

MOTOR SKILL LEARNING AND PERFORMANCE

KIN 760

Spring 2016

Wed 8:30 – 11:15 am

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Course description

Skilled motor behavior is foundational to many human activities in daily life (e.g., typing, driving, using tools), sports (e.g., golf, swimming, skiing), the performing arts (e.g., singing, playing musical instruments, dancing), occupations such as law enforcement, firefighting, and the military (e.g., piloting aircraft, controlling machines, shooting) and medical professions (e.g., surgery, dentistry). In this course, we will address questions such as: How do we manage to coordinate our movements effectively, and what are some underlying mechanisms that help us achieve our movement goals? How can a coach, athletic trainer, music teacher, or physical/occupational therapist facilitate the learning process? Which types of feedback are more helpful than others? What practice methods are effective? Why do people choke under pressure, and how can choking be avoided? How does a person's focus of attention affect motor performance and learning? How does a performer's motivational state influence learning?

Students will gain an understanding of basic concepts and current perspectives in motor control and learning. Research studies will be discussed, including limitations of current research, and how the knowledge base might be expanded in certain areas. Students will also gain experience in presenting material to an audience.

Course objectives and learning outcomes

Upon completion of the course, students will:

1. know concepts and terminology related to motor control and learning
2. understand the role of sensory and central contributions to motor control
3. appreciate the various roles of feedback
4. understand the function of practice variability in the learning process
5. understand the basis and effectiveness of observational learning
6. recognize the importance of autonomy support
7. understand the impact of performers' attentional focus
8. explain the reasons for "choking" under pressure
9. be familiar with motor learning theory, and
10. be able to apply this knowledge to his or her field of interest.

Course requirements

1. Each student will give 2 presentations on a specific topic. Each presentation should be 15-20 minutes long. Visual aids should be used as appropriate. In addition, there will be a shorter presentation ("Design your own study," up to 10 minutes) on April 27.
2. At the beginning of most class periods, there will be an assignment (i.e., 1 or 2 questions based on the reading assignment for that day).

3. Exams will be taken at the designated times.

Student evaluation

<u>Criteria</u>	<u>% of grade</u>
In-class assignments	10%
Presentations	2x15%, 1x10%
Midterm exam	25%
Final exam	25%

Final grades will be determined according to the following scale:

Grade scale (points):			
	1,000-920 = A	919-900 = A-	
899-880 = B+	879-820 = B	819-800 = B-	
799-780 = C+	779-720 = C	719-700 = C-	
699-680 = D+	679-620 = D	619-600 = D-	

COURSE SCHEDULE

Date

January 20 **Introduction: Motor control, learning, and performance**

January 27 **Sensory contributions to motor control**

- Closed-loop control
- Proprioception
- Exteroception
- Focal versus ambient visual systems
- Postural control, vision, and attention

Reading: Schmidt & Lee (2011) (Proprioception: p. 153-169; Vision: p. 136-142)

Presentation 1: "Ambient and focal vision" (Goodale, Milner, Jakobsen, & Carey, 1991; Schmidt & Lee, 2011, p. 137-138)

Presentation 2: "The role of vision in postural control" (Lee & Aronson, 1974; Schmidt & Lee, 2011, p. 142)

Presentation 3: "Attention and postural control" (Vuillerme & Nafati, 2005; Olivier, Palluel, & Nougier, 2008)

February 3 **Central contributions to motor control**

- Open-loop control
- Motor programs
- Functional variability
- Automaticity

Reading: Schmidt & Lee (2011) (in particular: p. 179-180, 182-185, 188-189, 208-210, 213-219)

Presentation 4: "Muscular efficiency" (Green & Wilson, 2000)

Neuroscience of learning

Presentation 5: "Brain activity as a function of motor learning" (Lohse, Wadden, Boyd, & Hodges, 2014)

Presentation 6: "Brain activity in novice versus expert golfers" (Milton, Solodkin, Hluštík, & Small, 2007)

February 10 **Feedback – The guidance notion**

- Measuring motor learning
- Feedback frequency
- Guidance hypothesis
- Concurrent feedback
- Error estimation

Readings: Schmidt (1991); Lewthwaite & Wulf (2010)

Presentation 7: "Feedback frequency effects" (Winstein & Schmidt, 1990, in particular Experiments 2 and 3)

Motivational effects of feedback

- Feedback after good versus poor performance
- Social-comparative feedback

Presentation 8: “Feedback after good versus poor performance” (Chiviawsky & Wulf, 2007)

Presentation 9: “The influence of social-comparative feedback” (Wulf, Chiviawsky, & Lewthwaite, 2010)

February 17 **Practice variability**

- Variable versus constant practice
- Random versus blocked practice (contextual interference)
- Explanations for the contextual interference effect
- Neurophysiological evidence

Reading: Lee (2012)

Presentation 10: “Judgments of learning during random versus blocked practice” (Simon & Bjork, 2001)

Presentation 11: “Variable practice and memory consolidation” (Kantak, Sullivan, Knowlton, & Winstein, 2010)

February 24 **Learning through observation**

- Mirror neuron system
- Learning through observation
- Practice in groups

Reading: “Mirror neurons” (Iacoboni, 2009)

Presentation 12: “Mirror neurons, expertise, and EEG activity” (Orgs, Dombrowski, Heil, & Jansen-Osmann, 2008)

Presentation 13: “Self-observation and self-modeling” (Clark & Ste-Marie, 2007)

Social-cognitive-affective motor behavior

- Social comparisons and self-evaluations
- Self-invoking trigger

Presentation 14: “Self-invoking trigger” (McKay, Wulf, Lewthwaite, & Nordin, 2015)

March 2 **MIDTERM EXAM**March 9 **Mindset**

- Stereotype threat
- Conceptions of ability

Reading: Baker & Horton (2003), Wulf & Lewthwaite (2009)

Presentation 15: “Gender stereotypes” (Hively & El-Alayli, 2014)

Presentation 16: “Conceptions of ability, motivation, and motor learning” (Jourden, Bandura, & Banfield, 1991)

Presentation 17: “Conceptions of ability and motor learning in children” (Chiviakowsky & Drews, 2014)

March 16 **Enhancing performance expectancies**

- Social comparisons
- Perceived task difficulty
- Superstition
- Optical illusions

Reading: Wulf, Chiviakowsky, & Lewthwaite (2012)

Presentation 18: “Perceived task difficulty and memory consolidation” (Trempe, Sabourin, & Proteau, 2012)

Presentation 19: “Superstition” (Damisch, Stoberock, & Mussweiler, 2010)

Presentation 20: “Optical illusions and motor learning” (Chauvin, Wulf, & Maquestiaux, 2015)

March 23 **SPRING BREAK**

March 30 **Providing autonomy support**

- Control over practice conditions
- Instructional language
- Incidental choices
- Autonomy as a basic psychological need

Reading: Lewthwaite, Chiviakowsky, Drews, & Wulf (2015)

Presentation 21: “Self-controlled use of assistive devices” (Chiviakowsky, Wulf, Lewthwaite, & Campos, 2012)

Presentation 22: “Born to choose” (Leotti, Iyenga, & Ochsner, 2010)

Presentation 23: “Instructional language and motor learning” (Hooyman, Wulf, & Lewthwaite, 2014)

April 6 **Attentional focus: Movement effectiveness**

- External versus internal focus
- Constrained action hypothesis
- Instructions and feedback
- Supra-postural tasks

Reading: Wulf (2013)

Presentation 24: “Attentional focus and automaticity: The constrained action hypothesis” (Kal, van der Kamp, & Houdijk, 2013)

Presentation 25: “Attentional focus supra-postural goals” (Wulf et al., 2003)

- April 13 **Attentional focus: Movement efficiency**
- Expertise
 - Movement disorders
 - Force production
 - Endurance
- Reading: Wulf (2013)
- Presentation 26: “Attentional focus and movement efficiency” (Lohse, Sherwood, & Healy, 2011)
- Presentation 27: “Attentional focus and maximum force production” (Wulf & Dufek, 2009)
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- April 20 **The OPTIMAL theory of motor learning**
- Enhanced expectancies
 - Autonomy support
 - Attentional focus
 - Goal-Action Coupling
 - Practical implications
- Reading: Wulf & Lewthwaite (2016)
- Presentation 28: “Functional connectivity” (TBA)
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- April 27 **Design your own study**
- May 4 **Study Week**
- May 11 **FINAL EXAM**

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Incomplete Grades - The grade of I – Incomplete – can be granted when a student has satisfactorily completed three-fourths of course work for that semester/session but for reason(s) beyond the student’s control, and acceptable to the instructor, cannot complete the last part of the course, and the instructor believes that the student can finish the course without repeating it. The incomplete work must be made up before the end of the following regular semester. If course requirements are not completed within the time indicated, a grade of F will be recorded and the GPA will be adjusted accordingly. Students who are fulfilling an Incomplete do not register for the course but make individual arrangements with the instructor who assigned the I grade. Please note – Students cannot enroll in other nursing courses if they have an incomplete (I) in a course that is designated as a prerequisite to that course. (Per School of Nursing Policy C-12).

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