Saint Leo University
PSY 322

Physiological Psychology

Course Description:
The structure and function of the central nervous system as related to emotion, motivation, learning and theory of brain functions. This course is an introduction to the gross and microscopic anatomy of the central nervous system and to the physiology of the nerve impulse and synaptic transmission. The course will review the relationship of behavior to the nervous system on such chemical factors as hormones and neurotransmitters. This course is intended to introduce you to brain-behavior relationships and to neuroscience in addition to some research and clinical studies of these relationships. The course is designed to provide you with a **broad understanding** of some of the mechanisms underlying behavior in animals and humans. You will become familiar with the cells of the nervous system and nervous system structures involved in those relationships. Evolutionary mechanisms of the nervous system and the principles of neuro-behavioral science will also be explored. You will all be **challenged to think critically** about the content areas covered in this course in Physiological Psychology.

Prerequisite:
PSY 161

Required Textbook:

Carlson, N. R. and Melissa A. Birkett (2017). Physiology of behavior. (12th ed.). Amherst, MA: Allyn & Bacon. ISBN 0134080912 (textbook only).

Course Objectives:
(Specific objectives):
By the end of the course, the successful student should be able to demonstrate that she/he can:

1. Discuss of the history of physiological psychology as well as the current interests and techniques of neuroscientists.
2. Understand the structure and function of the neuron, i.e., structural components of neurons, physiological mechanisms involved, and process of neural transmission of information throughout the nervous system.
3. Identify and describe the organization of the major divisions of the nervous system, especially major cortical and sub-cortical brain structures and their primary functions involved in brain-behavior relationships.
4. Explain the effects of neurotransmitters, neuromodulators, and hormones on behavior.
5. Describe the relationship between brain chemistry, drugs, and brain trauma and mental illness.
6. Identify and describe the basic mechanisms of visual, auditory, olfactory, gustatory, and somatosensory (especially pain) sensation and perception, as well as proprioception.
7. Understand the neuroanatomy, neural circuitry, and neurophysiological aspects of learning and memory.
8. Identify the basic physiological mechanisms involved in several other behaviors, as time permits, such as: sleep, thirst, and hunger.

(General objectives)
By the end of the course, the successful student should be able to demonstrate that she/he can:

- Critically think about the relationships between: mind/brain; nature/nurture; and epigenetics/bioethics.
- Use effective study strategies.
- Read journal abstracts and articles efficiently.
- Work independently and with groups through the discussion forum and email.

Evaluation:
Briefly, you will be graded based on your performance on a discussion and short essay questions to determine content understanding. The other components of your grade include a weekly journal and a Project which consists of a paper and presentation.

Grading Criteria:
Each student will be graded as follows:

Requirement	Points	Percentage of Total Grade
Discussion Questions (8 @ 10 pts each)	**80**	**10**
Journal	**100**	**12.5**
Short Essay Exams (6)	**140**	**37.5**
Project (paper portion)	**200**	**25**
Project Presentation	**120**	**15**
Total	**640**	**100%**

Grading Scale:

Grade	Percentage
A	94-100%
A-	90-93%
B+	87-89%
B	84-86%
B-	80-83%
C+	77-79%
C	74-76%
C-	70-73%
D+	67-69%
D	60-66%
F	<60%

Preparation and Interaction with Course Material:
In order to achieve the above learning objectives, online time will be devoted to module content and discussions. In order to get the most out of your time online and as part of your grade for participation, you are expected to view the course content in the module in which it is offered, and to log into the course often enough to remain abreast of any communications from the instructor. You are expected to participate in online discussions each week. It is the student's responsibility to be aware of what is happening in the class online.

It will be important to work with this challenging material, so schedule your time to allow daily interaction with the coursework. You must go beyond simply reading the text and devote time to the study of vocabulary and, most importantly, the understanding of concepts. Modules outline key concepts. It is your responsibility to master the material and to let your instructor know if problems arise.

Discussions:
Students will be required to interact within one threaded discussion each week. Three discussion posts will be graded within each discussion area (1 original worth up to 6 points, 2 responses to peers worth up to 2 points each).

The following guidelines will be used to determine grades for each initial post:

6 points:	Initial post was completed on time, and provided a well thought-out response which added content to the discussion (information from other sources, examples, questions to other students, etc.).
4 points:	Initial post was completed late, or it only minimally added to the content of the discussion.
2 points**:**	An "I agree" response was posted.
0 points:	No post was completed.

In online courses, students seek interaction with other students and the instructor. Since there is no face-to-face meeting, this interaction impacts the effectiveness of learning online. As such, class participation is essential and will account for a significant part of your grade. Plan to contribute to every discussion topic with "quality" contributions. In other words, responses should express clear thinking and demonstrate relevance to the discussion. This always involves more than just "I agree."

In summary, *three* responses will be graded within each discussion. Each student **must** post one answer to the question, as well as responses to *at least* two other students in order to earn full points for that discussion. Three posts per discussion is only a minimum, but the instructor would really like to see more! The instructor also really likes to see students asking each other questions within the discussions (hint, hint!). Due dates for the initial postings and responses to others will be strictly enforced. No credit will be given to any responses posted after the next module opens. Initial answers will be due by Thursday 11:59 pm EST/EDT, and responses to peers will be due by Sunday 11:59 pm EST/EDT.

Journal:
During each of the eight course modules, each student will need to make a notation in a journal (Word document is fine) that describes something encountered (in the course textbook or classes, or outside class in the student's personal life, or the lives of friends or family, seen on television, or on the Internet, or read about in a newspaper or magazine, or even ran into in another class) that relates material in this course to the student's own life, or the life of a family member or a friend. Each notation needs to be at least 100 words and should describe something new the student learned about in the area of "physiological psychology" and how this may have application to his/her life or the life of a friend or family member. The purpose of this assignment is to show students the wide applicability of the material covered in this course to each student's "personal development" (to minimize intrusion on student privacy in this assignment, simply saying the notation is about a "friend" is acceptable, even if, in reality, the information is really about the student or a family member). Journals are due on the first day of student presentations (Thursday 11:59 PM EST/EDT of Module 8) [The Assignment box may be linked to Turnitin.).

Project: (Paper and PowerPoint Presentation)
For this course, you will be required to complete a term project. This project consists of two parts: (1) a paper on a topic relevant to the physiological basis of some behavior of particular interest to you and (2) a PowerPoint presentation of that paper (posted to the Module 8 Discussion Board by Thursday 11:59 PM EDT/EST).

During Module 1, review the list of project topics provided because you will need to select and submit a topic to your instructor via email by the end of Module 2, Sunday 11:59 PM EDT/EST. The list of topics can be found at the end of Modules 1 and 2.

You are required to submit an APA formatted paper to the Assignment box on your selected topic by the

end of the Module 7, Sunday 11:59 PM EDT/EST. (The Assignment box linked to Turnitin.) Again, you will also complete and post a PowerPoint presentation of your paper to the Module 8 Discussion Board by Thursday 11:59 PM EDT/EST. Finally, you will post thoughtful commentary about two presentations other than your own by Sunday 11:59 PM EDT/EST of Module 8.

APA Format:
Students are required to use ONLY the APA (American Psychological Association) formatting style when writing a paper. APA stands for American Psychological Association, and the style is one of many in the academic world used to regulate the language, procedures and formatting of manuscripts and other writing. Please be consistent throughout each written paper. Refer to APA Guide under Resources on the Course Menu for correct APA style.

You will **also** complete and present the scope and content of your paper in a PowerPoint presentation format. By Thursday 11:59 pm EST/EDT of Module 8, you will be required to upload a presentation of your research for all students in the class to review. It is recommended that the presentation be created in Microsoft PowerPoint (commonly used presentation software) and enhanced with visual images or even your voice narration. Go to the Module 8 Discussion Board and upload your presentation as an attachment to a posted message.

You must post thoughtful commentary about two presentations other than your own.
No matter the format of the presentation, the paper should be the basis for it. It must contain relevant, scholarly resources. The research, organization, and presentation in addition to the quality of the paper and presentation will be the basis for evaluation.

Module 1 **Introduction and Structure and Function of Cells of the Nervous System**

Outcomes: After completing this module, the student will be able to:

- Compare and contrast the philosophical positions of animism, dualism, and monism.
- Describe the phenomenon known as unilateral neglect and describe at least one research study which suggests that such persons are not simply blind.
- Describe the following principles or techniques and identify the researchers who were responsible for their development: experimental ablation, and electrical stimulation of the brain.
- Identify three key contributors to the development of physiology and discuss the implications that their work had for the science of neurophysiology.
- Describe Darwin's principle of natural selection. Give examples of structural and behavioral characteristics that might confer selective advantages to an organism.
- Discuss the use of animals in research and the ethical issues associated with such use. Make an argument a) FOR and b) AGAINST their use.
- Discuss the general support functions of glial cells for the nervous system.
- Explain how ion channels alter the electrical properties of a nerve cell membrane.
- Explain the functional significance of the loss of acetylcholinesterase (AChE) for an organism.
- Explain how the nerve cell membrane acts as an integrator of incoming inputs.
- Explain why the termination step of the neural communication process is a key target for therapeutic drugs.

Items to be Completed:	Due No Later Than:
Post introduction to the discussion board	Thursday 11:59 PM EST/EDT
Read the assigned chapters from your textbook	
Post initial response to the discussion board	Thursday 11:59 PM EST/EDT
Post responses to at least two peers	Sunday 11:59 PM EST/EDT
Complete short essay exam	Sunday 11:59 PM EST/EDT
Make journal notation	Sunday 11:59 PM EST/EDT
Review project (presentation and paper) requirements	

Module 2 **Basic Features of the Nervous System, Experimental Ablation, and The Nature of Learning**

Outcomes: After completing this module, the student will be able to:

- Explain the origins of the names of brain structures and the terms used to indicate directions and planes of section.
- Outline the development of the central nervous system and the evolution of the human brain.
- Describe the peripheral nervous system, including the two divisions of the autonomic nervous system.
- Discuss the research method of experimental ablation: the rationale, the evaluation of behavioral effects resulting from brain damage, and the production of brain lesions.
- Describe research methods for preserving, sectioning, and staining the brain and for studying its parts and interconnections.
- Describe how neural activity in the brain is stimulated, both chemically and electrically, and the behavioral effects of electrical brain stimulation.
- Describe research methods for locating particular neurochemicals, the neurons that produce them, and the receptors that respond to them.
- Discuss research techniques to identify genetic factors that may influence behavior.
- Describe the four basic forms of learning.
- Describe research on the role of the primary visual cortex in visual perceptual learning.
- Describe research on perceptual short-term memory.
- Discuss the physiology of the classically conditioned emotional response to aversive stimuli.
- Describe the role of the basal ganglia and premotor cortex in instrumental conditioning and motor learning.
- Discuss how the reinforcement system may detect reinforcing stimuli and strengthen synaptic connections.
- Describe the nature of human anterograde amnesia.
- Describe the role of the hippocampus in relational learning including spatial learning and the role of hippocampal place cells.
- Outline a possible explanation of the role of the hippocampal formation in learning and memory.

Items to be Completed:	Due No Later Than:
Read the assigned chapters from your textbook	
Post initial response to the discussion board	Thursday 11:59 PM EST/EDT
Post responses to at least two peers	Sunday 11:59 PM EST/EDT
Complete short essay exam	Sunday 11:59 PM EST/EDT
Submit project topic to your instructor via email	Sunday 11:59 PM EST/EDT
Make journal notation	Sunday 11:59 PM EST/EDT

Module 3 **Vision, Audition, and Control of Movement**

Outcomes: After completing this module, the student will be able to:

- Describe the coding of visual information by photoreceptors and ganglion cells in the retina.
- Discuss the striate cortex and discuss how its neurons respond to orientation and movement, spatial frequency, and texture.
- Discuss how neurons in the striate cortex respond to retinal disparity and color; explain the modular organization of striate cortex.
- Describe the anatomy of the visual association cortex and discuss the location and functions of the two streams of visual analysis that take place there.
- Discuss the perception of color and the analysis of form by neurons in the ventral stream.
- Describe the two basic forms of visual agnosia: apperceptive agnosia and associative visual agnosia.
- Describe how neurons in extrastriate cortex respond to movement and location, and discuss the effects of brain damage on perception of these features.
- Describe the parts of the ear and the auditory pathway.
- Describe the detection of pitch, loudness, timbre, and the location of sound.
- Describe the structures and functions of the vestibular system.
- Describe the cutaneous receptors and their response to touch, temperature, and pain.
- Describe the somatosensory pathways and the perception of pain.
- Describe the four taste qualities, the anatomy of the taste buds and how they detect taste, and the gustatory pathway and neural coding of taste.
- Describe the major structures of the olfactory system, explain how odors may be detected, and describe the patterns of neural activity produced by these stimuli.
- Describe the three types of muscles found in the bodies of mammals, and explain the physical basis of muscular contraction.
- Explain the monosynaptic stretch reflex, the gamma motor system, and the contribution of the Golgi tendon organ.
- Describe the organization of motor cortex, and describe the four principal motor tracts and the movements they control.
- Describe the symptoms and causes of limb apraxia and constructional apraxia.
- Discuss the anatomy and function of the basal ganglia, and its role in Parkinson's disease and Huntington's disease.
- Discuss the role of the cerebellum and the reticular formation in the control of movement.

Items to be Completed:	**Due No Later Than:**
Read the assigned chapters from your textbook	
Post initial response to the discussion board	Thursday 11:59 PM EST/EDT
Post responses to at least two peers	Sunday 11:59 PM EST/EDT
Complete short essay exam	Sunday 11:59 PM EST/EDT
Make journal notation	Sunday 11:59 PM EST/EDT
Continue Working on project (paper and presentation)	Reminder

Module 4 **Emotions and Human Communication**

Outcomes: After completing this module, the student will be able to:

- Discuss the behavioral, autonomic, and hormonal components of an emotional response and the role of the amygdala in controlling them.
- Discuss the nature, functions, and neural control of aggressive behavior.
- Discuss the role of the prefrontal cortex in the analysis of social situations and the effects of damage to this region.
- Discuss the hormonal control of aggression in males, aggression in females, and maternal aggression.
- Discuss the effects of androgens on human aggressive behavior.
- Discuss cross-cultural studies on the expression and comprehension of emotions.
- Describe the neural control of the recognition of emotional expression in normal people and people with brain damage.
- Discuss the neural control of emotional expression in normal people and people with brain damage.
- Discuss the James-Lange theory of feelings of emotion and evaluate relevant research.
- Describe the use of subjects with brain damage in the study of language and explain the concept of lateralization.
- Compare and contrast the symptoms noted in Broca's aphasia and Wernicke's aphasia.
- Discuss the brain mechanisms that underlie our ability to understand the meaning of words and to express our own thoughts and perceptions in words.
- Describe the symptoms of conduction aphasia and anomic aphasia, including aphasia in deaf people.
- Describe pure alexia and explain why this disorder is caused by damage to two specific parts of the brain.
- Describe whole-word and phonetic reading and discuss five categories of acquired dyslexia's.
- Describe research on the neurological basis of developmental dyslexias.

Items to be Completed:	**Due No Later Than:**
Read the assigned chapters from your textbook	
Post initial response to the discussion board	Thursday 11:59 PM EST/EDT
Post responses to at least two peers	Sunday 11:59 PM EST/EDT
Complete short essay exam	Sunday 11:59 PM EST/EDT
Make journal notation	Sunday 11:59 PM EST/EDT
Continue working on project (paper and presentation)	Reminder

Module 5 **Psychopharmacology, Schizophrenia, and Major Affective Disorders**

Outcomes: After completing this module, the student will be able to:

- Describe the routes of administration and the distribution of drugs within the body.
- Describe drug effectiveness, the effects of repeated administration, and the placebo effect.
- Describe the effects of drugs on neurotransmitters, and presynaptic and postsynaptic receptors.
- Review the general role of neurotransmitters and neuromodulators, and describe the acetylcholinergic pathways in the brain and the drugs that affect these neurons.
- Describe the monoaminergic pathways in the brain and the drugs that affect these neurons.
- Review the role of neurons that release amino acid neurotransmitters and describe drugs that affect these neurons.
- Describe the symptoms of schizophrenia and discuss the evidence that some forms of schizophrenia are heritable.
- Discuss drugs that alleviate or produce the positive symptoms of schizophrenia.
- Discuss evidence based on population studies that the negative symptoms of schizophrenia may result from brain damage.
- Discuss direct evidence that schizophrenia is associated with brain damage.
- Discuss the relationship between the prefrontal cortex in the positive and negative symptoms of schizophrenia.
- Describe the two major affective disorders, the heritability of these diseases, and their physiological treatments.
- Summarize the monoamine hypothesis of depression and evidence for the involvement of substance P and brain abnormalities in depression.
- Explain the role of circadian and seasonal rhythms in affective disorders: the effects of REM sleep deprivation and total sleep deprivation, and seasonal affective disorder.

Items to be Completed:	**Due No Later Than:**
Read the assigned chapters from your textbook	
Initial response to the discussion board	Thursday 11:59 PM EST/EDT
Responses to at least two peers	Sunday 11:59 PM EST/EDT
Short essay exam	Sunday 11:59 PM EST/EDT
Journal notation	Sunday 11:59 PM EST/EDT
Working on project (paper and presentation)	Reminder

Module 6 **Sleep and Reproductive Behaviors**

Outcomes: After completing this module, the student will be able to:

- Describe the course of a night's sleep: its stages and their characteristics.
- Discuss insomnia, sleeping medications, and sleep apnea.
- Discuss narcolepsy and problems associated with REM and slow-wave sleep.
- List and explain possible reasons for sleep.
- Explain the hypothesis that sleep serves as a period of restoration by discussing the effects of sleep deprivation, exercise, and mental activity.
- Evaluate evidence that the onset and amount of sleep is chemically controlled, and describe the neural control of arousal.
- Discuss the neural control of slow-wave and REM sleep.
- Describe circadian rhythms and discuss research on the role of the suprachiasmatic nucleus in the control of these rhythms.
- Discuss the time base of the circadian clock, control of seasonal rhythms, and changes in circadian rhythms caused by work schedules and travel.
- Describe mammalian sexual development and explain the factors that control it.
- Describe the hormonal control of the female reproductive cycle and of male and female sexual behavior.
- Describe the role of pheromones in reproductive and sexual behavior.
- Discuss the activational effects of gonad hormones on the sexual behavior of women and men.
- Discuss sexual orientation, the prenatal androgenization of genetic females, and the failure of androgenization of genetic males.
- Discuss the neural control of male sexual behavior.
- Discuss the neural control of female sexual behavior.
- 8 Describe the maternal behavior of rodents and explain how it is elicited and maintained.
  Explain the hormonal and neural mechanisms that control maternal behavior and the neural control of paternal behavior.

Items to be Completed:	**Due No Later Than:**
Read the assigned chapters from your textbook	
Initial response to the discussion board	Thursday 11:59 PM EST/EDT
Responses to at least two peers	Sunday 11:59 PM EST/EDT
Short essay exam	Sunday 11:59 PM EST/EDT
Journal notation	Sunday 11:59 PM EST/EDT
Working on project (paper and presentation)	Reminder

Module 7 **Neurological, Anxiety, Autistic, ADHD, and Stress Disorders**

Outcomes: After completing this module, the student will be able to:

- Discuss the causes, symptoms, and treatment of brain tumors, seizure disorders, and cerebrovascular accidents.
- Discuss developmental disorders resulting from toxic chemicals, inherited metabolic disorders, and Down syndrome.
- Discuss research on the role of misfolded prion proteins in the transmissible spongiform encephalopathies.
- Discuss the causes, symptoms, and treatments for the degeneration of the basal ganglia that occurs in Parkinson's disease and Huntington's disease.
- Discuss the causes, symptoms, and treatments for the brain degeneration caused by Alzheimer's disease.
- Discuss the causes, symptoms and treatments of the brain degeneration caused by amyotrophic lateral sclerosis (ALS), multiple sclerosis, and Korsakoff's syndrome.
- Discuss the causes, symptoms, and available treatments for encephalitis, dementia caused by the AIDS virus, and meningitis.
- Describe the symptoms and possible causes of panic disorder, obsessive-compulsive disorder, autistic disorder, and attention-deficit/hyperactivity disorder.
- Describe the physiological responses to stress and their effects on health.
- Discuss some of the long term effects of stress: posttraumatic stress disorder, cardiovascular disease, and the coping response.
- Discuss psychoneuroimmunology and the interactions between the immune system and stress.

Items to be Completed:	**Due No Later Than:**
Read the assigned chapters from your textbook	
Initial response to the discussion board	Thursday 11:59 PM EST/EDT
Responses to at least two peers	Sunday 11:59 PM EST/EDT
Journal notation	Sunday 11:59 PM EST/EDT
Project paper to Assignment box	Sunday 11:59 PM EST/EDT

Module 8 **Drug Abuse**

Outcomes: After completing this module, the student will be able to:

- Examine the role of physical and psychological factors in drug addiction.
- Describe two common features of addiction: positive and negative reinforcement.
- Describe the neural mechanisms responsible for craving and relapse.
- Review the neural basis of the reinforcing effects and withdrawal effects of opiates.
- Describe the behavioral and physical effects of cocaine, amphetamine, nicotine, alcohol, barbiturates, and cannabis.
- Describe research on the role that heredity plays in addiction.

Assignments	**Due No Later Than**
Read the assigned chapters from your textbook	
Initial response to the discussion board	Thursday 11:59 PM EST/EDT
Responses to at least two peers	Sunday 11:59 PM EST/EDT
Project presentation to the discussion board	Thursday 11:59 PM EST/EDT
Responses to at least two peers	Sunday 11:59 PM EST/EDT
Journal notation	Thursday 11:59 PM EST/EDT
Journal to the Assignment box	Thursday 11:59 PM EST/EDT