Carnegie Mellon University  
Course Syllabus  
86-601 Topics in Motor Control (3 units)  
M 3:30-5:30, MI 130

Instructor  
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Course Description  
This course will delve into the literature on the neural control of movement, to gain a deep understanding of how movements are planned, coordinated, and executed. Our goal will be to synthesize the major research findings, by sifting out and summarizing the data that support various theories of motor control. Topics to be covered include representation (muscles vs. movements, reference frames), the role of feedback circuitry (basal ganglia, cerebellum), and computational frameworks (internal models, optimal control). The first class will be an organizational meeting; class time may change to accommodate conflicting schedules.

Course Objectives  
This class will develop your abilities to review, critique, and report on the scientific motor control literature. At the end of this class, you should be able to (1) summarize major themes in the motor control literature and (2) assess how new papers contribute to the larger body of work in this field.

Course requirements and evaluation  
Each week, you will be assigned a paper to read and present to the group. The presentation should be roughly 15 to 20 minutes long and cover the pertinent details of the motivation, experimental design, results, and conclusions, in abbreviated journal club format. I will send the reading assignments and abstracts to everyone in the class: you should read the other abstracts to situate your presentation in the context of the others that will be presented that day. In addition to the class presentation, you will turn in a one page summary of the paper. I will collate these summaries from everyone and, at the end of the class, give you a document containing summaries from all of the papers we covered in class.

This class is graded Pass/Fail.
READINGS LIST (final version)

**Wk1 - Muscles v movements: 1/28**


http://www.ncbi.nlm.nih.gov/pubmed/7143039

http://www.ncbi.nlm.nih.gov/pubmed/2388062


**Wk2 - Muscles v movements: 2/4**


**Wk3 - Other things represented in M1 (I): 2/11**


**Wk4 - Other things represented in M1 (II): 2/18**


KJS Chapter 40 – Voluntary Movement

**Wk5 - Representations in other cortical brain areas: 2/25 (PMv)**


KJS Chapter 38 – Spinal Mechanisms of Motor Coordination
Wk6 - Representations in other cortical brain areas: 3/4 (PMd)


Wk7 - Motor Learning – Psychophysics (I): 3/18


Ch1 of Motor Cortex in Voluntary Movements: Motor Areas in the Frontal Lobe

Wk8 - Motor Learning – Psychophysics (II): 3/25


Wk9 - Motor Learning – Neurophysiology: 4/1


Wk10 – Computational Models (I): 4/8


**Wk11 – Computational Models (II): 4/15**


**Wk12 – Computational Models (III): 4/22**


Wk13 – Songbird learning: 4/29


**2009** Andalman & Fee. A basal ganglia-forebrain circuit in the songbird biases motor output to avoid vocal errors. PNAS 106:12518-23.