



Course Syllabus **PSY311NT Biopsychology**

Course Credits: 3

Course Duration: 8 weeks

Course Description:

This course will discuss the relationship between behavior, mental processes, and biological factors such as the nervous system, biochemistry, hormones, and genetics. Discussions are couched within the larger contexts of psychology, biology, physiology, genetics, chemistry, anthropology, medicine, and computer science. **Prerequisite: PSY105**

Course Learning Outcomes:

1. Identify the basic functions of the nervous system, including functional anatomy.
2. Discuss how neurons communicate; the biological basis of behavior; genetics in neuroscience.
3. Analyze myths about the brain; the mind-body connection; drugs and drug addiction, brain disorders; research methodology; neuroimaging, and new research technologies.
4. Identify and discuss the balance of Nature vs. Nurture.
5. Describe the design elements and any problems raised in a Biblical Theological perspective.

Required media:

Jennings, Timothy. (2017). *The God-Shaped Brain: How Changing Your View of God Transforms Your Life*. InterVarsity. ISBN-13: 9780369371812. (An online version of this text is available at: <https://research.ebsco.com/plink/7ecba033-a628-36dc-9bbb-5d15254d5637>)

Shapiro, Martin S. (2020). *Biopsychology: Fundamentals and Contemporary Issues, Version 1.0*. Flatworld. ISBN-13: 9781453392942.

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Assignments:

Discussions (8) - 25 pts. each	200 points
Weekly Quizzes (8) - 50 pts. each	400 points
Written Assignments (2) - 100 pts. each	200 points
Final Paper (1) - 200 pts.	200 points
Total Points	1000 points

Course Schedule:

Week 1

Media:

1. Calkins, Week 1 Overview Video
2. Shapiro, Chapters 1-2 (and view the videos embedded in the chapters)
3. Jeeves, "Squaring Christianity and Neuroscience: How Should Christians Approach the Booming Field of Neuroscience." (link provided in course)
4. "The Brain God of Renaissance Art - Science on the Web #70" Video
5. "Tool-Making Crows" Video
6. "Lucy: Debunking the 10% Brain Myth" Video
7. "7 Myths About the Brain You Thought Were True" Video
8. "New 'Neural Dust' Sensor Could Be Implanted in the Body" Video
9. "2-Minute Neuroscience: The Neuron" Video
10. "2-Minute Neuroscience: Directional Terms in Neuroscience" Video
11. "2-Minute Neuroscience: The Ventricles" Video
12. Lobotomy - PBS Documentary on Walter Freeman" Video
13. "2-Minute Neuroscience: The Thalamus" Video
14. "Brain Waves Simulation" Video
15. "The Human Brain Project" Video
16. Anderson, "What's Your Worldview?" Video

Assignments:

- 1.1-1 Quiz
- 2.1-2 Essay - See Instructions in the course
3. Wk1 Discussion - See Instructions in the course

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Week 2

Media:

1. Calkins, Week 2 Overview Video
2. Shapiro, Chapter 3
3. Jennings, Chapters 1-2
4. Krane, "How Do Nerves Work?" Video
5. "Sodium Potassium Pump" Video
6. "2-Minute Neuroscience: Synaptic Transmission" Video
7. "2-Minute Neuroscience: Receptors & Ligands" Video
8. "Transport Inside the Brain: The Basic Mechanisms of Neuronal Trafficking" Video
9. "2-Minute Neuroscience: Serotonin" Video
10. "Neuropeptides in Our Brain" Video
11. "Scientists Put the Brain of a Worm Into a Robot ... and It MOVED" Video
12. "How Brains See" Video
13. "Beautiful 3-D Brain Scans Show Every Synapse" Video

Assignments:

1. 2-1 Quiz
2. Wk2 Discussion - See Instructions in the course

Week 3

Media:

1. Calkins, Week 3 Overview Video
2. Shapiro, Chapter 4
3. Shapiro, Chapter 5, Sections 1, 3, 6
4. Jennings, Chapters 3-4
5. "The Ant Cemetery" Video
6. "Brain Sight Technology" Video
7. "Brain Histology" Video
8. "Brain Slices of Famous Patient Create 3D Model" Video
9. "Green Fluorescent Protein | What Is This Thing?!" Video
10. "Brainbow: Mixing Colors to Map the Brain" Video
11. Schoonover, "How To Look Inside the Brain" Video
12. "A New Way to See the Brain" Video
13. "How Does a CT Scan Work?" Video
14. "2-Minute Neuroscience: Neuroimaging" Video
15. "Recording the Brain with MEG | Futurescape" Video

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16. "Can You Use Electricity to Supercharge Your Brain? | tDCS" Video
17. "Deep Brain Stimulation Treats Depression" Video
18. "Thought Control of Robotic Arms Using the BrainGate System" Video
19. "Robot With a Rat Brain" Video
20. Guerrero-Bosagna, "What is Epigenetics?" Video
21. "GloFish® Fluorescent Fish Video! (Includes Our New GloFish Tetras!" Video
22. "CRISPR: Gene Editing and Beyond" Video
23. "How Do Genes Influence Behavior? - Instant Egghead #18" Video
24. "BBC Planet Earth - Birds of Paradise Mating Dance" Video

Assignments:

1. 3-1 Quiz
2. Wk3 Discussion - See Instructions in the course

Week 4

Media:

1. Calkins, Week 4 Overview Video
2. Shapiro, Chapter 6, Sections 1-5, 7-8
3. Shapiro, Chapter 7
4. "How the Eye Works" Video
5. "2-Minute Neuroscience: The Retina" Video
6. "Visual Signal | Signaling Pathway in Eye | Molecular Mechanism" Video
7. Kelleher, "How We See Color" Video
8. "Sex Linked Inheritance" Video
9. "Swirl Illusion" Video
10. "Center-Surround Receptive Field" Video
11. "Hube and Wiesel Cat Experiment" Video
12. "Prosopagnosia" Video
13. "Can You Trust Your Eyes?" Video
14. "Auditory Transduction" Video
15. "Ear Organ of Corti" Video
16. "Can You Trust Your Ears?" Video
17. "2-Minute Neuroscience: Wernicke's Area" Video
18. "Dolphin Language: Two Dolphins Communicate With Each Other" Video
19. "A Visual Neglect Patient" Video

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- 20. "Split Brain Patient 'Joe' Being Tested with Stimuli Presented in Different Visual Fields" Video
- 21. "The Brain Dictionary" Video
- 22. "Vision Reconstruction" Video

Assignments:

- 1. 4-1 Quiz
- 2. 4-2 Presentation Slides - See Instructions in the course
- 3. Wk4 Discussion - See Instructions in the course

Week 5

Media:

- 1. Calkins, Week 5 Overview Video
- 2. Shapiro, Chapter 8, Sections 1-5
- 3. Shapiro, Chapter 9
- 4. Jennings, Chapters 5-6
- 5. "Utricle and Saccule Balance and Equilibrium" Video
- 6. "2-Minute Neuroscience: Primary Somatosensory Cortex" Video
- 7. "Phases of Nociceptive Pain" Video
- 8. "2-Minute Neuroscience: Basal Ganglia" Video
- 9. "2-Minute Neuroscience: Cerebellum" Video
- 10. "Cross Bridge Cycle" Video
- 11. "What is Sarin Gas" Video
- 12. "Circadian Rhythm and Your Brain's Clock" Video
- 13. "Chronobiology" Video
- 14. "2-Minute Neuroscience: Suprachiasmatic Nucleus" Video
- 15. "2-Minute Neuroscience: Pineal Gland" Video
- 16. "2-Minute Neuroscience: Stages of Sleep" Video
- 17. Marcu, "The Benefits of a Good Night's Sleep" Video
- 18. Adkins, "Why Do We Dream" Video
- 19. Angelowicz, "The Terrors of Sleep Paralysis" Video
- 20. "Your Brain on Coffee" Video
- 21. "Muse Technology Enhanced Meditation - Meditation Reimagined" Video

Assignments:

- 1. 5-1 Quiz
- 2. Wk5 Discussion - See Instructions in the course

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Week 6

Media:

1. Calkins, Week 6 Overview Video
2. Shapiro, Chapter 12
3. Jennings, Chapters 7-10
4. Ekman, "Exploring Facial Expressions" Video
5. "Boxing Rats" Video
6. "2-Minute Neuroscience: Periaqueductal Gray (PAG)" Video
7. "The Amygdala in 5 Minutes | Think Big" Video
8. "See What Happens When You Tickle a Rat" Video
9. Sapolsky, "The Psychology of Stress" Video
10. "2-Minute Neuroscience: HPA Axis" Video
11. "Effect of Stress on Your Heart and Cardiovascular System" Video
12. Cox, "Does Stress Affect Your Memory" Video
13. "Adverse Childhood Experiences (ACEs): Impact on Brain, Body, and Behaviour" Video
14. "FaceReader Classifications Demo | Noldus Product Demo" Video
15. "Heart Rate Variability" Video

Assignments:

1. 6-1 Quiz
2. Wk6 Discussion - See Instructions in the course

Week 7

Media:

1. Calkins, Week 7 Overview Video
2. Shapiro, Chapter 13, Sections 1-3, 5-8
3. Jennings, Chapters 11-13
4. "The Big Bang Theory - Sheldon Trains Penny" Video
5. "NOVAscience NOW | NOVA Short | A Memorable Snail" Video
6. "Sensitization in Aplysia" Video
7. "Chimp vs Human! | Memory Test" Video
8. "2-Minute Neuroscience: Long-Term Potentiation (LTP)" Video
9. "2-Minute Neuroscience: Long-Term Depression (LTD)" Video
10. "Grid Cell Movie" Video
11. "Research Human Spatial Recognition" Video
12. "London Taxi Drivers" Video
13. Kean, "What Happens When You Remove the Hippocampus?" Video
14. "What Do 'Smart Pills' Really Do To Your Brain" Video

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Assignments:

1. 7-1 Quiz
2. 7-2 Final Paper - See Instructions in the course
3. Wk7 Discussion - See Instructions in the course

Week 8

Media:

1. Calkins, Week 8 Overview Video
2. Shapiro, Chapter 14, Sections 1, 6
3. Shapiro, Chapter 15, Sections 1-3
4. Shapiro, Chapter 16, Sections 1, 8, 10
5. Jennings, Chapters 12-13
6. "Opioid Tolerance" Video
7. "Addiction | Whirlpools of Risk | Episode 2" Video
8. "Addiction and the Rat Park Experiments - Short Version" Video
9. "2-Minute Neuroscience: Reward System" Video
10. "John Spencer on Scotch (The West Wing)" Video
11. "Types of Cerebral Palsy" Video
12. "Autism TMI Virtual Reality Experience" Video
13. "Understanding the Brain Basis of Autism" Video
14. "The ADHD Brain" Video
15. "Why Stimulants Help ADHD" Video
16. "The Science of Depression" Video
17. "Deep Brain Stimulation Treats Depression" Video
18. Jamison, "Descent Into Madness" Video
19. "Integrative Bipolar Doctor: What Is Bipolar Disorder?" Video
20. "Schizophrenia ... What Is It?" Video
21. Nash, "Overcoming Schizophrenia" Video
22. "Side Effects of Antipsychotic Drugs | Schizophrenia" Video

Assignments:

- 1.8-1 Quiz
2. Wk8 Discussion - See Instructions in the course

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