FRANCIS MARION UNIVERSITY: DESCRIPTION OF PROPOSED NEW COURSE or MODIFICATION OF AN EXISTING COURSE

Department/School__Psychology_____**Date**__2/15/14_____

Course No. or Level_346__**Title**_Cognitive Neuroscience_____

Semester hours__3____Clock hours: Lecture____2.5 hours/wk__
Laboratory___n/a___

Prerequisites_PSY 206 or Permission of Department _____

Enrollment expectation___25_____

Indicate any course for which this course is a (an)

modification_____
(proposed change in course title, course description, course content or method of instruction)

substitute_____
(The proposed new course replaces a deleted course as a General Education or program
requirement.)

alternate_____
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description__Jesse Sargent_____

Department Chairperson's/Dean's Signature_____

Provost's Signature_____

Date of Implementation_____

Date of School/Department approval_____

Catalog description:

346 Cognitive Neuroscience (3) (Prerequisite: 206 or permission of department) F, S, or SU. Cognitive neuroscience is an emerging interdisciplinary field that addresses the question: How does the brain enable mind and behavior? Psychological, physiological, and computational methodologies are brought to bear in understanding the neural basis of cognitive processes such as vision and attention, learning and memory, reading and language, meaning and semantics, and the organization and control of action. The

emphasis will be on how the application of converging methodologies (brain imaging - EEG and fMRI, recordings from individual neurons, studies of brain-injured patients) leads to important insights into the nature of cognition that would be difficult to obtain through any one methodology alone.

Purpose: 1. For Whom (generally?)

This course is designed primarily for upper-level psychology and Biology majors and minors who are interested in understanding the link between brain and cognition and wish to further their study in this area, perhaps to earn elective credits toward their major/minor requirements. This course will be of particular interest to students completing a minor or collateral in Neuroscience and will allow them to earn elective credits towards completion of that program. This course will also add another option to the Psychology Department's available electives.

2. What should the course do for the student?

This course will acquaint the student with the rapidly evolving, technology driven research into brain function. Specifically, students will become familiar with methodologies such as physiological recordings from neurons in behaving animals, functional neuroimaging (EEG and fMRI) of humans performing cognitive tasks, behavioral studies of brain-injured patients with selective cognitive deficits, and computational modeling of normal and impaired processing. In addition to shedding light on brain function, exposure to these methodologies will provide an appreciation for how cutting edge science and state-of-the-art technologies marry. Students will develop a deeper understanding of human biology that will certainly be useful for those going into any human health related field, or into graduate study in fields such as Medicine, Nursing or Psychology.

Teaching method planned:

Lecture, class discussion, in-class learning activities, tests, a paper, student presentations

Textbook and/or materials planned (including electronic/multimedia):

Gazzaniga, M., Mangun, R. and Ivry, R. "Cognitive neuroscience: The Biology of the Mind." 4th edition, 2014. W. W. Norton and Company, Inc.

Course Content:

(Please see the attached syllabus.)
Topics to be covered in the course include:

- Brief history of the brain in Psychology. Covering some of the early debates and discoveries in brain and neural function allows students to begin with more basic, intuitive, easily digestible questions such as: what is the brain made of? Does the

whole brain do a little bit of everything, or do certain parts do certain things? How does the brain communicate with the rest of the body?

- The anatomy of the neuron. To appreciate how the brain works as a system, students will learn about the amazing cells (neurons) that compose that system: neural structure (e.g., dendrites, axon, terminal buttons, myelin), electrochemical transmission (e.g., ion channels, resting/action potentials, ions, neurotransmitters, receptors), etc.
- Gross anatomy. The student will be reacquainted, briefly, with the major divisions, organization and functions of the nervous system (central - brain, spinal cord; peripheral – somatic/autonomic, etc.)
- Methods of Cognitive Neuroscience. Students will be introduced to the technologies used to measure brain activity (EEG, PET, fMRI). Equally importantly, students will be refreshed on the behavioral methods used in cognitive psychology (experimental design, independent/dependent variables, etc.)

  which typically measure as outcomes, error rates and reaction times. Additional methodologies studied include neuropsychology, in which we study patients with damage to particular brain regions, and computational neuroscience, in which we model brain function using computers. The power of applying multiple methodologies to common scientific questions (e.g., how does memory work?) is a theme in this course.
- Development and Plasticity. Students will learn bits and pieces regarding how the brain develops with an eye towards appreciating brain plasticity. We will discuss mechanisms by which the brain undergoes the changes that represent learning, e.g., long term potentiation.
- Lateralization. The field of cognitive neuroscience, in large part, started with the work of Michael Gazzaniga (an author on our text) on split brain patients whose left and right hemispheres can no longer communicate normally. We have learned fascinating things about the extent to which there are redundant systems in the brain and perhaps more strikingly, the extent to which brain function is compartmentalized. What can the left half do that the right half cannot? Which half would you rather have? Answer: left.
- Action. The student will investigate what has been learned about how the brain controls action. For example, we will examine the different systems and pathways that handle voluntary and involuntary motor control.
- Perception and Attention. How are energy (light, sound waves) and chemicals (smells, tastes) in the world around us turned into neural impulses, the language of the nervous system. How is attention to the world around us controlled by the brain? What part of the brain does this (DLPFC)? "Who" is controlling attention, a homunculus?
- Language. Language is one of the more impressive things that human brains do, and it not only allows us to communicate but it shapes thought as well. Students will get a look at the very specialized regions and systems in the brain that evolved to handle language, and how they are inextricably linked with broader cognitive function.
- Memory. Perhaps the most studied and fundamental cognitive function, memory is the brain's capacity to take in information, store it, and spit it back out later. We will

study what has been learned from cognitive neuroscience regarding this complex and multifaceted system. For example, what have we learned from temporal lobectomies? How are modern computer models of the human memory system faring? What parts of the brain handle encoding? What parts of the brain handle retrieval? What can be learned about human memory by considering the answers to all these questions together?

PSYC 346: Cognitive Neuroscience
Course Syllabus

Instructor: Jesse Sargent, Ph.D.
CEMC 109-C
phone: 843. 661-1634
email: jsargent@fmarion.edu

Time: ??????

Location: ??????

Office Hours: by appt.

Overview

The central question to be addressed is: How does brain enable mind and behavior? Cognitive neuroscience is an emerging interdisciplinary field in which psychological, physiological, and computational methodologies are brought to bear in understanding the neural basis of cognitive processes. In this course, we will consider the application of methodologies such as physiological recordings from neurons in awake, behaving animals, functional neuroimaging (EEG and fMRI) of normal subjects performing cognitive tasks, behavioral studies of brain-injured patients with selective cognitive deficits, and computational modeling of normal and impaired processing, in understanding cognitive domains such as high-level vision and attention, learning and memory, reading and language, meaning and semantics, and the organization and control of action. In each instance, the emphasis will be on how the application of converging methodologies, particularly those related to brain organization and function, leads to important insights into the nature of cognitive processes that would be difficult to obtain through any one conventional methodology alone.

The goal of the course is to introduce you to the questions, issues and methods within cognitive neuroscience, and to encourage you to think critically about the strengths and limitations of each methodology and whether they can be integrated into a coherent approach to understanding cognition.

The course is divided into an introductory section lasting roughly 3 weeks, a methods section lasting

just over 2 weeks and then topical sections, each lasting 2-3 weeks. The introductory section will consist
of a series of lectures and readings covering basic material on neuroanatomy and neurophysiology, and
the methods classes include overviews of the major methodologies employed in cognitive neuroscience research. Each of the remaining sections will focus on a specific domain of study. For each domain, we
will read relevant chapters from the textbook as well as supplementary readings, when necessary.
This portion of the course will be run as a seminar; you will be expected to read the assigned
reading(s) beforehand and to come to class prepared to discuss them in an interactive and lively fashion.

Readings

Required Text: Gazzaniga, M., Mangun, R. and Ivry, R. "Cognitive neuroscience: The Biology of the Mind." 4th edition, 2014. W. W. Norton and Company, Inc.

The class will mostly follow chapters from within the text, but some classes will be supplemented with
other course readings. The supplementary course readings will be available on Blackboard (see below). These readings are a bit more complicated than the book chapters, but I will go over them in detail during lectures. I would strongly encourage you to read each week's assignments prior to the class.

Blackboard

We will be using Blackboard so you should make sure you can log in and see this class, even if you have used Blackboard in the past. You log onto Blackboard here:
https://blackboard.fmarion.edu

Username: **swampfox** e-mail username (what comes before the @)
Password: fmu + last **5** digits of your SSN

I will use the Blackboard email system to communicate with students, and to post materials you need, including the lecture Powerpoints (to the "Content" folder), so **make sure that your email is up to date**
in Blackboard. To do this, go to My Places (picture of head) / Personal Information / Edit Personal Information. Be sure that the e-mail associated with your account is one that you use and check often, or
you will miss important notes from me.

Assignments

There are two required assignments that will amount to 20% of your grade:

Assignment 1 - Paper

Your assignment is to write a paper (3-5 double-spaced pages of solid writing, not including title page or references) about a question or thought you have regarding any learning or cognition topic that catches
your interest. Surely Something that we talk about will be interesting to you and generate some curiosity. You should search for peer reviewed articles in scientific journals that answer your question or at least lead you to some more interesting thoughts or questions. The paper should include summaries of at least 2 articles reporting data relevant to your topic. If the paper is turned in later the same day it is due, there is a 5% late penalty. After that, the penalty is 10% per day.

Here is a guide for the paper.

- Introduce the topic and the question about it or aspect of it that you are interested in. Why is it interesting to you?
- Summarize the research studies in each of the cited journal articles
    - What was the primary research question? But first, make sure the reader can understand this research question!!
    - How did they study it? What was the experimental design? What were the variables (independent and dependent if appropriate)?
    - What were the results in terms of these variables and the data?
    - How did they interpret these results, what were their conclusions?
    - Talk about how the study helped answer your question if it is not already obvious.
- Finally, try to tie together the articles that you talked about in a cohesive way, in summarizing what you learned. Include at least one new question or thought arising from what you learned.
- **MUST USE APA FORMAT THROUGHOUT!!**

Assignment 2 – Presentation

The second assignment is a 20 minute group presentation to the class (15 mins presentation, and 5 mins
for Q&A). Your presentation will be based on a journal article chosen from a major scientific journal.
The article will be chosen during a scheduled meeting between your group and me. Each presentation will consist of an introduction, methods, results, conclusions, and discussion sections. More detailed guidelines will be available on Blackboard. Presentations will be graded by your fellow classmates and me.

Grading

Grading in the class will be based on three short tests, a final longer test, two assignments, and class participation. The contribution of each of these to your final grade will be as follows:

Three short tests (15% each)	45%	
Final test		25%
Two assignments (10% each)	20%	
Class participation		10%

Extra Credit

You may earn up to 3 percentage points added to your final grade by participating in research. More information on Blackboard.

Final Grade Distribution

Your total final grade will be combined with the extra credit and rounded to one decimal. It will then be assigned to a corresponding letter grade based on the following distribution:

A 90% - 100%
B+ 87.5 – 89.9%
B 80-87.4%
C+ 77.5 – 79.9%
C 70-77.4%
D+ 67.5 – 69.9%
D 60-67.4%
F below 60%

Missed exams

A test may be made up only in serious cases such as hospitalization. The student must provide written documentation of the reason for missing the test date. The student must notify the instructor **within 24 hours of the test time** to arrange for a make-up test.
Students without a valid excuse for missing a test will be given a grade of zero.

Academic Honesty

All work that is turned in, whether a lab write-up, quiz, exam, or research paper, should be your own work unless I specify that group work is allowed on that assignment. Any instance of turning in work that is not your own or completed with unauthorized assistance will result in an F in the course (not just the assignment) and reporting to the FMU administration. You can always ask the instructor for help without penalty.

If you are a person with a disability on this campus and anticipate needing any type of academic accommodations in order to participate in your classes, please make timely arrangements by disclosing this disability in writing to Rebecca Lawson at the Office of Counseling and Testing 843-673-9707. I will need the notification of accommodations letter from their office in order to set up the necessary accommodations.

Tentative Schedule – subject to change

I. INTRODUCTION

Date	Day	Content	Reading
Aug. 27	Tu	Overview and introduction What is cognitive neuroscience?	
Aug. 29	Th	Introduction and History	Chapter 1
Sept. 3	Tu	Cellular and molecular bases	Chapter 2 (pp. 23-39)

Sept. 5	Th	Gross and functional anatomy	Chapter 2 (pp. 40-67)

II. METHODS

Date	Day	Content	Reading
Sept. 10	Tu	Methods of cognitive neuroscience I	Chapter 3 (pp.71-94)
Sept. 12	Th	Methods of cognitive neuroscience II	Chapter 3 (pp. 95-117)
Sept. 17	Tu	Test I	Chapters 1-3

III. CONTROL OF ACTION and EXECUTIVE FUNCTION

Date	Day	Content	Reading
Sept. 19	Th	Control of action	Chapter 8
Sept. 24	Tu	Control of action: movement planning and disorders	Chapter 8 continued
Sept. 26	Th	Cognitive control: frontal lobes	Chapter 12

IV. PERCEPTION and ATTENTION

Date	Day	Content	Reading
Oct. 1	Tu	Sensation and perception	Chapter 5
Oct. 3	Th	Object recognition	Chapter 6
Oct. 8	Tu	Object and face recognition	Assigned reading
Oct. 10	Th	Test II	Chapters 5, 6, 8, 12
Oct. 15	Tu	Attention and consciousness Assignment I, due in class Oct. 24th	Chapter 7

V. BRAIN ORGANIZATION

Date	Day	Content	Reading
Oct. 17	Th	Attention and consciousness, continued	Chapter 7

Oct. 22	Tu	Emotion	Chapter 10
Oct. 24	Th	Language and the brain Assignment 1 due	Chapter 11
Oct. 29	Tu	Language and the brain, continued	Chapter 11
Oct. 31	Th	Lateralization	Chapter 4
Nov. 5	Tu	Test III	Chapters 4, 7, 10, 11
Nov. 7	Th	Development and plasticity	Chapter 2 (pp. 60-66)
Nov. 12	Th	Groups meet, Assignment II	
Nov. 14	Tu	Learning and memory	Chapter 9
Nov. 19	Th	Learning and memory, continued	Chapter 9, assigned reading
Nov. 21	Tu	Group Presentations I (Assignment 2)	Assigned readings
Nov. 26	Th	THANKSGIVING BREAK	
Nov. 28	Tu	Group Presentations II (Assignment 2)	Assigned reading
Dec. 3	Th	Group Presentations III (Assignment 2)	Assigned readings
Dec. 5	Th	Group Presentations III (Assignment 2)	Assigned readings
TBD		Review for the final exam	Cumulative

FRANCIS MARION UNIVERSITY: DESCRIPTION OF PROPOSED NEW COURSE or MODIFICATION OF AN EXISTING COURSE

Department/School: Biology Date: September 16, 2014

Course No. or level: 120 Title: Natural History of South Carolina

Semester hours: 4 Clock hours: 6 Lecture: 3 Laboratory: 1

Prerequisites: Biol 103 or permission of department

Enrollment expectation: 60
Indicate any course for which this course is a (an)

modification: None

substitute: None
(The proposed new course replaces a deleted course as a General Education or program
requirement.)

alternate: None
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description: Jeff Steinmetz

Department Chairperson's/Dean's Signature_____

Provost's Signature_____

Date of Implementation_____

Date of School/Department approval_____

Catalog description: Natural history of South Carolina organisms. Topics may cover a variety of plants and/or animals. Identification, taxonomy, evolution, ecology and conservation of these groups will be covered. Laboratories will include outdoor field trips.

Purpose: 1. **For Whom (generally?):** non majors and biology majors (as an elective).

2. **What should the course do for the student?** To introduce students natural history of South Carolina plants and animals,

including taxonomy, evolution, ecology and conservation of these organisms.

Teaching method planned: Three hours of lecture each week, plus three hours lab. Lectures will be a mix of PowerPoint and classroom activities. Labs will consist of a mix of examining preserved specimens and field trips to find and identify species in the field.

Textbook and/or materials planned (including electronic/multimedia):

- Text 1: A variety of field guides to plants/animals. An example would be:
- Alden, P. and G. Nilson. 1999. National Audubon Society Field Guide to the Southeastern States. Alfred A. Knopf, New York. ISBN: 978-0679446835

Course Content: (Please explain the content of the course in enough detail so that the Academic Affairs Committee can make an informed judgment. Include a syllabus for the course.)

Please see attached sample syllabi. The structure of the class will be similar to majors taxonomy classes such as Fall Flora, Vertebrate Zoology, etc.

Biology 120: Natural History of South Carolina

Instructor: Dr. Jeff Steinmetz
Office: 201A MSB
Office Hours:
e-mail: jsteinmetz@fmarion.edu
Phone: 843-661-1404

Texts: Required

- Pough, F. H., C. M. Janis, J. B. Heiser. 2009. Vertebrate Life. 8th Ed. Benjamin Cummings. San Francisco, CA. ISBN: 978-0-321-54576-3
- Field Guides: Bird and herp field guide of your choice (either paper or app format)

Course Info: Lecture: M/W/F ; Lab M. This is a 4 credit course. Lecture counts for 75% of your grade, lab counts for 25%.

Requirements:			**Grading Scale:**	
	Quizzes:	12%		A=90
	Exam 1:	20%		B+=87
	Exam 2:	20%		B=80
	Exam 3:	20%		C+=77
	Final Exam:	20%		C=70
	Participation/Attendance	3%		D+=67
	Lab	25%		D=60
		100%		F≤59

Note: Lowest score from 1st 3 exams is dropped

Course description:

This course is designed to introduce you to the natural history of South Carolina organisms. Identification, taxonomy, evolution, anatomy, physiology, biogeography, behavior and ecology of species will be discussed. We will go over the evolutionary history of these taxa, and in doing so go over some of the basic changes that occur in anatomy and physiology. We will also cover ecological and conservation issues associated with each group. The laboratory portion of the course will focus on the natural history, systematics and identification of South Carolina species, and will involve both laboratory and field components.

Student Learning Objectives:

- Understand the basics of species anatomy/physiology
- Understand the evolutionary relationships among organisms
- Understand the basic ecology of the taxa covered
- Be able to identify major Orders/Families of SC plants and/or animals

- Be able to identify the major species of SC plants and/or animals

Tentative **Lecture Schedule**

Week	Lecture Topics	Lab Topics
1	Course Intro, Diversity and Classification Overview	Use of field guides and dichotomous keys
2	Plants: Gymnosperms	Herbarium specimens
3	Plants: Gymnosperms	Plant ID field trip
4	Plants: Angiosperms	Plant ID field trip
5	Plants: Angiosperms	**Plant practical**
P	Invertebrates: Protists, Sponges, Cnidarians	Invertebrate specimens
7	Invertebrates: Echinoderms and Molluscs	Invertebrate field trip
8	Invertebrates: Crustaceans	Invertebrate field trip
9	Invertebrates: Insects	**Invertebrate practical**
10	Vertebrates: Fish	Fish/Herp specimens
11	Vertebrates: Amphibians	Fish/Herp field trip
12	Vertebrates: Reptiles	Bird/mammal specimens
13	Vertebrates: Birds	Bird/mammal field trip
14	Vertebrates: Mammals	**Vertebrate practical**

Attendance and Participation Policy:

You are expected to attend class regularly and punctually. Students that attend regularly routinely do better in the course than those that do not. You are responsible for obtaining, completing, and submitting missed assignment. Note that the lecture outline is tentative. Should you miss class, check with myself or a fellow classmate to see if there were any changes announced on the day you missed.

Note that attendance counts towards the participation portion of your grade. For each day that you have an unexcused absence, you will lose 5 participation points (out of 100). According to FMU policy, ***more than six unexcused lecture absences from lecture or two unexcused absences from lab, can result in dismissal from the course and a grade of an F or W.*** If you choose to withdraw from the course, you are responsible for filing the paperwork with the registrar. If you missed class for a legitimate reason, it is your responsibility to provide documentation to avoid having an unexcused absence. For example, if you're sick, get an official doctor's excuse.

Participation means attending class regularly, speaking during discussions, being on time, paying attention to ideas being discussed, and proper classroom behavior (see below).

Classroom Behavior:

In the class and lab, you are expected to treat your fellow classmates with respect and civility**. ASOLUTELY NO CELL PHONE / IPOD / ELECTRONIC DEVICE USE during class. You will lose five participation points (out of 100) for every time you're caught using one of these devices.** If you engage in disruptive behavior you will

be asked to leave the class and be counted as absent for that day. Repeated offenses will result in your being dropped from the course.

If you are a parent or have a situation where your phone needs to be on, set it to vibrate and if you absolutely need to take the call step outside the classroom to do so.

Academic Honesty and Plagiarism:

Every student is responsible for turning in his or her own unique work. Cheating and plagiarism will not be tolerated in the classroom. ***Depending upon the severity of the offense, you may receive an F for that assignment or an F for the entire course.*** You will also be reported to the appropriate university office. A first offense typically results in an F on that assignment or and F in the course. A second offense results in a one semester suspension. A third offense results in expulsion from the university. If you are not sure what constitutes cheating or plagiarism, ask me before completing the assignment. "I didn't know" is NOT an acceptable excuse.

Quizzes:

Quizzes will consist of multiple choice questions done on Blackboard. There will be five quizzes over the course of the semester (roughly one every two weeks). Quizzes are open notes/book, and are designed simply to help you keep up with the material and figure out what you do and do not understand. You may drop your lowest quiz score. You will have a window of time to complete these quizzes, thus no make-up quizzes will be given. I encourage you to take all the quizzes, just in case later in the semester you forget one, have a bad week, get sick, have computer problems, etc.

Exams:

Exams will be given during regular class time. Thus you will have the full class period to complete the exams. They may include multiple choice, true and false, matching, identification/labeling, short answer and essay questions. Exams 1-3 will not be cumulative and will only cover material since the previous exam; however, the final exam will be cumulative. The cumulative portion of the final will be drawn from material on the first three exams. You may drop your lowest regular exam, thus no make-up exams will be given. However, ***everyone MUST take the final exam!***

Laboratory Assignments

Laboratory exercise will be a mix of examining specimens in the lab and field exercises. For field days, you should be prepared to go outside and dress appropriately (boots/old tennis shoes, long pants, etc.). Laboratory grades will be a mix of lab practicals / quizzes / field trip reports/questions.

Daylong Field Trips

In addition to the laboratory activities, you ***must*** attend 2 out of 3 day trips. The first will be to Huntington Beach State Park to observe plants and wildlife. The second will be to a nearby DNR property to conduct species surveys. These first two will be on Saturdays. The final trip will be a behind the scenes trip to Riverbanks Zoo. This trip

will be held on a Monday, so you may need to miss some classes to attend this one. Plan accordingly. A short report will be due after each of these trips. This report should be approximately 1 page single spaced (two pages double spaced) and describe our sampling location, summarize what we did on the trip/techniques used, the species we found, etc.

Withdrawal

After the official last day to drop a course, you may still withdraw, but your grade will be either a W or WF, depending on your current grade, except in cases of incapacitating illness or family trauma. ***Make up your mind whether you are serious about the class before this date!*** I do not allow frivolous withdrawals after this point.

Accommodations of Disabilities:

I am happy to make accommodations for students with special needs; however, you first must provide proper documentation from the Office of Counseling and Testing. You must also notify me of your needs one week prior to an assignment/quiz/test/etc. to allow time to arrange for the appropriate accommodations.

FRANCIS MARION UNIVERSITY: DESCRIPTION OF PROPOSED NEW COURSE or MODIFICATION OF AN EXISTING COURSE

Department/School Biology **Date** 6-2-14

Course No. or Level 309 **Title** Introduction to Neuroscience

Semester hours 4 **Clock hours**: Lecture 3 **Laboratory:** 1

Prerequisites: Biology 104 or 105 and Sophomore status or higher, or permission of the instructor

Enrollment expectation 20

Indicate any course for which this course is a (an)

modification
(proposed change in course title, course description, course content or method of instruction)

substitute
(The proposed new course replaces a deleted course as a General Education or program
requirement.)

alternate
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description Shayna A. Wrighten

Department Chairperson's/Dean's Signature

Provost's Signature

Date of Implementation

Date of School/Department approval

Catalog description:

309 Introduction to Neuroscience (4:3-3) (Prerequisite: Biology 104 or 105, Psychology
206 and Sophomore status or higher, or permission of the instructor) F, S, or SU. Neuroscience

is an interdisciplinary science that encompasses many fields including but not limited to Biology, Psychology, Physics, Computer Science and Chemistry. This course will introduce students to basic concepts of how the brain works, anatomy and physiology of neural networks, methodologies used in Neuroscience research and other fundamental concepts of the neurobiological and neurochemical aspects of Neuroscience. This course will focus heavily on the molecular aspects of Neuroscience and will include an introduction to the biological basis of particular behaviors such as learning and memory. The course will also provide an introduction to biological and neurochemical basis of pathological behaviors such as addiction, clinical depression and Schizophrenia.

Purpose: 1. **For Whom (generally?)**

This course is designed primarily for mid-level Biology and Psychology students interested in better understanding the molecular basis of how the brain works. This class will be especially beneficial for students interested in pursuing a graduate level degree in Neuroscience, Biomedical Science, Psychology or related fields. This course will also be of special interest to students intending to pursue a career in health care such as those interested in medicine, physical or occupational therapy, physician assistance, dentistry and other related areas. This course is intended to act as a core course for the Neuroscience program and as an elective course for Biology majors and minors.

2. **What should the course do for the student?**

This course will familiarize students with the rapidly evolving field of Neuroscience. Additionally, the course will give students the necessary background to complete upper level Neuroscience related courses such as Cognitive Neuroscience (Psychology 346 (proposed course), Brain and Behavior (Psychology 304) and relevant graduate courses. This course will also provide students with an appreciation for Neuroscience research and various cutting-edge techniques used within the

field. The course will give students a grasp of the direct relationship between neurobiology and
behavior, providing students with the opportunity to engage in thought provoking discussions based
on current Neuroscience literature. This course will aid in preparing students for future endeavors
in a variety of fields including medicine, osteopathy, chiropractic care, physical therapy and much more.

Teaching method planned:
Lecture, class discussions, in-class learning activities, tests, article reviews, lab activities, lab reports,
student presentations, independent projects will be used in this course.

Textbook and/or materials planned (including electronic/multimedia):
Neuroscience, 5th edition;
Purves et al. Sinaeur Associates, Inc.

Course Content:

(Please see the attached syllabus.)
Topics to be covered in the course include:

- Electrical signals of nerve cells: The major function of the nervous system is to control
  and coordinate behaviors necessary for carrying out simple and complex aspects of eukaryotic
  life. The primary form of communication used by the nervous system to carry out these processes
  is through electrical signals. The function, purpose, and mechanisms underlying electrical communication of nerve cells will be studied in detail in this course.

- Ion channels and transporters: Communication within and between cells, the basic units of
  life, heavily depends on the ability of ions and other important substances to move into and out
  of cells. Primary movement occurs through ion channels and transporters. A basic understanding
  of the structure and function of ion channels and transporters is necessary for the comprehension
  of how cells communicate with one another.

- Synaptic transmission: Synaptic transmission is the general process of neurons (nervous
  system cells) communicating with other neurons and cells of the body. Synaptic transmission

is the foundation of communication by the nervous system. A mid-level understanding of
synaptic transmission, a complex process, will be taught in this course.

- Neurotransmitters and their receptors: Neurotransmitters, chemicals used for communication
by the nervous system, are a pivotal component of nervous system function. In this course,
students will learn the structure and function of various neurotransmitters, including
synthesis, mechanism of action and degradation. This course will also introduce
students to neurotransmitter receptors, which are used by neurotransmitters to carry out
proper neurotransmitter action.

- Synaptic plasticity: The ability of individuals to learn and remember new information is
highly dependent on the fact that the brain is plastic, able to change in response to
new experiences/information. The ability of nerve cells to change in response to information
is termed synaptic plasticity. This course will introduce students to the historical significance
of the discovery of synaptic plasticity, the mechanisms of synaptic plasticity and current
techniques used by neuroscientists to study synaptic plasticity.

- The sensory systems: The ability of organisms to experience the world around them is
dependent on use of the five major sensory systems: gustatory (taste), olfactory (smell), auditory
(hearing), visual and tactile. Each system uses unique mechanisms to function properly. In
this course, students will learn about the various types of receptors and stimuli used by the
various sensory systems to allow us to perceive the world around us.

- Central control of motor movement: Motor movement of the body is carried out by the
muscular system of the body. Control of the muscular system, as well as other body systems,
is carried out by the nervous system. In this course students will take an in depth look at the
intricate relationship between the nervous systems and the muscular system. Students will learn
how the nervous systems control muscle movement and will learn what happens when

these processes no longer function properly.

- Brain development: In this course students will learn about the various divisions of the
  brain and how these divisions develop. Brain development will be studied on a gross (large)
  scale as well as a cellular (small) scale. Students will leave the course with an in depth understanding of how the human brain develops as well as consequences of improper development.

- Neural anatomy: Throughout the course students will be taught neural anatomy. Students will
  learn gross (large) structures of the brain as well as smaller divisions within the brain. Students
  will learn neural anatomy through the use of books, models and animal brains. Neural anatomy
  will be taught in both lecture and lab. A proper understanding of neural anatomy is an essential
  to the foundation of the study of neuroscience.

Francis Marion University
Biology 309: Introduction to Neuroscience
Prerequisites: Biology 104 or 105, Psychology 206 and
Sophomore status or higher, or permission of the instructor
Textbook: Neuroscience, 5th edition; Purves et al. Sinaeur Associates, Inc.
Instructor: Dr. Wrighten
Office: 301A McNair Science Building (MSB)
Phone: (843) 661-1383 **Email:** swrighten@fmarion.edu

Course objective: This course is designed to introduce students to basic concepts of how the brain works, anatomy and physiology of neural networks, methodologies used in Neuroscience research and other fundamental concepts of the neurobiological and neurochemical aspects of Neuroscience. Students will learn the molecular and cellular functioning of the nervous system as well as basic neural anatomy important for understanding how the nervous system works. The course will also highlight the biological basis for particular behaviors and disorders.
Course information/updates: Information and updates concerning this course will be posted in the announcements section of Blackboard. Please be sure to check Blackboard at least once per week. Individual correspondence will be made via your campus email only. Please be sure that you check your assigned FMU email account on a regular basis. You will be held responsible for any information distributed via blackboard and/or your official FMU email account. This syllabus is subject to change. Changes made to the syllabus will be announced in class and posted on blackboard.

Course grades: Course grades will be posted in the grading center of Blackboard. Late work WILL NOT be accepted. I will not calculate course grades for individual students prior to the submission of final grades; however, if you need assistance in figuring out your overall course grade average, please contact me. The standard university grading scale will be used in this course.

Date	**Topic**	**Reading assignment due**	**Assignment(s) due**
Week 1	Syllabus and course review; Nervous system overview	Chapter 1	
	Neural anatomy overview		
Week 2	Neural anatomy overview		
	Electrical signals and ion movement	Chapter 2	
	Membrane potential and ion movement	Chapter 2	
Week 3	Voltage dependent membrane permeability	Chapter 3	
	Ion channels and their transporters	Chapter 4	
	Ion channels and their transporters	Chapter 4	

	The role of ions in synaptic transmission	Chapter 5	Article review #1 due (Bb)
	Proteins in synaptic transmission	Chapter 5	
Week 5	Neurotransmitters and their receptors **Exam #1 in lab**	Chapter 6	
	Neurotransmitters and their receptors	Chapter 6	
	Molecular signaling within neurons	Chapter 7	
Week 6	Synaptic plasticity	Chapter 8	
	Synaptic plasticity	Chapter 8	Article review #1 due with revisions (Bb)
	Touch, proprioception and pain	Chapter 9-10	
Week 7	*Case study 1 Discussion*		
	The visual system	Chapter 11-12	
	The visual system	Chapter 11-12	
Week 8	The auditory system and vestibular system	Chapter 13-214	
	The chemical senses: olfaction	Chapter 15	
	The chemical senses: gustation	Chapter 15	
Week 9	Nervous system control of motor movement **Exam #2 in lab**	Chapter 16	
	Nervous system control of motor movement	Chapter 16	
	Nervous system control of motor movement	Chapter 17	
Week 10	Nervous system control of motor movement	Chapter 17	
	Nervous system control of motor movement	Chapter 18-19	
	Nervous system control of visceral motor movements	Chapter 21	
Week 11	Case Study 2 Discussion		
	Brain development	Chapter 22	
	Brain development	Chapter 22	
Week 12	Brain development	Chapter 23	Article review #2 due (Bb)
	Modification of neural circuits based on experience	Chapter 24	
	Modification of neural circuits based on experience	Chapter 24	
Week 13	Cognition **Exam #3 in lab**	Chapter 26-27	

	Emotions	Chapter 29	
	Sex, sexuality and the brain	Chapter 30	
Week 14	Memory	Chapter 31	
	Diseases/disorders of the nervous system		Article review #1 due with revisions (Bb)
	Diseases/disorders of the nervous system		
	Final Exam		

Summary of points

Lecture exams (3x115pts each)	345
Lecture final exam (cumulative)	200
Case study discussions	95
Final project	110
Article review	100
Lab report	40
Lab participation	50
Lab homework	60
Total	**1000**

**To determine your grade throughout the semester, take the total number of points that you have earned to date, divide that by the total possible points to date, then multiply by 100

Personal responsibility: Each student is expected to take personal responsibility for his/her part in this course. Chapters in your required textbook will be assigned to accompany each topic that we cover. Each student is expected to independently read the chapters associated with each topic prior to class. Students are expected to maintain academic integrity and cheating WILL NOT be tolerated.

Academic honesty

- Cheating (including **plagiarism** on any written assignments) will absolutely **not be tolerated**. Any evidence of cheating or plagiarism will result in a zero on the assignment/quiz/exam, and the incident will be reported to the appropriate university office. Repeated offenses (more than one offense) will result in failure of the course. Please refer to the student handbook for specific information about the Francis Marion University policy regarding academic honesty.
- Cell phones, lecture notes, books, and talking are not permitted during graded assignments/quizzes/exams unless otherwise noted by me. Evidence of any of the aforementioned devices and/or behaviors in sight during a graded assignment will result in a grade of zero on the assignment/quiz/exam.

Make up exams: Exams will be allowed to be made up at my discretion. In the event of a conflict with a scheduled exam it is your responsibility to make arrangements with me to take the exam at another time at least seven days prior to the scheduled exam date. In the case of an emergency preventing you from taking an exam you must reschedule the exam within two days of the original exam date. Exams that are missed will only be

allowed to be rescheduled for legitimate reasons (legitimate to be determined by me) such as illness with a doctor's excuse. All exams in this course will be given during the designated lab period. Exams will begin at the beginning of the lab period and you will be given 50 minutes to take the exam. If you are late to the exam a 1-point deduction will be taken from the exam grade for every minute you are late. Extended time will not be given to students who are late. BE ON TIME!!!

Attendance: Attendance will not be taken in class. If you desire to drop the course it is your responsibility to carry out the necessary paperwork. Do not assume that you will be withdrawn from the course due to lack of attendance. However, I reserve the right to withdraw any student who has missed more than four class periods.

Accommodation of disabilities: If you have a disability that requires academic accommodations, please submit a letter of verification to me from the Office of Counseling and Testing. I will acknowledge receipt of the letter to you by email. It is then YOUR RESPONSIBILITY to contact me at least one week prior to each exam in order to arrange the necessary accommodations. If you fail to contact me a week in advance I cannot guarantee your needs can be met. In the event that other accommodations are needed (such as a note taker) it is your responsibility to arrange that with the testing center.

Behavioral Conduct: If you display inappropriate behavioral conduct, excessive talking/laughing during class or other types of disruptive conduct, on multiple occasions you will be notified not to return to class until you have spoken with Dean Teresa Ramey in student affairs and have been given permission from the professor to return to class. Failure to comply with these disciplinary actions will result in you being withdrawn from the course with a grade based on your grade at that time.

Cell phones and other electronic devices: I don't want to see them during lecture. The use of cell phones and other electronic devices such as, but not limited to, laptops and tablets is not allowed during lecture. If I see your device I will take it and hold it at the front of the class until the class period is over. The use of electronic devices is disruptive to you the user, other students around you and to me. If any student continuously uses his/her electronic devices during lecture there will be a 5% deduction to his/her final grade.

Date	**Topic**	**Assignment(s) due**
Week 1	Gross neuroanatomy structures	Anatomy workbook
Week 2	Gross neuroanatomy structures	Anatomy workbook
Week 3	Microanatomy structures	Anatomy workbook
Week 4	Microanatomy structures	Anatomy workbook
Week 5	**Lecture Exam #1; Lab practical**	

Francis Marion University
Biology 309: Introduction to Neuroscience
Meeting time and location:
Instructor: Shayna A. Wrighten, Ph.D.
Office: 301A McNair Science Building (MSB)
Phone: (843) 661-1383 **Email:** swrighten@fmarion.edu

Course objective: Laboratory exercises will be performed to provide an additional learning tool to accompany the lecture material covered. During lab there will be a particular emphasis on the study of neuroanatomy.

Week 6	Neural plasticity lab	
Week 7	Sensory lab	Neural plasticity homework
Week 8	Taste perception lab	
Week 9	**Lecture Exam #2**	Taste lab homework
Week 10	Muscle control lab/muscle development simulation	
Week 11	Learning/memory lab	Muscle lab homework
Week 12	Synaptic development simulation lab	Learning/memory lab homework
Week 13	**Lecture Exam #3**	Synaptic development homework
Week 14	**Final project presentations**	Lab report due

Course grades: Course grades will be posted in the grading center of

Blackboard. Late work **WILL NOT** be accepted. I will not calculate course grades for individual students prior to the submission of final grades.

Weekly lab exercises: Weekly lab exercises will be posted on Blackboard. It is your responsibility to print these each week before coming to lab. Failure to do so will affect your participation grade.

Homework assignments: Homework assignments are due at the BEGINNING of lab on the due date. If you arrive after assignments have been collected your assignment will not be collected and you will receive a grade of 0. Late work will not be accepted! All assignments must be typed. Hand written assignments will receive a grade of 0.

Personal responsibility: Each student is expected to take personal responsibility for his/her part in this course. Labs are designed to aid in your Neuroscience learning experience. However, as is the case with all things in life, you get out of lab what you put into it. Students are expected to actively participate and remain engaged in lab activities.

Academic honesty

- Cheating (including plagiarism on any written assignments) will absolutely **not be tolerated**. Any evidence of cheating or plagiarism will result in a zero on the assignment or quiz; and the incident will be reported to the appropriate university office. Repeated offenses (more than one offense) will result in a
- failing lab grade. Please refer to the student handbook for specific information about the Francis Marion University policy regarding academic honesty.
- Cell phones, lecture notes, books, and talking are not permitted during graded assignments or quizzes unless otherwise noted by the professor. Evidence of any of the aforementioned devices and/or behaviors in sight during a graded assignment will result in a grade of 0 on the assignment or quiz.

Accommodation of disabilities: If you have a disability that requires academic accommodations, please submit a letter of verification to me from the Office of Counseling and Testing. I will acknowledge receipt of the letter to you by email. It is then YOUR RESPONSIBILITY to contact me at least one week prior to each exam in order to arrange the necessary accommodations. If you fail to contact me a week in advance I cannot guarantee your needs will be met.

Attendance: Missing lab (you must be present for the entire lab for you to be considered present) will result in the following penalties to your final lab grade:

- 1 lab missed= no penalty except any assignments missed which will not be allowed to be made up and participation points
- 2 labs missed-10% deduction to your final course grade
- 3 labs missed-25% deduction to your final course grade
- More than three labs missed– 0 for your final course grade

If you miss a lab and an assignment based on that lab is due you will not be allowed to complete the assignment.

Lab Safety: refer to lab safety procedures posted on Blackboard

When completed, forward to the Office of the Provost. 9/03