

# College of San Mateo

## Course Outline

- New Course  
 Update/No change  
 Course Revision (Minor)  
 Course Revision (Major)

Date: January 19, 2007

Department: Psychology Number: 220

Course Title: Introduction to Psychobiology Units: 3.0

Hours/Week: Lecture: 3 Lab: By Arrangement:

### Length of Course

- Semester-long  
 Short course (Number of weeks \_\_\_)  
 Open entry/Open exit

### Grading

- Letter  
 Credit/No Credit  
 Grade Option (letter or Credit/No Credit)

1. Prerequisite (Attach Enrollment Limitation Validation Form.)

Psychology 100

2. Corequisite (Attach Enrollment Limitation Validation Form.)

None

3. Recommended Preparation (Attach Enrollment Validation Form.)

Eligibility for ENGL 838 or 848 and completion of READ 400 or 405 with a grade of C or higher OR concurrent enrollment in READ 400, 405, or 415 OR appropriate skill level as indicated by the reading placement tests or other measures.

4. Catalog Description (Include prerequisites/corequisites/recommended preparation.)

Prerequisite: PSYC 100. Recommended Preparation: eligibility for ENGL 838 or 848 and completion of READ 400 or 405 with a grade of C or higher OR concurrent enrollment in READ 400, 405, or 415 OR appropriate skill level as indicated by the reading placement tests or other measures.

Survey of central and peripheral nervous system processes underlying the behavior of humans and animals. Emphasizes evolutionary, genetic, and gender differences underlying social behavior; anatomical and physiological substrates of behavior and consciousness; and neural mechanisms and sensory processes associated with learning, language, perception, motivation, emotion, sleep, speech, and sexuality. (CSU/UC)

5. Class Schedule Description (Include prerequisites/corequisites/recommended preparation.)

Survey of nervous system processes related to human and animal behavior. Emphasizes evolutionary, genetic, and gender differences underlying behavior and consciousness, and mechanisms and processes associated with learning, language, emotion, sexuality, motivation, perception, and sleep. Prerequisite: PSYC 100. Recommended Preparation: eligibility for ENGL

838 or 848 and completion of READ 400 or 405 with a grade of C or higher OR concurrent enrollment in READ 400, 405, or 415 OR appropriate skill level as indicated by the reading placement tests or other measures. (CSU/UC)

6. **Student Learning Outcomes** (Identify 1-6 expected learner outcomes using active verbs.)

Upon successful completion of the course, the student will be able to:

1. Critically evaluate the major figures and important milestones in the historical development of psychobiology, with special recognition of gender and cultural issues, including the contributions and perspectives of women;
2. Recognize and explain the various research methods used in psychobiological investigations;
3. Evaluate and explain the role of evolutionary, genetic and anatomical, neurological, electrical, and chemical processes that form the biological basis of behavior and consciousness;
4. Explain and identify the major structures and the principles underlying sensation and perception;
5. Distinguish the sequences of maturational processes in the development of the brain and brain-behavior relationships;
6. Compare and contrast the major biological theories of learning and memory;
7. Critically evaluate the biological basis of emotion, personality, sexuality, and psychopathology;
8. Critically analyze the contribution of neurological and hormonal factors relating to gender and culture.

7. **Course Objectives** (Identify specific teaching objectives detailing course content and activities. *For some courses, the course objectives will be the same as the student learning outcomes. If this is the case, please simply indicate this in this section).*

Same as above

8. **Course Content** (Brief but complete topical outline of the course that includes major subject areas [1-2 pages]. Should reflect all course objectives listed above. In addition, you may attach a sample course syllabus with a timeline.)

1. Identifying and critically examining the major historical developments in psychobiology
  - a. Biological explanations of behavior
    - i. Physiological explanation
    - ii. Ontogenetic explanation: sensitive period
    - iii. Evolutionary explanation: common ancestor
  - b. Theoretical models of the mind-brain relationship
    - i. Materialism
    - ii. Dualism
    - iii. Emergent property position
  - c. Contributions and perspectives of women: Linda Bartoshuk, Sandra Bem, Patricia Churchland, Marian Diamond, Diane Halpen, Eleanor Maccoby, Margaret Matlin and Brenda Millner
2. Research Methods of Psychobiological investigation
  - a. Ethical Issues
    - i. Animal welfare vs. equal rights for animals
    - ii. Are alternative methods feasible?
    - iii. Difficulty of resolving moral issues
  - b. Methods of research
    - i. Macro anatomical methods

- ii. Micro anatomical methods
  - iii. Stereostatic techniques and other surgical methods
  - iv. Introduction to anatomical methods using the sheep brain as a model
- 3. Basic Anatomy and Physiological Processes of the Nervous System
  - a. The Cells of the nervous system
    - i. Neurons and glia
    - ii. Structure of the neuron: soma, dendrites and axon
    - iii. Glia: oligodendrocytes and Schwann cells
  - b. The nerve impulse
    - i. Resting potential of the neuron
    - ii. Action potential
    - iii. Propagation of the action potential
    - iv. The myelin sheath and saltatory conduction
  - c. Synapses and Drugs
    - i. Chemical events at the synapse
    - ii. Sequence of chemical events at a synapse
    - iii. Synthesis of transmitters
    - iv. Release and diffusion of transmitters
    - v. Activation of receptors of the postsynaptic cell
- 4. Comparing and contrasting the major sensory systems
  - a. Reception, transduction and coding
    - i. Generator potential
    - ii. Coding: law of specific nerve energies
    - iii. Labeled-line coding vs. pattern across fibers
  - b. Audition
    - i. Structures of the ear
    - ii. Pitch perception
    - iii. Deafness
    - iv. Localization of sounds
  - c. The chemical senses
    - i. Taste: receptors and paths to the brain
    - ii. Olfaction: olfactory cells and cilia
  - d. Vision
    - i. Visual receptors: rods and cones
    - ii. Chemical basis for receptor excitation
    - iii. Neural basis of visual perception
    - iv. Visual processing at higher levels
    - v. Mechanisms of shape perception
- 5. Tracing the growth and differentiation of the vertebrate brain
  - a. Development of the brain
    - i. Neural tube
    - ii. Central canal of spinal cord
    - iii. Cerebrospinal fluid
  - b. Pathfinding by axons
    - i. Chemical pathfinding
    - ii. Competition among axons
    - iii. Pioneer neurons
  - c. Development of the Visual Systems
    - i. Infant vision
    - ii. Development of binocular areas
    - iii. Development of pattern perception
    - iv. Development of other aspects of vision
  - d. Abnormalities of development
    - i. Mental retardation
    - ii. Genetic causes

- iii. Exposure to toxic substances
  - iv. Malnutrition
  - v. Head injury
- 6. Comparing and contrasting the major biological theories of learning and memory
  - a. Learning, memory, amnesia, and brain functioning
    - i. Localized or diffuse representations of memory
    - ii. Classical conditions
    - iii. Operant conditioning
  - b. Brain damage and human amnesia
    - i. Korsakoff's syndrome
    - ii. Alzheimer's disease
    - iii. Different types of memory
  - c. Memory consolidation
    - i. Head-trauma interference with consolidation
    - ii. Chemical enhancement and impairment of consolidation
  - d. Role of the hippocampus, amygdale, and frontal cortex
    - i. Damage to hippocampus in rats
    - ii. Damage to the hippocampus in the primates
    - iii. Two hypotheses of the hippocampus function
  - e. Mechanisms of storing information in the nervous system
    - i. Long-term potentiation in the mammalian brain
    - ii. Learning elsewhere in the nervous system
    - iii. The biochemistry of learning and memory
    - iv. Brain and memory in young and old
- 7. Evaluating the biological basis of emotional behavior and stress
  - a. Role of the autonomic nervous system in emotional behaviors
    - i. Sympathetic nervous system
    - ii. Parasympathetic nervous system
    - iii. Measures of autonomic arousal
  - b. Emotions, autonomic response and health
    - i. Posttraumatic-stress disorder
    - ii. Psychosomatic illnesses
  - c. Chronic stress, the immune system, and health
    - i. Posttraumatic-stress disorder
    - ii. Immune system
- 8. Reinforcement, escape and attach behaviors and the brain
  - a. The limbic system and emotions
  - b. Hypothalamus, hippocampus, amygdale, septum and cortex
  - c. Temporal lobe epilepsy
  - d. Brain activity and reinforcement
  - e. Fear and anxiety
  - f. Panic disorder
  - g. Aggressive behavior
  - h. Serotonin synapses and aggressive behavior
- 9. Critically analyzing the contribution of neurological and hormonal factors relating to gender and culture
  - a. Biological factors relating to gender and culture
    - i. Brain cortical organization
    - ii. Hormonal influences
    - iii. Aggression
    - iv. Sexual behavior
  - b. Culturally and gender related hemispheric differences
  - c. Cognitive differences related to brain morphology

9. **Representative Instructional Methods** (Describe instructor-initiated teaching strategies that will assist students in meeting course objectives. Include examples of out-of-class assignments, required reading and writing assignments, and methods for teaching critical thinking skills.)

Lecture/Discussion and laboratory work

10. **Representative Methods of Evaluation** (Describe measurement of student progress toward course objectives. Courses with required writing component and/or problem-solving emphasis must reflect critical thinking component. If skills class, then applied skills.)

1. Midterm examinations combining objectives and written questions
2. Final comprehensive examination combining objective and essay sections
3. Oral and written group/individual report
4. Lab practicum work
5. Research paper on a problem or issue in psychobiology

11. **Representative Text Materials** (With few exceptions, texts need to be current. Include publication dates.)

James W. Kalat, *Biological Psychology*, Thomson Learning, 2006.

John P. J. Pinel, *Basics of Biopsychology*, Allyn & Bacon, 2006.

Mark R. Rosenzweig and others, *Biological Psychology, An Introduction to Behavioral and Cognitive Neuroscience*, 4/E, Sinauer Associates, 2004.

Prepared by:

\_\_\_\_\_  
(Signature)

Email address:

clifford@smccd.edu

Submission Date:

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