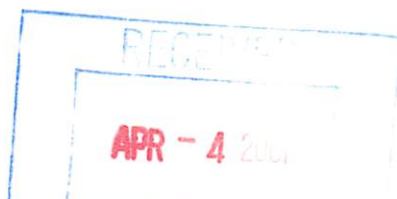


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App 9/11/01
Senate App 10/21/01

CURRICULUM PROPOSAL COVER SHEET
University-Wide Undergraduate Curriculum Committee

I. CONTACT

Contact Person Dr. Andrew C. Browe Phone 357-2191
Department Biology

II. PROPOSAL TYPE (Check All Appropriate Lines)

☒ COURSE BIOL 477/577 NEUROBIOLOGY
☒ New Course* NEUROBIOLOGY
____ Course Revision _____
____ Liberal Studies Approval + _____
 for new or existing course _____
____ Course Deletion _____
____ Number and/or Title Change _____
____ Course or Catalog Description Change _____
____ **PROGRAM:** _____ Major _____ Minor _____ Track
____ New Program* _____
____ Program Revision* _____
____ Program Deletion* _____
____ Title Change _____

III. Approvals (signatures and date)

Arthur C. Hulse, III-26-01
Department Curriculum Committee
[Signature] 4/4/01
College Curriculum Committee

+ Director of Liberal Studies (where applicable)

W. Bay B. 3/27/01
Department Chair
[Signature] 4/4/01
College Dean

*Provost (where applicable)

I. Catalog Description

3 lecture hours

3 credits

(3c-01-3sh)

PREREQUISITE: BIOL 111, or 105, or 151, or PSYC 350
or permission of instructor

This course presents the underlying mechanisms through which the nervous system mediates behavior, from the molecular to the organismal level. This course emphasizes two major themes: 1) the roles of synapses and neuronal excitability in shaping the input/output functions of neurons and neuronal networks, and 2) the role of neuronal development and neuronal experience upon resultant neuronal organization.

II. Course Objectives

- A) Students will understand the fundamental properties of neuronal membranes, their ionic channels and the molecular mechanisms underlying these properties.
- B) Students will understand the basic mechanisms of synaptic organization, including the roles of neurotransmitters and neuromodulators.
- C) Students will apply basic neuronal network concepts to the understanding of motor control, vision, somatic sensations, audition, consciousness, autonomic functions, language, emotions, attention, and learning and memory.
- D) Students will utilize basic mechanisms of neuronal development and experience to understand the role that each plays in central nervous system function.

III. Course Outline (each topic represents one lecture hour)

- A. Cellular neuronal mechanisms
- 1) introduction, general nervous system organization
 - 2) nerve cell /glial cell organization
 - 3) resting membrane potential
 - 4) action potential
 - 5) ion channels and pumps

- 6) synaptic organization
- 7) synaptic transmission
- 8) neurotransmitter/neuromodulator
- 9) transmitter receptor/drug modification
- B. Sensory Systems
 - 10) sensory receptors
 - 11) somatic sensation
 - 12) pain/pain control
 - 13) photoreceptors
 - 14) peripheral vision
 - 15) central vision
 - 16) EXAM #1
 - 17) auditory system
 - 18) vestibular system
 - 19) chemical senses
 - 20) proprioceptors
- C. Motor Systems
 - 21) ganglia properties
 - 22) spinal cord/reflexes
 - 23) descending motor tracts
 - 24) cerebellum
 - 25) basal ganglia
 - 26) motor cortex regions
 - 27) sensory/motor integration
 - 28) autonomic system
 - 29) Exam #2
- D. Neuronal Development
 - 30) general principles of neuron development
 - 31) maturation of neuronal circuits
 - 32) neuronal experience
 - 33) neuronal plasticity
 - 34) neuronal aging
- E. Behavior
 - 35) language
 - 36) sleep/wakefulness
 - 37) brain lateralization
 - 38) emotions
 - 39) central nervous system sexual differentiation
 - 40) learning and memory mechanisms
 - 41) graduate student presentations

42) graduate student presentations
final exam week - EXAM #3

IV. Evaluation Methods

A. Undergraduate students

Lecture quizzes/assignments (30 @ 5points)	= 150 points
Exams (3 exams @ 150 points)	= 450 points
Nervous System computer simulations (3 simulations @ 30 points)	= 90 points
TOTAL	= 690 points

Note: undergraduate exams will be 100% short answer

Undergraduate grading

88-100%	= A
76-87%	= B
64-75%	= C
52-63%	= D
below 52%	= F

B. Graduate students

Lecture quizzes/assignments (30 @5 points)	= 150 points
Exams (3 exams @ 150 points)	= 450 points
Nervous system computer simulations (3 @ 30 points)	= 90 points
Literature research paper	= 160 points
TOTAL	= 850 points

Note: graduate student exams are 60% short answer and 40% essay

Graduate grading

90 – 100%	= A
80 - 89%	= B
70 - 79%	= C
below 70%	= F

Graduate student literature search paper components

Title page
Summary page
Topic and subtopic outline page
Body of paper (approximately 8-12 pages)
Bibliography / references page(s)

Rough draft of paper (due 2/3 into semester)	=	30 points
Final draft of paper (due final week of semester)	=	100 points
Oral presentation (final week of semester)	=	30 points
TOTAL	=	160 points

V. Required Textbooks/Papers

Dana Press; **The Brain in the News**, weekly free newspaper devoted to brain science advances

Purves D., Augustine G., Fitzpatrick D., Katz L., LaMantia A., McNamara J., and Williams S. editors: **Neuroscience**. 2nd edition, 2001.

VI. Special Resources Requirements

There are neither materials nor equipment expected for this course. There is no lab fee for the course.

VII. Bibliography

Bear M., Connors B., Paradiso M.; **Neuroscience: Exploring the Brain**. Lippincott Williams & Wilkins. 2nd edition, 2001.

Beatty J.; **The Human Brain: Essentials of Behavioral Neuroscience**. Sage Publications, 2000.

Bownds M.; **Biology of the Mind**. Fitzgerald Science Press, 1999.

Collins P., editor; **Nature Reviews: Neuroscience**. Volumes 1-3, 1999-2001.

Cowan W., Shooter E., Stevens C., and Thompson R. editors; **Annual Reviews of Neuroscience**. Annual Reviews, Inc. Volumes 14-24, 1990-2001.

Delcomyn F.; **Foundations of Neurobiology**. W.H. Freeman and Company, 1998.

Good M. editor; **Science**. American Association for the Advancement of Science, Volumes 290-291, 2000-2001.

Hanaway J., Woolsey T., Gado M. and Roberts M.; **The Brain Atlas: Visual Guide to the Human Central Nervous System**. Fitzgerald Science Press, 1998.

Kandel E., Schwartz J., and Jessel T.; **Principles of Neural Science**. Elsevier, 4th edition, 1998.

Liebieskind A. editor: **Journal of Neuroscience**. Volumes 10-21, 1990 –2001.

Paul CA, Beltz B., Berger-Sweeney J.; **Discovering Neurons: The Experimental Basis of Neuroscience**. Cold Springs Harbor Laboratory Press, 1997.

Shepherd GM; **Neurobiology**. Oxford University Press, 3rd edition, 1994.

Steward O.; **Functional Neuroscience**. Springer-Verlag, 2000.

Section A: Details of the Course

A1. Academic need:

This course is designed to satisfy two needs within the College: (1) to provide a required course for the undergraduate pre-physical therapy program in Natural Science, and (2) to provide a physiology elective for the graduate student curriculum in the Biology Department. The course can also be used as a biology elective for Biology and Pre-Medicine undergraduate majors. This course is also designed to be an elective for the eventual cognitive science minor.

A2. Changes in existing courses:

This course will not require any changes in the content of any existing course in the Biology Department nor in the University.

A3. Previous offering:

This course has been offered three times as a special topic course for the Biology Department. Enrollment for this course has ranged from 14-18 students each offering. The type of student enrolled in the course included graduate students in Biology, undergraduate Biology, Pre-Medicine, and Pre-Physical Therapy majors, and undergraduate in Psychology taking the course as a free elective.

A4. Type of offering:

This course will be offered as a dual level course (BIOL 478/578). Presently the undergraduate and graduate curriculum committee for the Biology Department has approved the proposal. The proposal has also been approved by the college curriculum committee.

A5. Variable credit:

This course will not be taken for variable credit. The credit for all students enrolled in the course will be 3 credits reflecting the 3 hours of lecture per week.

A6. Higher education institutions currently offering this course:

Presently many universities in Pennsylvania offer Neurobiology as an undergraduate/graduate course. This reflects the increased demand for Neurobiology brought on by; (1) the increase in physical therapy programs in Pennsylvania and, (2) the increased research opportunities in neuroscience

during the past decade and the financial commitment by NIH for neuroscience programs. Schools in Pennsylvania which presently offer Neurobiology as an undergraduate or dual level course include Millersville University, Slippery Rock University, Gannon University, Duquesne University, and the University of Pittsburgh.

A7. Content recommendation by professional society:

Presently Neurobiology is not required by any professional society at the undergraduate level. It is a required course for Physical Therapy majors in the Master's degree program offered at many universities including Slippery Rock, Duquesne, University of Pittsburgh, and Gannon.

Section B: Interdisciplinary Implications

B1. Number of instructors for this course:

This course will be taught by only one instructor in the Biology Department.

B2. Content relationship with other courses:

The content of the proposed Neurobiology course is similar only to the content of Physiological Psychology offered by the Psychology Department. I have discussed this overlap of content with Dr. Ray Pavloski who teaches Physiological Psychology and we agree on the substantial differences between the courses and the need for both courses. Physiological Psychology has an emphasis upon human behavior and the neurological correlates. Neurobiology has an emphasis upon CNS mechanisms for the control of movement, behavior, sensation, autonomic function, etc. in all animals, particularly vertebrates. In addition, Neurobiology places a great deal of emphasis upon explaining basic neuronal mechanisms in these animals. The Neurobiology course has the support of the Psychology Department (see enclosure).

B3. Continuing Education students:

This course will be open to all students who have completed one of the pre-requisite courses or equivalent. This includes students who may be enrolled in the School of Continuing Education.

Section C: Implementation

C1. Faculty:

The faculty member qualified to teach this course is presently a member of the Biology Department.

C2. Other Resources:

Space – Space needed for this course consists of only an available lecture room

Equipment – No new equipment is required for teaching this didactic course. Demonstrations can be provided with existing equipment in the Physiology Lab.

Laboratory supplies – No laboratory supplies will be needed to offer this course. The nervous system simulations are provided by the textbook publisher or can be downloaded (without cost) off the internet.

Library materials – The existing journal offering in the library is minimally adequate to allow for literature searches and paper presentations in the course. Important journals in neuroscience that are subscribed to the IUP library include: Science, Journal of Neuroscience, Annual Review of Neuroscience, and Nature Reviews.

Travel funds – No travel funds will be required. The proposed instructor presently travels to either the Neuroscience Society meetings or the American Association for the Advancement of Science meetings using a combination of personal and departmental funds.

C3. Grant funded sources:

There are no resources funded by a grant for this course.

C4. Frequency of course offering:

This course is designed to be offered once every four semesters. This will allow the course to be placed on a rotational basis with other Departmental graduate and upper level undergraduate courses. It will also allow all undergraduate and graduate students an opportunity to take this course during their matriculation period.

C5. Number of course sections:

This course will require only one section each time it is offered.

C6. Number of students who can be accommodated in the course:

Course enrollment is unlimited and dependent only upon the number of available seats in a general purpose lecture room.

C7. Professional society limitations on nature of this course:

There are no limitations on the content, nature, or enrollment of this course based upon professional society criteria.

Section D: Miscellaneous

No additional information is necessary

Andrew C. Browe

From: Mary Lou Zanich <mlzanich@grove.iup.edu>
To: <acbrowe@grove.iup.edu>
Sent: Wednesday, October 04, 2000 12:12 PM
Subject: Course Proposal

Dr. Browe,

This letter is in support of your course proposal for BIOL 478/578: Neurobiology. The proposal has been reviewed by the Department's curriculum committee. Given the nature of our disciplines, some overlap with courses offered in Psychology is inevitable. However, there is no existing psychology course which your course will duplicate. We would hope that those psychology majors who minor in Biology would take advantage of the opportunity to take the Neurobiology course.

Please let me know if you require anything additional.

Mary Lou Zanich, Ph.D.
Chair and Professor of Psychology
101 Uhler Hall - IUP
Indiana, PA 15705
PHONE: (724) 357-4528
FAX: (724) 357-2214