Hand and Brain

Introduction and Course requirements

This course concerns the relationship of hand and brain from many different perspectives including structure, function, evolution and neural control.

Two introductory chapters by Hollerbach and three primary books constitute the main reading. The books include: Human Hand Function, Lynette A. Jones and Susan J. Lederman, Oxford University Press, 2006; The Hand, Frank R. Wilson. Vintage, 1999 (paperback edition) – The Body Has a Mind of Its Own, Sandra Blakeslee and Matthew Blakeslee, Random House (paperback edition). Additional reading includes 20 research articles. Laboratory demonstrations of hand function and motor adaptation will also be part of the course.

Each class will begin with a 90 minute lecture. After a 20 minute break, the class will resume with presentations and discussions of two of the reading papers. Two students will present and lead discussion of one of the papers and two other students will present the other paper. The entire class will participate in asking questions and discussing the papers. Over the semester each student will have participated in presenting two papers. There will be a brief 10 minute quiz at the end of each class.

The goal of the course is to give you a broad comprehensive knowledge of human hand function from biomechanics, and neuromuscular control to cognitive representation. The format is a combination of lecture and seminar.

Grading will be based on participation in class discussions, presentations of papers in class, the regular quizzes, and the final exam.

SYLLABUS

Sept. 2 Introduction

Sept. 9 Fundamentals of Motor Behavior – John Hollerbach
        Planning of Arm Movements – John Hollerbach

Sept. 16 The Body Has a Mind of Its Own, Blakeslee and Blakeslee. Random House
         Chapter 1: The Body Mandala
         Chapter 2: The Little Man in the Brain
         Chapter 3: Dueling Body Maps
         Chapter 4: The Homunculus in the Game

Sept. 23 No class

Sept. 30 The Body Has a Mind of Its Own, Blakeslee and Blakeslee. Random House
          Chapter 5: Plasticity Gone Awry
          Chapter 6: Broken Body Maps
          Chapter 7: The Bubble Around the Body
          Chapter 8: Sticks and Stones and Cyberbones

Oct. 7 Lab tour and demos

Oct. 14 The Body Has a Mind of Its Own, Blakeslee and Blakeslee. Random House
          Chapter 9: Mirror, Mirror
          Chapter 10: Heart of the Mandala
Chapter 1: Dawn
Chapter 2: The hand-thought-language nexus
Chapter 3: The arm we brought down from the trees

Oct. 21
Chapter 4: Puppet lesions from Alexandria and Dusseldorf
Chapter 5: Hand, eye and sky
Chapter 6: The grip of the past
Chapter 7: The twenty-four-karat thumb
Chapter 8: The right hand knows what the left hand just did

Oct. 28
Chapter 9: Bad boys, polyliths, and the heterotechnic revolution
Chapter 10: The articulate hand
Chapter 11: In tune and evolving prestissimo
Chapter 12: Lucy to Lulu to Rose

Nov. 4
Chapter 13: Tough, tender, and tenacious
Chapter 14: Hidden in the hand
Chapter 15: Head for the hands

Nov 11
Human Hand Function, Lynette A, Jones and Susan Lederman
Chapter 1: Historical Overview and General Introduction
Chapter 2: Evolutionary Development and Anatomy of the Hand
Chapter 3: Neurophysiology of Hand Function

Nov 18
Quiz

Nov. 25
Human Hand Function, Lynette A, Jones and Susan Lederman
Chapter 4: Tactile Sensing
Chapter 5: Active Haptic Sensing
Chapter 6: Prehension

Dec. 2
Human Hand Function, Lynette A, Jones and Susan Lederman
Chapter 7: Non-prehensile Skilled Movements
Chapter 8: End-effector Constraints