

# PSYC 4: INTRODUCTION TO BIOPSYCHOLOGY

## Foothill College Course Outline of Record

Heading	Value
<b>Units:</b>	5
<b>Hours:</b>	5 lecture per week (60 total per quarter)
<b>Prerequisite:</b>	PSYC 1 or 1H.
<b>Degree &amp; Credit Status:</b>	Degree-Applicable Credit Course
<b>Foothill GE:</b>	Area IV: Social & Behavioral Sciences
<b>Transferable:</b>	CSU/UC
<b>Grade Type:</b>	Letter Grade (Request for Pass/No Pass)
<b>Repeatability:</b>	Not Repeatable

## Student Learning Outcomes

- Each student will demonstrate their knowledge of biological processes that form the basis of all human behavior.
- Each student will demonstrate their knowledge of the relationship of the human brain and nervous systems.

## Description

This course examines the brain-behavior connection and the biological aspects of behavior and consciousness. Topics covered within the course include behavioral genetics, evolutionary psychology, neuroanatomy, physiological perspectives of sensory perception, learning and memory, sleep and dreaming, drug addiction, emotion, human sexuality, and biological bases of psychiatric disorders.

## Course Objectives

The student will be able to:

- define biopsychology and explain the basics of genetics and how genetics influence behavior
- explain and define all of the major anatomical components relevant to biopsychology
- explain how neurons communicate and the role of glial cells in neural communication
- define the different divisions of the nervous system and explain the roles they play in behavior
- explain and apply the methodologies and technologies that biopsychologists use to conduct research, such as the fMRI, EEG, EKG, MRI, TMS, and PET
- explain the foundational knowledge needed for behavioral genetics, evolutionary psychology, neural communication, the anatomy of the brain and nervous system, development, sensation and perception, movement, internal regulation, sleep and dreaming, internal regulation, hunger, thirst, sexuality, emotions, learning and language, consciousness, and psychological disorders
- evaluate major theories of development, internal regulation, sleep, dreaming, perception, emotion, motivation, memory, consciousness, learning, language, and psychological disorders
- analyze basic controversies in contemporary biopsychology
- analyze the ethics of using animals in research

- analyze primary source research articles from professional journals describing biopsychological research
- compose reports in the American Psychological Association approved style and format
- explain theory and research about brain plasticity and brain damage
- apply findings from biopsychology to their own life and explain how research findings may apply to their own beliefs, attitudes, and lives

## Course Content

- Introduction to the biological approach to behavior
  - Definition of neuroscience and biological psychology and related fields
- Genetics and behavior
  - Mendelian genetics
  - Sex-linked and sex-limited genes
  - Genetic changes
  - Hereditary and environmental influences of behavior
  - Explanation of evolution and evolutionary psychology
- Use of animals in research
  - Ethics of research using animals
- The anatomy of neurons and the explanation of how neurons communicate
  - Explanation of glial cells and aspects of neuroanatomy that are relevant to understanding neural communication, such as the blood barrier, synapses, neurotransmitters, ions, etc.
- Drugs and addition and how psychoactive drugs exert their effects
- All relevant and foundational knowledge of the anatomy of the nervous system, including the anatomy of the brain and the peripheral nervous system
  - Research methods used to study the nervous system, including MRI, PET, fMRI, EEG, and newer technologies
- Development and plasticity of the brain
  - Maturation of the brain during fetal development
    - Neuronal survival and apoptosis
  - Differentiation of the cortex
    - The effects of experiences on the organization and functioning of the developing brain
  - Development of the adolescent brain and development across the life-span
    - Changes in the brain associated with old age
  - Plasticity after brain damage
    - How to reduce harm after a stroke
    - Regrowth of axons and learned adjustments in behavior
- Vision
  - General principles of perception
  - The connection between the eye and the brain
    - Visual receptors: rods and cones
    - Color vision theories and color vision deficiency
  - How the brain processes visual information
    - Processing in the retina
    - Processing in the primary visual cortex
  - The development of the visual cortex
  - Explanation of the paths of vision in the brain
    - Perceptions of shapes, colors, and motion
- Other sensory systems
  - Auditory sensory systems
  - The mechanical senses
  - The chemical senses
- Movement
  - Muscles and their movements
    - Fast and slow muscles and muscle control by proprioceptors
    - Brain mechanisms of movement

3. Movement disorders
  - a. Parkinson's disease
  - b. Huntington's disease
  - c. Hereditary and environment in movement disorders
- K. Wakefulness, sleep and dreaming
  1. Circadian rhythms
    - a. Endogenous cycles
    - b. Resetting the biological clock
    - c. The suprachiasmatic nucleus
    - d. Light and the biological clock
    - e. Brain chemistry and melatonin
  2. Stage of sleep in the brain
  3. Sleep disorders
  4. Theories and biological mechanisms of dreaming
- L. Internal regulation
  1. Controlling the body's temperature
  2. Thirst
  3. Hunger
  4. Eating disorders
- M. Gender, sexuality and reproductive behaviors
  1. Organizing effects of sex hormones during prenatal development
    - a. Activating effects of sex hormones during brain development
  2. Variations in sexual behavior
    - a. Mating behavior
  - b. Gender identity and gender differences
  3. Sexual orientation
- N. Emotional behaviors
  1. Theories of emotion, including the James-Lange theory and modern theories
  2. Physiological arousal and emotion
  3. Brain areas associated with emotion
    - a. Contributions of the left and right hemispheres
  4. The functions of emotions
    - a. The functions of emotions in moral decision making
  5. Attack and escape behaviors
    - a. Fear and anxiety
    - b. Anxiety disorders
  6. Stress and health
    - a. Concepts of stress
    - b. Stress and the hypothalamus-pituitary-adrenal cortex axis
    - c. The immune system
    - d. Post-traumatic stress disorder
- O. The biology of learning and memory
  1. Localized representations of memory
    - a. The engram
  2. Types of memory
    - a. Long-term, short-term, procedural, implicit, explicit, etc.
  3. Brain structures associated with memory
  4. Types of amnesia
    - a. Korsakoff's syndrome
    - b. Alzheimer's disease
  5. The brain mechanisms and structures associated with learning
    - a. Long-term potentiation and consolidation
- P. Cognitive functions
  1. Lateralization and functions of the left and right hemispheres of the brain
  2. The corpus callosum
  3. Hemisphere specializations and communication
  4. Evolution and physiology of language
    - a. Precursors of language and how humans evolved language
    - b. Brain damage and language, including Broca's aphasia and Wernicke's aphasia

5. Consciousness and attention
- Q. Biology of psychological disorders
  1. Mood disorders
    - a. Major depressive disorder
    - b. Bipolar disorder
    - c. Genetic influences and other biological influences of mood disorders
  2. Antidepressant drugs
  3. Seasonal affective disorder
  4. Schizophrenia
    - a. Genetic and other biological influences of schizophrenia
    - b. The neurodevelopmental hypothesis of schizophrenia
  5. Treatments of schizophrenia
    - a. Antipsychotic drugs and dopamine
    - b. Role of glutamate
    - c. Newer drugs

## Lab Content

Not applicable.

## Special Facilities and/or Equipment

A. When taught as an online distance learning section, students and faculty need ongoing and continuous internet and email access.

## Method(s) of Evaluation

Methods of evaluation may include, but are not limited to:

- A. Multiple choice quizzes
- B. Essay exams
- C. Research papers
- D. Summaries and analysis of primary source research articles
- E. Personal reaction papers
- F. Problem-solving exercises
- G. Midterms
- H. Final exams

## Method(s) of Instruction

- A. Lectures
- B. In-class readings
- C. Videos
- D. Class discussion
- E. Active learning and group activities

## Representative Text(s) and Other Materials

Pinel, John P.J. *Biopsychology*. 10th ed. Pearson, 2017.

Kalat, James W. *Biological Psychology*. 13th ed. Cengage Learning, 2018.

## Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

- A. Reading and studying of textbook
- B. Reading and critically analyzing primary source research articles
- C. Reading current event articles that relate to prejudice and discrimination
- D. Writing research papers

E. Writing essay exam questions

F. Writing personal reaction papers

## **Discipline(s)**

Psychology