

APPENDIX
Example Program Goal

Goal 4: Biology majors will think critically and be intellectually flexible.

Students will:

1. Recognize the cumulative nature of scientific research and evidence.
2. Distinguish different ways of knowing and differentiate between “good” and “bad” science and between accurate and inaccurate biological information.
3. Apply both deductive and inductive reasoning skills to solve problems.
4. Read and analyze biological reports in the primary and secondary literature and popular media.
5. Identify and evaluate the moral and ethical dimensions of biological problems.
6. Understand how reductionist and holistic thinking can be combined to uncover emergent properties of biological systems.
7. Identify, formulate and evaluate questions, hypotheses, approaches and experiments. Analyze data and draw logical conclusions and interpretations based upon those data.
8. Identify and communicate the sources of error and uncontrolled conditions inherent in experimental design.
9. Explain the limitations of the use of models and theories as scientific representations of reality.
10. Evaluate key issues in contemporary science and technology and judge their impact on science and society.
11. Recognize the tentative nature of scientific discoveries and apply basic principles to understand and analyze new concepts and solve problems.
12. Demonstrate the ability to solve unscripted problems using a multidisciplinary approach.

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Course Syllabus

St. John Fisher College
BIOL 322 NEUROBIOLOGY
Syllabus
Semester, Year

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Office Hours: Monday 9-10 am, 4:30-5 pm
Wednesday 9-10 am
Thursday 1:30-2:30 pm
Friday 11:05- noon
I'm available to help at other times. Please stop by my office or schedule an appointment.

Course Description

This course is designed to introduce students to the field of neurobiology. We will examine the structure and function of the nervous system using an interdisciplinary approach. Information processing in the brain is considered at the molecular, cellular, circuit, and system levels of organization. Disorders of the nervous system are also explored. The course is designed for biology majors and requires students to attend and actively participate in class each week. Prerequisites: BIOL 128C & 311 or permission of the instructor.

Course Goals

- To understand and apply scientific concepts to explain and predict normal function as well as dysfunction of the nervous system.
- To further stimulate your interest and curiosity in neurobiology.

Learning Outcomes:

Students who successfully complete this course will be able to:

- Demonstrate proficiency in the correct usage of scientific terminology.
- Explain anatomical, physiological, pharmacological, and molecular properties of neurons and apply this information to examine electrical signaling and interneuron communication.
- Describe the organization of the nervous system and visually identify major landmarks, subdivisions, fiber tracts, and nuclei of the nervous system.
- Illustrate the pathways associated with somatic sensation and voluntary movement.
- Interpret links between brain function and behaviors.
- Critically analyze published studies as well as design experiments and interpret data to effectively answer experimental questions related to neural function.
- Recognize the interaction of science and society and identify and evaluate the moral and ethical dimensions of biological problems.
- Demonstrate precise, objective communication skills for reporting and interpreting scientific information.

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Course Meeting Times

Monday, Wednesday, Friday 10:10-11:05 am in A212

Course Strategy

Classes will consist of some lecturing to provide a foundation of content, as well as time for problem-solving and discussion to provide you with opportunities to better comprehend and apply the information. You are required to take an active part in the learning. Along with individual responsibilities, extensive in-class collaborative work is required.

Required Materials

- Bear, Mark F., Connors, Barry W., and Paradiso, Michael A., 2001. *Neuroscience Exploring the Brain*, 2nd edition, Lippincott Williams & Wilkins.
- Algom, Mitch, 1997. *Tuesdays with Morrie: An Old Man, A Young Man, and Life's Greatest Lesson*, Doubleday.

Other Course Requirements

The Blackboard course site is intended to enhance your learning experience. It enables you to prepare for upcoming material, review information when studying, and explore related areas of interest in greater depth. You are required to regularly participate in this aspect of the course. In particular, assignments will be updated on Blackboard each week.

Do NOT bring cell phones to class. I do not want to hear them or see them.

Attendance, Make-Up, & Withdrawal Policies

All class meetings are considered mandatory. In the event that a class is missed, it is the student's responsibility to obtain notes from someone in the class. In case of accident, illness, or other serious legitimate problem (this does not include wanting to leave early for a vacation), it is your responsibility to contact the instructor as soon as you know you will miss an exam. You will not be guaranteed a make-up exam unless you contact me either before the day of the exam or on the day of the exam. Make-up exams may be of a different type (for example, oral and/or essays) than the regularly scheduled exam and other students' make-up exams. No make-ups will be allowed once a test has been returned to the rest of the class. There will be no make-ups for quizzes missed. Excessive absences, in the opinion of the professor, will result in a grade of F.

Students should refer to the Undergraduate Bulletin for college policies and dates regarding student initiated withdrawal from the course.

Academic Honesty

Cheating and plagiarism will not be tolerated. Students should refer to the Student Handbook for the policies on academic honesty.

Responsibilities

I expect students to:

1. Come well-prepared and on time to all classes. Preparation may include some reading and problem-solving. You must check Blackboard for assignments.

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2. Respect the needs of all students in the class. Everyone must abide by the rules established by the class during the first week.
3. Work effectively with others on a regular basis in collaborative efforts.
4. Continually assess your progress in the course and make adjustments when necessary.

As the instructor, I will:

1. Use multiple strategies to engage students and facilitate your learning. If you have any suggestions, please share them with me.
2. Link new information to your existing knowledge base.
3. Present the information in an organized manner and provide learning objectives to help guide your studies.
4. Be fair and consistent in my grading.
5. Be available to meet with you outside of class.

Suggestions for Success

1. Come to my office for help.
2. Devise a strategy to effectively read new information and link it to what you already know or what you want to learn. Don't just open the book and read.
3. Work on the course every day. Don't cram.
4. Find a good place to study.
5. Form a study group. Your peers can be an invaluable source of help. You learn the most when you have to teach it to others.

Manage your time. Establish regular eating and sleeping patterns.

College Policy Concerning Students with Disabilities

In compliance with St. John Fisher College policy and applicable laws, appropriate academic accommodations are available to you if you are a student with a disability. All requests for accommodations must be supported by appropriate documentation/diagnosis and determined reasonable by St. John Fisher College. Students with documented disabilities (physical, learning, psychological) who may need academic accommodations are advised to make an appointment with the Coordinator of Services for Students with Disabilities in the Academic Support Center in K202. Late notification will delay requested accommodations.

Grading

- Your grade is earned by you and is based on your performance. I am always available to help you reach your goals and I look forward to interacting with you outside of class time.
- No extra assignments or make-up exams will be given to improve your grade. If you are dissatisfied with your performance, please come to me so we can create an effective study program for you.

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- I have high expectations for your active role in this course. This will be assessed in a variety of ways.

EXAMS	70%
PROJECT	15%
STUDENT ENGAGEMENT	15%

EXAMS

Exams are based on information covered in the class and/or textbook.

The first three exams will be given during regularly scheduled classes and be worth 100 points each.

The final exam is cumulative. It will be given during the final exam period.

Exams will consist mostly of short answers or short essays along with some combination of multiple choice and/or matching questions.

NEUROLOGICAL DISORDER PROJECT

The disease I have chosen for us to explore in detail is amyotrophic lateral sclerosis (better known as ALS or Lou Gehrig's disease). The project consists of reading, researching and reporting on several different aspects of this disease. Exact details will be provided early in the semester.

STUDENT ENGAGEMENT

Students retain the most knowledge when they actively participate in the learning process. A variety of exercises will be introduced with each topic to encourage active learning on the part of the student. Your active participation in class is required in this class. Assessment of student engagement may include homework assignments, quizzes, discussions, and group activities. You are expected to come prepared for class and this may involve reading assignments and/or written work. Reading articles from primary sources will be expected. Everyone must respect the rules of the classroom established by the students.

Letter Grade	Percentage
A, A-	90 and above
B+, B, B-	80 - 89
C+, C, C-	70 - 79
D+, D, D-	60 - 69
F	59 and below

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BIOL 322 Neurobiology

Dr. E. Lynd-Balta

Tentative Course Schedule

Detailed schedule updated on Blackboard after each class.

Date	Topic	Text Reading due at start of class (Ch)
9/8-9/10	Introduction	1
9/13-9/17	Neurons & Glia	2
9/20-9/24	Resting Membrane	3
9/27-10/1	Action Potential EXAM 1 (9/29)	4 Start reading Tuesdays with Morrie
10/4-10/8	Synapses	5
10/11-10/13	Neurotransmitters Friday 10/15 Recess Day	6
10/18-10/22	Neuroanatomy	7
10/25-10/29	Somatic Sensory EXAM 2 (10/25)	12 Finish reading <i>Tuesdays with Morrie</i>
11/1-11/5	Somatic Sensory	12
11/8-11/12	Motor Reaction Essay (11/8)	13, 14
11/15-11/19	Motor Chemistry/ANS	15
11/22	EXAM 3 (11/22) 11/24 Thanksgiving Break	
11/29-12/3	Higher Cognitive Functions Pamphlet (12/3)	TBA
12/6-12/10	Higher Cognitive Functions	TBA
Friday, 12/17 8:30 am	FINAL EXAM	

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Project Instructions

ALS PROJECT INFORMATION SHEET

Read **Tuesdays with Morrie: An Old Man, A Young Man, and Life's Greatest Lesson** by Mitch Albom & prepare a response to the following questions to demonstrate you have read and reflected on the book (due 11/8).

- How has reading this book changed your perspective on life & death?
- What is the single most important lesson you learned?

The response should be 2 pages using 1 inch margins, 1.5 spacing, normal font size...

Create an informational pamphlet about ALS (due 12/3).

You must create the pamphlet from a particular perspective and provide information that would be deemed relevant by such an organization. Some possibilities include, but are not limited to: neurologists, hospice care, pro-euthanasia group, support group for caregivers, support group for ALS patients.

I want you to choose a perspective that has the most interest to you. Explore issues relevant to your target audience and provide succinct and clear information in a pamphlet. The perspective you choose will help to make your pamphlet unique.

Every pamphlet must include:

- a description of what ALS is, the current understanding of mechanisms underlying ALS, and how dysfunction of the nervous system produces the characteristic symptoms
- an effective summary of one recent scientific study done related to ALS
- the organization sponsoring your pamphlet, the target population, and salient information about ALS
- a list of all references used to create your pamphlet
 - at least 4 references, 2 from peer-reviewed journals
 - You can use textbooks, journals, and credible internet sources ('.org' , '.edu'; if you are not sure, let me decide)
 - I will provide instructions for properly citing your references

As we explore the motor system in class, there will be additional homework assignments and in-class work to both aid and assess your progress.

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Assessment

Your project grade will be assessed using several criteria. The table that follows shows the skills and products that will be evaluated and the course learning outcomes (indicated by number) to which they correspond. In addition, the rubric that will be used to assess the pamphlet is included.

RELATED COURSE LEARNING OUTCOMES

Students will:

1. Demonstrate proficiency in the correct usage of scientific terminology.
2. Explain anatomical, physiological, pharmacological, and molecular properties of neurons and apply this information to examine electrical signaling and interneuron communication.
3. Describe the organization of the nervous system and visually identify major landmarks, subdivisions, fiber tracts, and nuclei of the nervous system.
4. Illustrate the pathways associated with somatic sensation and voluntary movement.
5. Critically analyze published studies as well as design experiments and interpret data to effectively answer experimental questions related to neural function.
6. Recognize the interaction of science and society and identify and evaluate the moral and ethical dimensions of biological problems.
7. Demonstrate precise, objective communication skills for reporting and interpreting scientific information.

Skills and Products Evaluated	Outcomes Addressed
reaction essay	6, 7
class discussion & group work	1, 2, 3, 4, 5, 6, 7
Informational Pamphlet (see rubric for details)	
• Content	1, 2, 3, 4
• Research Summary	5
• Perspective	6
• Writing/Graphics	7

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ALS Brochure/Pamphlet Rubric

CATEGORY	A	B	C	D
Content - Accuracy	All facts in the brochure are accurate.	99-90% of the facts in the brochure are accurate.	89-80% of the facts in the brochure are accurate.	Fewer than 80% of the facts in the brochure are accurate.
Research Summary	Clear & succinct summary of recent scientific study is provided along with an explanation of the significance of the study.	Summary of recent scientific study and its significance includes main points, but misses some important details.	Summary of recent scientific study and its significance is inaccurate or difficult to understand.	Little or no summary of scientific study is provided. Significance of study is not articulated. Study is not published in peer-reviewed journal.
Sponsoring Organization	Sponsoring organization & target population clearly identified. ALS information presented is salient to sponsor &/or target.	Sponsoring organization & target population clearly identified. ALS information presented is not specific to sponsor &/or target.	Sponsoring organization or target population not clearly identified. ALS information presented is not specific to sponsor &/or target.	Sponsoring organization and target population not clearly identified.
Organization & Originality	The brochure has exceptionally attractive formatting and well-organized information.	The brochure has attractive formatting and well-organized information.	The brochure has well-organized information.	The brochure's formatting and organization of material are confusing to the reader.
Graphics/ Pictures	Graphics go well with the text and there is a good mix of text and graphics. Graphics are original.	Graphics go well with the text, but there are so many that they distract from the text. Some non-original graphics used.	Graphics go well with the text, but there are too few and the brochure seems "text-heavy".	Graphics do not go with the accompanying text or appear to be randomly chosen. Graphics are copied from source.
Writing - Organization	Each section in the brochure has a clear beginning, middle, and end. There are no grammatical mistakes nor spelling errors in the brochure.	Almost all sections of the brochure have a clear beginning, middle and end. There are no more than two grammatical mistakes/ spelling errors in the brochure.	Most sections of the brochure have a clear beginning, middle and end. There are no more than 4 grammatical mistakes/ spelling errors in the brochure.	Less than half of the sections of the brochure have a clear beginning, middle and end. There are no more than 6 grammatical mistakes/ spelling errors in the brochure.
Bibliography	At least 4 references, 2 in peer-reviewed journals, were used and correctly cited.	At least 4 references, 1 in a peer-reviewed journal, were used and correctly cited.	Less than 4 references were used or there were significant errors in citing references.	Less than 4 references were used and there were significant errors in citing references.

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Sample Exam Questions

FINAL EXAM SAMPLE QUESTIONS: MOTOR SYSTEM

This brain pathway is responsible for keeping your head balanced on your shoulders as your body moves through space: (2 points)

Answer the following questions about the corticospinal tract. **Be specific.** (4 points)

begins here: _____

neurons identified above synapse on neurons here: _____

You are a neurophysiologist electrically stimulating or recording the activity of neurons in the cerebrum. Identify which area of the cerebrum is being described in each situation. Be specific.

You stimulate neurons in the lateral aspect of this region and cause the subject's lips to move. You stimulate neurons in the medial aspect of this region and cause the subject's foot to move. Which area of the cerebrum are you stimulating? (2 points)

There is a lesion of the left ventral root L2 spinal nerve. Predict whether you would expect deficits in the following systems based on this lesion. Indicate N for normal, and D for deficit. (3 points)

touch on right leg: _____

touch on left leg: _____

pain on right leg: _____

pain on left leg: _____

motor of right leg: _____

motor of left leg: _____

Your hand moves away from an offending stimulus. Map out the pathway responsible for this reflex from start to finish. Identify each type of neuron in the circuit, the type of receptor, and the effector. (5 points)

What does somatotopic organization mean? (2 points)

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