreceptors
W, Sept 30th			***No lab this week.***
R Oct 1st	Proprioception	SL 5	The vestibular system and mechanoreceptors
T, Oct 6th	Proprioception	SL 5	The vestibular system and mechanoreceptors
W, Oct 7th			***Lab 4: Mobile EMG in the Motor Learning Lab.***
R, Oct 8th	Proprioception/Central contributions to motor control	SL 6	Open loop processes, the hierarchical control model.
T, Oct 13th	Central contributions to motor control	SL 6	Control of rapid movements, neuropsychology and motor disorders.
W, Oct 14th			***Lab 5: Feedback processing EEG lab.***
R, Oct 15th			**Fall Break: No Lecture**
T, Oct 20th	Central contributions to motor control	SL 6	Central pattern generators and the spinal cord
W, Oct 21st			***No lab this week.***
R, Oct 22nd	Central contributions to motor control	Kornatz et al (2005)	Aging and motor control.
T, Oct 27th	Coordination		Review for Exam 2 (if free).
***	**Exam #2 Assigned**		

Unit #3| Learning and Memory for Motor Skills.

Date:	Topic:	Read (before class)	Lecture/Lab Content:
T, Nov 3rd	Motor Learning	SL 10	What is learning? How do we measure it?
W, Nov 4th			***No lab this week.***
R, Nov 5th	Motor Learning	SL 14	Understanding testing conditions.
T, Nov 10th	Motor learning	SL 14	The distinction between learning and performance.
W,Nov 11th			***Lab 6. Fast learning and visuomotor adaptation.***
R, Nov 12th	Conditions of practice	SL 11	Performance curves, verbal information, observational learning.
T, Nov 17th	Conditions of practice	SL 11	Distribution of practice, variable practice, contextual interference.
W,Nov 18th			***No lab this week.***
R, Nov 19th	The learning process	SL 13	Theoretical perspectives on motor skill learning.
Nov 23-27			**Thanksgiving Break: No Classes**
T, Dec 1st	The learning process	SL 13	Theoretical perspectives on motor skill learning
W, Dec 2nd	Lab Day turned into Lecture: A neuro-psychological model of learning		More on learning; Connecting psychology to physiology**.** Structural and functional changes in the brain.
R, Dec 3rd	A neuro-psychological model of learning	Lohse et al., 2014	Motor disorders: Processes and associated brain regions.
***	**Final exam assigned**		

Final Exam Due: Wed, Dec 9, by 11:59 pm CT

***The instructor reserves the right to change this syllabus as she/he sees fit. Students will be made aware of any changes via email and in-class, verbal announcements. ***

I confirm that _____ participated in _____ minutes of research between the dates of ___/___/___ and ___/___/___.

Investigator's signature: **Date:**

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