



**Gifted LearningLinks Program
Course Syllabus
Neuroscience Honors**

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Session Date: 2010-2011

Course Description:

The field of neuroscience encompasses the interdisciplinary principles of biology, chemistry, anatomy, physiology, and psychology. Students explore topics from the anatomy and physiology of the brain to mental disorders associated with brain dysfunction. Activities include readings, lecture, discussion and participation in laboratory activities, such as a virtual eye dissection and the opportunity to analyze sleep data online. This course is appropriate for students interested in pursuing advanced courses in biology or psychology.

Outcomes: Upon successful completion of this course, students will:

- be able to describe the anatomy of a neuron and the path of communication
- be able to differentiate between the parts of the nervous system.
- be able to identify the parts of the eye and brain
- be able to explain the effects of various neurotransmitters of neural transmission and elaborate of how these effects are altered by various pharmaceuticals.
- be able to identify several methods of investigation used in neuroscience.
- know how vision is processed by the eye and brain and be able to trace the path of a light stimulus to the cerebral cortex.
- know how audition works and be able to describe how neural transmission occurs in the ear.
- be able to describe the various parts of the sleep cycle and identify the neural components of the sleep cycle.
- understand how hormones control sexual behavior and how these hormones impinge of neural control of the brain.
- know the brain structures associated with emotion and be able to explain current research in the area.
- be able to describe the brain mechanisms involved in ingestive behaviors and be able to explain eating disorders associated with dysfunction of these brain areas
- be able to differentiate among the various forms of conditioning, describe the various brain area involved and describe the various learning and memory disorders associated with damage to these brain areas.
- know the various communication disorders and how they relate to brain physiology
- be able to identify different psychological disorders and describe their brain pathology.

Resources and Materials:

Foundations of Behavioral Neuroscience, 8th edition, ISBN# 10: 0-205-79035-6 ISBN# 13: 978-0-205-79035-7

*For the sheep brain dissections, from Carolina Biological Supplies:

<http://www.carolina.com/product/young+scientist%27s+brain+dissection+kit.do?keyword=sheep+brain&sortby=bestMatches>

**For eye dissections, also from Carolina Biological Supplies:

<http://www.carolina.com/product/young+scientist%27s+eye+dissection+kit.do?keyword=cow+eyes&sortby=bestMatches>

*Note: the sheep brain will be needed on week 6 and 7 of the course. Orders usually take 1-2 weeks to be received.

**Note: the eye will be needed on week 12 and 13 of the course. Orders usually take 1-2 weeks to be received.

Schedule:

SEMESTER ONE				
	Topic/Focus	Activities & Reading Assignments	What do I need to post to the Discussion Board?	What do I need to turn in?
Week 1	Orientation to Online Learning	Complete on-line training		
Week 2	History of Neuroscience	Read Chapter 1 View Chapter 1 powerpoint (ppt)	Chapter 1 post: Why do we use animals in research and not computer models alone?	Neuroscience Careers assignment
Week 3	History of Neuroscience	Read Chapter 1 View Chapter 1 powerpoint (ppt)	---	Quiz, Chapter 1

<p>Week 4</p>	<p>Structure and Function of the cells of the Nervous System</p>	<p>Read Chapter 2</p> <p>View Chapter 2 ppt</p> <p>Watch Action potential video: http://www.youtube.com/watch?v=SCasruJT-DU</p> <p>Watch the interactive tutorial on the action potential: http://outreach.mcb.harvard.edu/animations/actionpotential.swf</p>	<p>---</p>	<p>Action potential assignment</p>
<p>Week 5</p>	<p>Structure and Function of the cells of the Nervous System</p>	<p>Read Chapter 2</p> <p>View Chapter 2 ppt</p> <p>Watch Action potential video: http://www.youtube.com/watch?v=SCasruJT-DU</p> <p>Watch the interactive tutorial on the action potential: http://outreach.mcb.harvard.edu/animations/actionpotential.swf</p>	<p>---</p>	<p>Thought question: Why does TTX and TEA work?</p> <p>Quiz, Chapter 2</p>
<p>Week 6</p>	<p>Structure of the Nervous System: Brain Anatomy and Function</p>	<p>Read Chapter 3</p> <p>View Chapter 3 ppt</p> <p>Watch the online dissection: http://www.youtube.com/watch?v=AxRrIX7kuIY</p> <p>Perform actual sheep brain dissection</p>	<p>--</p>	<p>Brain area function assignment</p>

Week 7	Structure of the Nervous System: Brain Anatomy and Function	<p>Read Chapter 3</p> <p>View Chapter 3 ppt</p> <p>Watch the online dissection: http://www.youtube.com/watch?v=AxRriX7kulY</p> <p>Look over this website: http://academic.scranton.edu/departments/psych/sheep/ieframerow.html</p> <p>Perform actual sheep brain dissection</p>	--	Quiz, chapter 3
Week 8	Psychopharmacology	<p>Read Chapter 4</p> <p>View Chapter 4 ppt</p> <p>Watch the tutorial mouse party and complete the accompanying assignment</p>	--	Mouse party assignment
Week 9	Psychopharmacology	Discussion post on the article, genes and the teenage brain.	Post one comment and two responses to the question: Given teens brains are not fully developed, should they be punished for violent crimes?	Test over chapters 1-4
Week 10	Methods and Strategies in Research	<p>Read Chapter 5, there is not ppt for this chapter</p> <p>Watch the movie, "Lorenzo's Oil," 1992</p>	--	Methods in neuroscience questions
Week 11	Methods and Strategies in Research	Read Chapter 5	Post one comment and one response to the question, What would you have done if you had were Lorenzo's parent?	Write a 1-2 page paper, summarizing the plot of the movie, as well as giving your opinion to specific ethical dilemmas.

Week 12	Vision	Read Chapter 6 View Chapter 6 ppt	--	Chapter 6, vision questions
Week 13	Vision	Complete eye dissection and perform blind spot activity		Chapter 6 quiz, eye practical
Week 14	Audition, body senses and the chemical senses	Read Chapter 7	Post to response to cochlear implants: Good or Bad Idea?	Chapter 7 questions
Week 15	Audition, body senses and the chemical senses	Read Chapter 7		Chapter 7 quiz
Week 16	Sleep and Biological Rhythms	Read Chapter 8 View chapter 8 ppt	--	There is no quiz for this chapter.
Week 17	Sleep and Biological Rhythms	Read the article on Jet lag, circadian rhythms and athletic performance	--	Pick a professional athletic team and analyze the consequence of jet lag on the team's performance.
Week 18	Reproductive Behavior	Read chapter 9 View chapter 9 ppt		Test, chapters 5-8
SEMESTER TWO				
	Topic/Focus	Activities & Reading Assignments	What do I need to post to the Discussion Board?	What do I need to turn in?
Week 19	Reproductive Behavior	Read chapter 9 View the documentary on John Money	Is it possible to be trapped in the wrong body? Post your opinion and reply to two others.	Chapter 9 quiz Summarize the documentary on John Money

Week 20	Emotion	Read chapter 10 View the chapter 10 ppt Note: The quiz for this chapter will be combined with chapter 11	--	
Week 21	Emotion	Read chapter 10 View the chapter 10 ppt	--	Emotions and Eating worksheet
Week 22	Ingestive Behavior	Read chapter 11 View the Chapter 11 ppt	What would you tell an anorexic? Post your answer and reply to two others	Anorexia Nervosa assignment
Week 23	Ingestive Behavior	Read chapter 11		Chapter 10/11 quiz
Week 24	Learning and Memory	Read chapter 12 View the Chapter 12 ppt		Complete Learning and memory worksheet
Week 25	Learning and Memory	Read chapter 12		Test, Chapters 9-12
Week 26	Human Communication	Read Chapter 13 View the Chapter 13 ppt		Worksheet on language
Week 27	Human Communication	Read Chapter 13		Chapter 13 quiz
Week 28	Neurological Disorders	Read chapter 14 View chapter 14 ppt		Neurological disorders worksheet
Week 29	Neurological Disorders	Read chapter 14		Chapter 14 quiz
Week 30	Schizophrenia, affective disorders, and anxiety disorders	Read Chapter 15 View chapter 15 ppt	Discussion post: The homeless and mentally ill: Should they be required to take medicine? Post your response and reply to two others	

Week 31	Schizophrenia, affective disorders, and anxiety disorders	Read Chapter 15		Chapter 15 quiz
Week 32	Autistic, Attention-Deficit/Hyperactivity, Stress and Substance abuse disorders	Read chapter 16	Pretend you have Asperger's syndrome. Write a letter home to your family from college.	Letter home
Week 33	Autistic, Attention-Deficit/Hyperactivity, Stress and Substance abuse disorders	Read chapter 16		Chapter 16 quiz
Week 34	Final paper	Neurological Disorders Paper, students pick one neurological disorder to explore in more detail.		
Week 35	Final paper	Neurological Disorders Paper		Paper, 4-5 pages in length
Week 36	Final exam	This exam will cover chapters 13-16. It is NOT cumulative.		Exam, chapters 12-16

Student Evaluation and Grading Policies for Credit Courses Only:

a. CTD Grading scale

A+ 97-100	B+ 87-89	C+ 77-79	D+ 67-69	F Below 60
A 93-96	B 83-86	C 73-76	D 63-66	
A- 90-92	B- 80-82	C- 70-72	D- 60-62	

b. Grading: Class work – 40%; Exams – 40%; Final paper – 20%

Instructor Biography:

This is Beth Christiansen's fourth year working with the Center for Talent Development. A veteran teacher of Evanston Township High School (ETHS), she has taught all levels of biology, including advanced placement biology, for thirteen years. Previous to this, she obtained her Ph.D. in behavioral neuroscience, from Northwestern University. At

Northwestern, she taught over 15 classes, including five courses, which she created and designed. Nominated for Northwestern's Distinguished Lecturer award on three occasions, Beth is currently the lead teacher for the freshman research program at ETHS. In addition to teaching neuroscience honors, she is currently teaching Biology Honors, as well as the semester long elective, Mysteries of the Brain, both through Gifted LearningLinks.

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GLL Sample