

**REVISED**

8:15 pm, Apr 04, 2016

Week	Topic	Presenter Readings	Additional Readings:
1 Mar 28—Mar 31	Relationship between metabolic dysfunction and cognitive impairment	Tuesday-Boyle: Introduction to metabolism and consequences of metabolic dysfunction in the brain.	
	Course Basics Groups and Medium	Thursday-Billy and Bree: Class Basics	
2 Apr 4—7	Ins and Outs of Insulin	Tuesday: Autonomic regulation of islet hormone secretion-implications for health and disease.	
		Thursday: Interactions between the central nervous system and pancreatic islet secretions: a historical perspective.	
3 Apr 11 – 14	<i>Diabetes Type 2 and the Brain</i> <i>How does the brain regulate metabolism.</i>	Tuesday: The role of insulin receptor signaling in the brain.	Insulin Signaling in Health and Disease.
		Friday: Leptin and the Central Nervous System Control of Glucose Metabolism.	The insulin receptor: structure, function and signaling.  Insulin concentration is critical in culturing human neural stem cells and neurons.
5 Apr 18—21	<i>How does the brain sense and control insulin?</i>	Tuesday: Is Obesity a Brain Disease?	Where does insulin resistance start?  Is insulin action in the brain clinically relevant?  The twentieth century struggle to decipher insulin signaling.

**REVISED**

8:15 pm, Apr 04, 2016

Friday:  
Central Nervous system  
control of food intake.

Food intake during the  
normal activity phase  
prevents obesity and  
circadian desynchrony in a  
Rat model of Night Work.

Relationships between the  
autonomic nervous system  
and the pancreas including  
regulation of regeneration  
and apoptosis.

6  
Apr 25—28

Gut – Brain relationship

Tuesday:  
'Metabolic syndrome' in the  
brain: deficiency in omega-3  
fatty acid exacerbates  
dysfunctions in insulin  
receptor signalling and  
cognition.

Brain-gut-microbe  
communications in health  
and disease.

Normal gut microbiota  
modulates brain  
development and behavior.

Mind-altering  
microorganisms: the impact  
of the gut microbiota on  
brain and behaviour.

Thursday:  
Fermentable Carbohydrate  
Alters Hypothalamic  
Neuronal Activity and  
Protects against the  
obesogenic environment.

Acne vulgaris, probiotics  
and the gut-brain-skin-axis –  
back to the future?

Fasting launches CRTC to  
facilitate long term memory  
formation in *Drosophila*.

6  
May 2—May 5

*What role does glia play in  
metabolic brain disorders*

Tuesday:  
Sleep drives metabolite  
Clearance from the Adult  
Brain

Glia and epilepsy:  
excitability and  
inflammation.

Thursday:  
Glial cell line-derived  
neurotrophic factor protects  
against high-fat-diet-  
induced obesity.

7  
May 9—12

*Early life metabolic  
hormonal impact on  
developing neural circuits*

Tuesday:  
Neonatal Insulin Action  
Impairs Hypothalamic  
Neurocircuit formation in  
Response to Maternal High-  
Fat Feeding.

New neurons in an aged  
brain.

		Thursday: Metabolic programming effects initiated in the suckling period predisposing for adult-onset obesity cannot be reversed by calorie restriction.	
8 May 16—19	<i>Diabetes and Dementia</i>	Tuesday: Diabetes Mellitus and Dementia.  Thursday: Insulin and neurodegenerative disease: shared and specific mechanisms.	Intranasal Insulin Improves Memory in Humans: superiority of Insulin Aspart.  Combined Effects of exercise and food in preventing neurological and cognitive disorders.
9 May 23—26	<i>Ketogenic Diet and the Brain-Epilepsy</i>	Tuesday: Mechanisms of Ketogenic Diet Action.  Thursday: The nervous system and metabolic dysregulation: emerging evidence converges on ketogenic diet therapy.	Historical Review: ATP as a neurotransmitter.  Ketogenic Diet and Epilepsy: the Role of Adenosine.  Purines and neuronal excitability: Links to the ketogenic diet.  Astrocytic adenosine kinase regulates basal synaptic adenosine levels and seizure activity but not activity-dependent adenosine release in the hippocampus  Suppression of Generalized Seizures Activity by intrathalamic 2-chloroadenosine application.

10 May 30—Jun 2	<i>Lipids and Alzheimer's Disease</i>	Tuesday: Plasma phospholipids identify antecedent memory impairment in older adults.	Brain metabolism and Brain Disease: Is Metabolic Deficiency the Proximate Cause of Alzheimer Dementia?  Review of insulin and insulin-like growth factor expression,
--------------------	---------------------------------------	---	--

**REVISED**

8:15 pm, Apr 04, 2016

Thursday:  
Arginine Deprivation and  
Immune Suppression in a Mouse

signaling and malfunction in the  
central nervous system:  
relevance to Alzheimer's disease.

Genetic discoveries as the basis  
of personalized therapy:  
rosiglitazone treatment of  
Alzheimer's disease.

Metabolic profiling of Alzheimer's  
disease brains

10  
Jun 1—5

*Schizophrenia Parkinson's and  
Diabetes*

Tuesday:  
Crosstalk between metabolic  
and neuropsychiatric disorders.

K-ATP channels promote the  
differential degeneration of  
dopaminergic midbrain neurons.

Thursday:  
Antipsychotic drug mechanisms:  
links between therapeutic  
effects, metabolic side effects  
and the insulin signaling  
pathway.

Finals  
Tuesday  
June 7th @  
11:30-2:30p

15 minute group presentation on researched review topic.  
Bring a light snack to share – pot-luck style 😊.



Grades will be determined by:

### COGS163 – Metabolic Brain Disorders

Research is showing that cellular metabolic processes are mediating normal and abnormal brain function. For example, neurocognitive disorders often co-occur with metabolic disturbances, such as insulin resistance, diabetes, and obesity. An understanding of these mechanisms will provide insight to new treatments for cognitive and neurological disorders. The course will cover topics on the role of abnormal cellular structure, genetic, epigenetic and pathogenic influences on synaptic signaling, neural circuitry and cognitive function.

<ul style="list-style-type: none"> <li>• 10% Mind maps</li> <li>• 10% Class participation</li> <li>• 15% Weekly blogs – Medium</li> <li>• 35% research paper presentation and</li> <li>• 30% final review essay due at noon on the scheduled day of the final exam</li> <li>• 1% EC for 4 hours SONA</li> </ul> <p>The final review essay can expand on the topic discussed by the group in the class presentations. The essay will take the form of a published mini-review – following the organization and references found in the scientific literature. Each student in the group will contribute to a section of the review.</p>	<p>On Mondays, Dr. Boyle will discuss and introduce a particular topic in the field of metabolic disorders of the brain. Tuesdays and Thursdays will feature student-led presentation and discussions of important research papers specially selected for this course.</p> <p>In addition, for each class, each student is asked to read the required readings, build a mind map of the material over the entire course, prepare a short summary (maximum 1 page) of each paper, interpret the data associated with two figures and compose three high quality questions associated with each of the papers to be used for class discussion.</p> <p>Each group will be responsible for two presentations during the course. Paper selection will be determined during the first week of classes.</p>
<p>Lecture-Mondays PCYNH 120</p> <p>T/Th-Presentations: 11:00—12:20p: CSB 003</p>	<p><b>COGS163 Contact Information:</b></p> <p>If you have any questions or would like to set up an appointment to meet it is best to talk with me before or after lecture. 😊</p> <p>OH and contact information for Bree and Billy will be posted on TED.</p> <p>Dr. Boyle's – Office Hours: Mondays after lecture ~12:40 – 2:00 &amp; gladly by appointment CSB 130 Email: mboyle at ucsd dot edu</p>

**REVISED**  
8:15 pm, Apr 04, 2016