

## COURSE OUTLINE: NROD60F 2001

### Cognitive Neuroscience

#### *Instructor*

N. W. Milgram  
Room S-637  
phone 287-7402  
lab phone 287-7461  
fax 416-287-7642  
email milgram@psych.toronto.edu or  
milgram@banks.scar.utoronto.ca

Course Meets 11:00 - 1:00 Room B-358

#### *Grading*

1. Class presentation 15%
2. Class participation 10%
3. Term paper 35%
4. Exams (2) 40%

#### *Course Material*

Students will be responsible for:

1. Assigned readings
2. Material covered in classroom discussions
3. Presentations given by other students

#### *Student presentations*

Each student will give one classroom presentation on a recently published article. The student will select an article published within the last two years dealing with an assigned general topic. The purpose is to provide the class with updated information on recent innovations in cognitive neuroscience. The article should have instructors approval and should be from one of the following journals:

1. Science
2. Nature
3. Nature Neuroscience

Topics:

1. Cognitive Neuroscience: Techniques
2. Brain memory systems – storage mechanisms medial temporal lobes. (Week 3)
3. Brain memory systems –working prefrontal cortex. (Week 4)
4. Thought, theory of mind, intelligence (Week 5-6)
5. Language
6. Attention

The presentation should be about 15 minutes in length and should include a summary of the purpose, methods and results of the article. The presentation should also contain a brief discussion of the importance of the article within the framework of this course (cognitive neuroscience).

- At least one day before giving your presentation, you should make copies available to everyone in the course. It would also be helpful to hand out outlines of the main points.
- A necessary requirement is to also provide at least three exam questions that could be based on your presentation

### **Term paper**

The term paper will be a review article on a neurobiological disorder from the list below. (Or on a related topic, contingent on the instructors approval.) The term paper must be based on readings of original research and should follow the format of the Publication Manual of the American Psychological Association. The length excluding references should not exceed 15 double spaced pages.

Grading will be based on organization, clarity, scholarship (thoroughness of literature search), and originality of content. Most importantly, the article should consider how our understanding of the disorder contributes to our knowledge of the neurobiological basis of cognition. The following are possible topics:

### **Topics for Term Paper**

Acromatopsia  
Agraphia  
Alexia  
Alzheimer's disease (cognitive aspects)  
Amusia  
Amnesia syndromes  
Apraxia  
Attention deficit disorder  
Autism  
Compulsive disorders  
Depression  
Downs syndrome  
Dyslexia  
Infantile amnesia  
Language learning impairment  
Neglect syndromes  
Obsessive Compulsive Disorder  
Prosopagnosia  
Schizophrenia  
Stuttering and stammering  
Synesthesia  
Williams disorder

### Readings

You will be responsible for the following list of assigned readings (see course schedule) and for the student presentations (see appended list of articles).

- Barkley, R.A. (1998). Attention-Deficit hyperactivity disorder. *Scientific American* (September) 279, 66-72.
- Damasio, A.R. (1999). How the brain creates the mind. *Scientific American*, (December) 281, 112-117.
- Damasio, A.R., & Damasio, H. (1992). Brain and Language. *Scientific American*, 89-95.
- Calvin, W.H. (1994). The emergence of intelligence. *Scientific American*, 271, 100-108
- Churchland, P.S., & Sejnowski, T.J. (1988). Perspectives on cognitive neuroscience. *Science*, 242, 741-745.
- Damasio, A.R., & Damasio, H. (1992). Brain and language. *Scientific American*, 89-95.
- Gallup and Povencelli . (1999). Can animals empathize? *Scientific American*, 68-75.
- Gazzaniga, M.S. (1998). The split brain revisited. *Scientific American*, 279, 50-55
- Hickok, G., Bellugi, U., & Klima, E.S. (2001). Sign language in the brain. *Scientific American*. (June) 284, 58-65.
- Jefferys, J.G.R., Traub, R.D., & Whittington, M.A. (1996). Neuronal networks for induced '40Hz' rhythms. *Trends in Neurosciences*, 19, 202-207
- Lenhoff, H.M., Wang, P.P., Greenberg, F., & Bellugi, U. (1997). Williams syndrome and the brain. *Scientific American* (December), 227, 68-73.
- Leiner, H.C., Leiner, A.L., & Dow, R.S. (1991). The human cerebro-cerebellar system: its computing, cognitive and language skills. *Behavioural Brain Research*, 44, 113-128.
- Maunsell, J.H.R. (1995). The brain's visual world: representation of visual targets in cerebral cortex. *Science*, 270, 764-768.
- Pepperberg, I.M. Speech in parrots. *Scientific American*, 61-65.
- Perry, E., Walker, M., Grace, J., & Perry, R. (1999). Acetylcholine in mind: a neurotransmitter correlate of consciousness. *Trends in Neurosciences*, 22, 273-280.
- Plomin, R., & DeFries, J.C. (1998). The genetics of cognitive abilities and disabilities. *Scientific American* (May), 62-68.

Posner, M.I., & Dehaene, S. (1994). Attentional networks. *Trends in Neurosciences*, 17, 75-79.

Povinelli, D.J., & Preuss, T.M. (1995). Theory of mind: evolutionary history of a cognitive specialization. *Trends in Neurosciences*, 18, 418-424.

Sergent, J. (1994). Brain-imaging studies of cognitive functions. *Trends in Neurosciences*, 17, 221-226.

Singer, W. (1993). Synchronization of cortical activity and its putative role in information processing and learning. *Annual Review of Physiology*, 55, 349-374.

Smith, E.S., & Jonides, J. (1999). Storage and executive processes in the frontal lobes. *Science*, 283, 1657-1661.

Ungerleider, L.G. (1995) Functional brain imaging studies of cortical mechanisms for memory. *Science*, 270, 769-775.

IN ADDITION, YOU WILL BE RESPONSIBLE FOR ALL READINGS COVERED IN THE STUDENT PRESENTATIONS

## Schedule

Class	Date	Topics	Assigned Readings
1	Sept 14	Course organization What is cognitive neuroscience?	Damasio (1999)
2	Sept 21	Technologies used. Brain Imaging – Limitations Brain Memory Systems Working memory	Churchland and Sejnowski (1988) Sergent, J. (1994) Ungerleider (1995)
3	Sept 28	Brain Memory Systems	Smith & Jonides (1999)
4	Oct 5	Thought – Theory of Mind Individual differences (Intelligence)	Povinelli, D.J., & Preuss, T.M. (1995); Plomin and DeFries (1998) <i>Gallup and Povincelli</i>
5	Oct 12	Subcortical Structures (Cerebellum and Basal Ganglia)	Calvin (1994) Leiner et al. (1991)
6	Oct 19	Cognitive Networks – (Binding )	Singer (1993) Jefferys et al. (1999)
7	Oct 26	<b>First midterm exam</b>	
8	Nov 2	Language	Seidenberg (1997), Pepperberg
9	Nov 9	Language - Brain Systems Attention	Hickok et al. (2001), Damasio and Damasio and Damasio(1992) Perry et al. (273)
10	Nov 16	Alerting systems Attention	Posner & Dahanne (1994) Barkley (1998)
11	Nov 23	Attention- premotor hypothesis	Gazzaniga (1998) Maunsell (1995)
12	Nov 30	<b>Second Midterm Exam</b>	