COGS 5130/PYSC 5150
Neurodevelopment and Plasticity

3 credits
Class size: 12 graduate students, various divisions
Instructor: Dr. Holly Fitch
Email: roslyn.h.fitch@uconn.edu
Day: xx
Time: xx
Location: xx
Class website: www.fitchlab.com

Optional text, Brain Development and Cognition: A Reader. 2002. Mark H. Johnson (Editor), Yuko Munakata (Editor), Rick O. Gilmore (Editor)**
***Note that assigned chapters from this book will be scanned and uploaded to the class website so purchase is not required.*

****

FORMAT: Each week we will read several papers as posted on the class webpage. *All* students will come to class with a printed list of comments/thoughts/questions about each paper (2 per paper, minimum), to be turned in at the start of class. (Keep a copy for yourself!)

In class, *one* student will be responsible for reviewing (using PowerPoint) each paper (one student/paper). These reviews should be *direct*, using a maximum of 6 slides (presentation and discussion of key figures form the paper itself is suggested). The student will then use several additional slides to introduce a *related* paper or topic on which the class has *not* read (which the student has selected), and which is informed by the primary paper in some way. [Example, take a paper on general neurocognitive development, and then present a short paper or finding about a specific disorder that has been mapped over development using the same framework or measures; or for a paper on plasticity after a type of early injury, present a new paper or article or YouTube about interventions for such injury]. If you are having trouble choosing a related paper please contact Dr. Fitch (but not the day before your presentation!)

The total of the review and new presentation is a maximum of 25 min, and I will aggressively observe this limit, so be sure to practice and time out your talks! (Points will be subtracted if you cant finish).

Each student should sign up for FOUR talks. There are 10 students in the class (10X4=40), and 38 papers. Note that some papers are longer and more complex so that I have assigned 2 students for these talks. These are denoted by ******. I will cover the extra papers.

After the presentation we will have a 15-20 min discussion period in which students from the class can raise points from their prepared list of questions and comments, or raise new questions or comments about the new material.
At the *end* of class, we'll have a brief (20-30 min) review by Dr. Fitch in which terminology and critical concepts for the following weeks papers will be presented.

GRADES: Grades will be comprised primarily of scores from the class presentations (70%), along with submitted weekly comments (10%) and class participation (20%).

****

Jan xx – Introduction, distribute syllabus.
•Review class format and presentation expectations.
•Sign up for presentations.
•Review of neurodevelopmental terminology and principles to prep for next class/readings.

Jan xx -- Basics of Human NeuroDevelopment (prenatal/early postnatal)
1) Nowakowski & Hayes, 2002, [chapter 5], General Principles of CNS Brain Development.

2) Webb, Monk & Nelson, 2001, Mechanisms of postnatal neurobiological development: Implications for human development.

Feb x – Genetic Mechanisms of NeuroDevelopmental
3) Developmental genetics of vertebrate glial-cell specification. 2010. Rowitch & Kriegstein

4) Mitsuhashi & Takahashi, 2009, Genetic regulation of proliferation/differentiation characteristics of neural progenitor cells in the developing neocortex.

5) Walsh, 2000, Genetics of neuronal migration in the cerebral cortex.

Feb xx – NeuroDevelopment, Phylogeny, and Evolution ("Evo-Devo")
6) Willmore, 2010, Development influences evolution.

7) Finlay, 1998, Patterns of vertebrate neurogenesis and the paths of vertebrate evolution.

8) Rakic, 2009, Evolution of the neocortex: a perspective from developmental biology.

Feb xx - Disruption of Perinatal NeuroDevelopment
9) Rice & Barone, 2000, Critical periods of vulnerability for the developing nervous system: Evidence from humans and animal models.

10) Aylward, 2005, Neurodevelopmental outcomes of infants born prematurely.

11) Stiles et al., 2002, [chapter 15], Linguistic and spatial cognitive development in children with pre- and perinatal focal injury.

Feb xx – Plasticity, Part I. Synaptic circuits and experience.
12) Johnston et al., 2001, Sculpting the developing brain.

13) Katz & Shatz, 1996, Synaptic activity and the construction of cortical circuits.

14) Randy Nudo, 2006, Plasticity.

March x – Plasticity, Part II. Deprivation and re-organization.
15) Neville & Bavelier. 2002. [chapter 14]. Specificity and plasticity in neurocognitive development in humans.

16) Mauerer et al. 2005, Missing sights: consequences for visual development.

17) Harrison et al., 2005, Is there a critical period for cochlear implantation in congenitally deaf children? Analyses of hearing and speech perception performance after implantation.

March xx -- Cognitive NeuroDevelopment.
18) Casey et al., 2005, Imaging the Developing Brain: What Have we Learned about Cognitive Development?
(Note that B.J. Casey is to speak in the Psych Dept. friday Feb 1, 4pm, room 160)

19) Toga et al., 2006, Mapping brain maturation.

20) Kuhl & Rivera-Gaxiola, 2008, Neural Substrates of Language Acquisition.
For color version of Kuhl & Rivera-Gaxiola, see:
http://www.annualreviews.org/doi/full/10.1146/annurev.neuro.30.051606.094321

March xx -- Spring Break

March xx – Motor Development and Cerebral Palsy
21) Martin, 2005, The corticospinal system: from development to motor control.
22) Martin et al., 2004, Corticopsinal system development depends on motor experience.

23) Silbereis et al., 2010, Towards improved animal models of neonatal white matter injury associated with cerebral palsy.

24) Johnston, 2009. Plasticity in the developing brain: implications for rehabilitation.

April x - Computational and Theoretical Models of NeuroDevelopment

25) Thelan. 2002. Self-organization in developmental processes: Can systems approaches work? [Chapter 18].

26) Karmiloff-Smith. 2002. Development itself is the key to understanding developmental disorders. [Chapter 19].

27) Bates & Elman. 2002. Connectionism and the study of change. [Chapter 21

April x - LLI/Dyslexia and NeuroDevelopment.

28) Bishop, 2009, Genes, cognition and communication. Insights from neurodevelopmental disorders.

29) SLI paper – TBD (see Grela & Meyers)

30) Galaburda et al. 2006. From Genes to Behavior in Dyslexia.

April xx – Autism and NeuroDevelopment

31) Geschwind and Levitt, 2007, Autism spectrum disorders: developmental disconnection syndromes.

32) Amaral et al., 2008, Neuroanatomy of autism.

33) Courchesne et al., 2007, Mapping early brain development in autism.

April xx – Williams Syndrome and NeuroDevelopment

34) Bellugi et al., 1999, Bridging cognition, the brain and molecular genetics: evidence from Williams syndrome.

35) Williams paper 2

36) Levitin et al., 2004, Characterizing the musical phenotype in individuals with Williams Syndrome.

April xx – ADHD and NeuroDevelopment

37) Durston, 2008, Converging methods in studying attention-deficit/hyperactivity disorder: What can we learn from neuroimaging and genetics?

38) Andersen & Navalta., 2004, Altering the course of neurodevelopment: a framework for understanding the enduring effects of psychotropic drugs.