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), and Hands, John Napier. Princeton Science Library. 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. Sporadically there will be brief 10 minute quizzes to determine how well you are mastering the course content. 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 in class, the quizzes, the mid-term exam, and the final exam.

Success in this 4 credit hour course is based on the expectation that students will spend a minimum of 9 hours of study time per week in preparation for class (readings, papers, discussion sections, preparation for exams, etc.).

SYLLABUS

Sept. 1 Introduction

Sept. 8 Fundamentals of Motor Behavior – John Hollerbach
Planning of Arm Movements – John Hollerbach

Sept. 15 No class
Hands, John Napier
Read all chapters.

Chapter 1: Dawn
Chapter 2: The hand-thought-language nexus
Chapter 3: The arm we brought down from the trees

Sept. 29 No class – Monday Schedule

Chapter 4: Puppet lesions from Alexandria and Dusseldorf
Chapter 5: Hand, eye and sky
Chapter 6: The grip of the past
Oct. 13  Lab tour and demos

Chapter 7: The twenty-four-karat thumb
Chapter 8: The right hand knows what the left hand just did

Chapter 9: Bad boys, polyoliths, and the heterotechnic revolution
Chapter 10: The articulate hand

Chapter 11: In tune and evolving prestissimo
Chapter 12: Lucy to Lulu to Rose

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

Nov 17  Mid-term exam

Nov 24  *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

Dec. 1  *Human Hand Function*, Lynette A, Jones and Susan Lederman
Chapter 4: Tactile Sensing
Chapter 5: Active Haptic Sensing
Chapter 6: Prehension

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