Neurosciences BIMS 5323
Department of Life Sciences
Spring 2020

A. COURSE INFORMATION

Course number/section: 5323.001
Class meeting time: MW 7:00 – 8:15 pm
Class location: RFEB 106
Course Website: https://bb9.tamucc.edu/

B. INSTRUCTOR INFORMATION

Instructor: Riccardo Mozzachiodi, Ph.D.
Office location: TH 335
Office hours: MT: 10:00 am – 12:00 pm; W: 10:00 – 11:00 am; other times by appointment
Telephone: 361-825-3634
e-mail: riccardo.mozzachiodi@tamucc.edu
Appointments: to request an appointment outside of office hours, send email to the above email address at least 48 hours in advance. In the email, please specify the reason of the appointment.

C. COURSE DESCRIPTION

Catalog Course Description
The anatomy and physiology of the vertebrate nervous system with emphasis on functions and actions of the central nervous system.

Extended Course Description
This course focuses on the physiology, morphology, and integrative function of neurons and their role in generating complex functions, such as behaviors and memories. Topics include: morphology and physiology of the neuron; genesis of resting and action potential; electrical and chemical transmission; brain development and neuroanatomy; sensory and motor systems; neural basis of learning and memory. This elective course is beneficial for graduate students interested in understanding how the brain functions.

D. PREREQUISITES AND COREQUISITES

Prerequisites
Prerequisites: CHEM 3412 (Organic Chemistry II) or equivalent. Limited to individuals who have not taken BIMS 4323 (Neurobiology) for undergraduate credit.

Co-requisites
None

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Optional Textbook(s) or Other References
The electronic versions of the lecture handouts (PDF format) as well as the syllabus and study guides will be made available on Blackboard. Handouts will be posted on Blackboard one week before class. When necessary, additional material will be posted on Blackboard.

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT
Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.

By the end of this course, students should be able to:

1) Construct the morphological and anatomical structure of neurons
2) Analyze the genesis of the resting potential and action potential
3) Summarize the mechanisms underlying synaptic transmission
4) Examine the principle of neurodevelopment and neuroanatomy
5) Compare and contrast the different sensory and motor systems
6) Discriminate the neural bases of behavior and learning and memory
7) Write a review paper on a selected topic within the neurosciences

G. MAJOR COURSE REQUIREMENTS AND GRADING
The first six student learning outcomes outlined above will be assessed throughout the semester by using two types of in-class assignments: 1) Exams and 2) In-Class Learning Exercises. The comprehensive nature of exams and learning exercises (see details below) will allow the instructor and the student to assess knowledge on both current topics and previous material at several points during the semester. For the seventh learning outcome, students will write a review paper that will be prepared following the rubric provided below.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exams</td>
<td>69%</td>
</tr>
<tr>
<td>In-Class Learning Exercises</td>
<td>14%</td>
</tr>
<tr>
<td>Review Paper</td>
<td>17%</td>
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1) Exams: There will be 5 exams (4 during the semester + final exam). Each exam, including the final, is worth 100 points. Each exam will focus on the material covered during lectures and is listed in bold in the tentative schedule (see below). All the exams are comprehensive. Consequently, exam 2, for example, will cover material from chapters 6 - 9, but it may also contain questions about previous sections (chapters 1 - 5). In addition to the handouts, students are responsible for all material, such as videos, guest lectures, websites etc. covered during class. Exams may contain questions in the following formats: multiple choice, matching, true/false, making/labeling drawings, short answer questions, and essay questions. The lowest grade of the 5 exams will be automatically dropped. If the grade obtained at the end of the regular semester (i.e., after 4 exams and 8 in-class learning exercises) cannot be improved with the final exam, the student does not have to take the final exam. Consequently, students will take the final exam to replace the lowest exam grade obtained
during the semester and improve the cumulative grade. Exams are completed on a scantron answer sheet, which will be provided. Both exam and scantron answer sheet must be completed and submitted at the end of the test. Grades are calculated based on the answers provided on the scantron sheet. Consequently, if an answer was bubbled wrong on the scantron, but was marked correctly on the exam text, it will remain counted wrong. Also, answers that are not bubbled on the scantron will be counted wrong, even when marked correctly on the exam text. Therefore, students are strongly encouraged to carefully check their answers on the scantron before turning it in. Additionally, unless otherwise requested, students are not allowed to write on the write-in area of the scantron. An exam lasts as a regular class (approximately 60 minutes). There will be no lecture on exam days. During exams, students will be required to remove their caps, hats, etc. Different test forms may be prepared for an individual exam. Follow instructions. If a student leaves the examination room for any reason he/she must hand the test and will not be allowed to resume the examination. Students are encouraged to attend to personal matters (e.g., rest room visits) before the beginning of the exam. Be on time! Anyone arriving after someone has already completed and turned in an exam and left the room will not be allowed to take that examination. Exams will NOT be returned to students. Scantron reports with detailed information about the scores will be distributed to students during class. Exams will be made available for students only during office hours.

2) In-Class Learning Exercises: At random dates during the semester, students will engage in in-class learning exercises. These exercises will require the students to answer questions about topics covered during class. These in-class learning exercises WILL NOT be announced in advance. During the in-class learning exercises, students will be allowed to use textbook and handouts with notes, but not electronic devices including portable computers and phones. If a student forgets his/her textbook and/or notes, he/she will not be allowed to share those of the neighboring classmates. There will be 8 in-class learning exercises, each worth 10 points. Each class-learning exercises will last 10 minutes and can be presented at any time during class (i.e., at the beginning, at the end or during class). In-class learning exercises will not be scheduled on a day when an exam is already scheduled. All in-class learning exercises will count for the final grade. During in-class-learning exercises, students will be required to remove their caps, hats, etc. Once the student has turned in an in-class learning exercise, he/she is not allowed to turn on the cell phone or the computer or leave the room until all the students have turned in their assignments and the instructor begins/resumes the lecture. Learning exercises turned in without a printed name or with a name that is not legible will be automatically assigned “0” (zero) points.

3) Review Paper: Graduate students are entering careers where they will be required to communicate ideas to others in research (manuscripts, grant proposals, reports, etc.) and/or in teaching (academic education or public outreach). In this course, each student will prepare a Review Paper on a subject chosen within the topic of Neurosciences in consultation with the instructor. The Review Paper must be based on:
- At least 4 primary research articles published in peer-reviewed journals during the last 10 years.
- At least 1 review article published in peer-reviewed journals during the last 10 years.

Once a topic is identified, the student is encouraged to discuss with the instructor about the choice before proceeding with the review. After approval of the topic by the instructor, the articles that the student plans to use for the review must be sent to the instructor via email. The review should be at least 10-page long (double spaced) and arranged using the following format:

1) Title
2) Abstract
3) Introduction
4) Experimental Analysis
5) Discussion/Conclusions
6) Reference List

Because this is a review-style paper that requires the student to synthesize data from several sources, the “Materials and Methods,” and “Results” sections should be combined into a single “Experimental Analysis” section. In this section, the student should paraphrase and reorganize the data from their sources into a coherent “story.” Students should discuss and evaluate the experimental data and conclusions of their sources in the “Discussion” or “Conclusions” section. All the cited references must be cited in the text and the full citations must be provided in the Reference List. Each student must provide the instructor with a hard copy of all reference sources. The student is allowed to use the illustrations published in the chosen articles. As regards for the other sections (i.e., Title, Abstract, Introduction, Experimental Analysis, Figure Legends, Discussion/Conclusions), the student is required to prepare these sections using his/her own words and not just copy or paraphrase portions of the chosen articles. References must be cited in the text. The Reference List must be prepared by using the format of a peer-reviewed journal chosen by the student. The Review Paper is worth 100 points.

- Each student must select a topic of interest, discuss it with the instructor and have it approved by February 5.
- A first draft of the Review Paper is due at the beginning of class on March 4.
- The final draft of the Review Paper is due at the beginning of class on April 13.
- Both the initial and the final drafts of the Review Paper must be sent via email as electronic word files.
- Delayed submission dates are not permitted. If the student experiences difficulties with the preparation of the review paper, he/she is encouraged to inform the instructor in a timely manner.

Partial scores for exams and in-class learning exercises will be posted on Blackboard. It is the students’ responsibility to regularly check their scores on Blackboard.

Final Grade
The final letter grade is based on the sum of 4 exams (400 points), all 8 in-class learning exercises (80 points) and the review paper (100 points), for a total of 580 points. No statistical manipulations (e.g., curving) will be made at any time during the semester or for any exam, including the final.

The final grading scale is as follows:
580 - 512 = A
511 - 454 = B
453 - 396 = C
395 - 338 = D
337 or below = F

H. COURSE CONTENT/SCHEDULE
The lectures (titles and chapter numbers in parenthesis) listed in the schedule below correspond to the chapters of this book. In addition, some of the material illustrated in the lectures and in the handouts is derived from the chapters of this book.
January
22 Review of the syllabus and course introduction (chapter 1, lecture 1)
27 Neurons and glia (chapter 2, lecture 2)
29 The neuronal membrane at rest (chapter 3, lecture 3)

February
3 The action potential (chapter 4, lecture 4)
5 Synaptic transmission (chapter 5, lecture 5)
(Topic of the Review Paper discussed with the instructor and approved by today)
10 Synaptic transmission (chapter 5, lecture 5, continued)
12 Neurotransmitter systems (chapter 6, lecture 6)
17 Exam 1: material covered in chapters 1 – 5 (introduction, neurons and glia; the neuronal membrane at rest; the action potential; synaptic transmission)
19 The structure of the nervous system (chapter 7 + Appendix, lecture 7)
24 The structure of the nervous system (chapter 7 + Appendix, continued, lecture 8)
26 The structure of the nervous system (chapter 7 + Appendix, continued, lecture 9)

March
2 The chemical senses (chapter 8, lecture 10)
4 The eye (chapter 9, lecture 11)
(First draft of the Review Paper due today)
9 Spring break: no class
11 Spring break: no class
16 The central visual system (chapter 10, lecture 12)
18 Exam 2: material covered in chapters 6 – 9 (neurotransmitter systems; the structure of the nervous system; the chemical senses; the eye)
23 The auditory and vestibular systems (chapter 11, lecture 13)
25 The auditory and vestibular systems (chapter 11, lecture 13, continued)
30 The somatic sensory system (chapter 12, lecture 14)

April
1 Spinal control of movements (chapter 13, lecture 15)
6 Brain control of movements (chapter 14, lecture 16)
8 Exam 3: material covered in chapters 10 – 13 (the central visual system; the auditory and vestibular systems; the somatic sensory system; spinal control of movements)
13 Chemical control of the brain and behavior (chapter 15, lecture 17)
(Final draft of the Review Paper due today)
Brain mechanisms of emotion (chapter 18, lecture 18)

Memory systems (chapter 24, lecture 19)

Molecular mechanisms of learning and memory (chapter 25, lecture 20)

Exam 4: material covered in chapters 14, 15, 18, and 24 (brain control of movements; chemical control of the brain and behavior; brain mechanisms of emotion; memory systems)

Molecular mechanisms of learning and memory (chapter 25, lecture 20, continued)

May

4  TBD

6  General review of the course material and questions in preparation to the final exam

13 Final Exam: 7:15 – 9:45 pm. Final Exam will be comprehensive and will also include questions on chapter 25 (molecular mechanisms of learning and memory)

Note: Changes in this course schedule may be necessary and will be announced to the class by the Instructor. The exams shown are directly related to the Student Learning Outcomes described in Section F.

I. COURSE POLICIES

Attendance/Tardiness
Students are expected to attend every class. When absent, it is the student's responsibility to obtain missed information from a classmate. Missed information includes not only lecture notes, but also any possible information regarding changes to the agenda. The student is expected to arrive prepared to take notes and should bring textbook and handouts.

Late Work and Make-up Exams

1) In-class learning exercises. Regardless of the circumstances, students will not be allowed to make up the learning exercise(s) that they have missed. This rule applies to every exercise and to every student and no exceptions will be made. If a student cannot attend class because he/she will be officially representing TAMU-CC at meetings/conferences or sports events, see rule (e) below.

2) Exams. This course does not include make-up exams. If you are not able to attend one of the exams, contact the instructor ASAP (see below). Points missed because of an unexcused absence (including tardiness and leaving early) cannot be recovered. Only unavoidable absences are excused, so you should schedule routine personal events (e.g., vacations, weddings, reunions, non-emergency medical or dental visits, parent-teacher conferences, household or auto repairs) to avoid conflicts with your classes. Oversleeping is never an acceptable excuse. Employment conflicts are not acceptable excuses for absences, tardiness, or leaving class early. Once enrolled in a class, it is the student’s responsibility to arrange his or her work schedule so that no regularly scheduled class, laboratory, or examination time is missed. Texas waives jury duty for students, so jury duty is not an acceptable excuse. Students must remember that it is their responsibility to know the course schedule on pages 4 and 5 of this syllabus. If you miss an exam because you forgot, or because you were not aware that it was scheduled for that day, you WILL NOT be allowed to make it up! An excused absence allows the instructor to make alternative arrangements for completing assignments. The documentation required for an absence to be excused must be:
a) From an appropriate source (e.g., doctor, dentist, funeral director) who states the nature of the event that caused (or will cause) your absence.

b) In writing, on official stationery, and signed (I do not return excuses to you). Telephone calls, FAXes, and e-mails are not acceptable.

c) Presented prior to the absence for a scheduled event (e.g., university-sponsored activity recognized religious holiday, military service).

d) Presented no more than one week after the date of an unexpected absence.

e) In case a student cannot attend class because he/she will be officially representing TAMU-CC (e.g., meetings or sports events), the documentation required for an absence to be excused should be obtained from either the faculty/staff member in charge of the class/organization or from the Division of student Engagement and Success.

Extra Credit
No extra credit will be offered for this course

Laptop Use
- During lectures, computers and notebooks can be used to take notes.
- During exams or learning exercises, any portable device, including: phones, computers, notebooks and tablets must be turned off and removed from the table for the entire duration of the exam/exercise.

Cell Phone Use
- The use of cell/smart phones is strictly prohibited during the class period. Cell phones/smart phones/smart watches must be turned off at the beginning of class and remain so until the class is dismissed.
- During learning exercises and exams, phones and smart watches must be removed from the table and wrist, and placed inside bag pack, purse, or on the floor. If a student is caught with the phone/watch on the table, on his/her hand, on his/her lap, or on the chair, the learning exercise/exam will be automatically assigned “0” (zero) points, even if the phone/watch screen was turned off.

Scanning and photographs of any part of exams or exercises is prohibited! Being in possession of images of parts of past and/or current exams or exercises will be classified as cheating and will result in a Failing (F) grade for the student in the class (see below).

Other Policies
Cheating is defined as:
- Intentionally assisting another student(s) during an exam/exercise
- Copying to any extent the work of another student(s)
- Having access to material related to an exam/exercise during an exam/exercise
- Possessing or having access to unauthorized copies of an exam/exercise
- Departing from any stated exam/exercise conditions

Cheating or other academic dishonesty for exams and learning exercises will not be tolerated and will result in a Failing (F) grade for the class. Based on the gravity of the cheating episode, a misconduct case may be reported to the University.

J. COLLEGE AND UNIVERSITY POLICIES
- Academic Integrity (University)
  University students are expected to conduct themselves in accordance with the highest standards
of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity, or plagiarism. Plagiarism is the presentation of the work of another as one’s own work. In this class, academic misconduct, or complicity in an act of academic misconduct on an assignment or test will result in a failing grade. See Full University Policy at: http://catalog.tamucc.edu/content.php?catoid=10&navoid=313#Academic_Integrity

• Classroom/Professional Behavior
Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subjected to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom.

• Statement of Civility
Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state, and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation, or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

• Deadline for Dropping a Course with a Grade of W (University)
I hope that you never find it necessary to drop this or any other class. However, events can sometimes occur that make dropping a course necessary or wise. Please consult with your academic advisor, the Financial Aid Office, and me, before you decide to drop this course. Should dropping the course be the best course of action, you must initiate the process to drop the course by going to the Student Services Center and filling out a course drop form. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Please consult the Academic Calendar (https://www.tamucc.edu/academics/calendar/2020_spring.html) for the last day to drop a course. For the spring 2020 semester, the last day to drop a course is Friday April 10.

• Grade Appeals (College of Science and Engineering)
As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at: http://www.tamucc.edu/provost/university_rules/index.html and the College of Science and Engineering Grade Appeals webpage at: http://sci.tamucc.edu/students/GradeAppeal.html
For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

- **Disability Services**
  The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call (361) 825-5816 or visit Disability Services in Corpus Christi Hall 116. If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816. [http://disabilityservices.tamucc.edu/](http://disabilityservices.tamucc.edu/)

- **Final Exam**
  Students are not required to take more than two final examinations in any one day. The students who have three or more final examinations scheduled on the same day may request to take the final exam for this course on another day during the final examination period. The process is described below:

  1) The student should first try to resolve the matter with the appropriate instructor(s). The schedule with the final exams for the spring 2020 is available at: [https://registrar.tamucc.edu/Register%20for%20Classes/Final_Exams.html](https://registrar.tamucc.edu/Register%20for%20Classes/Final_Exams.html)

  Therefore, students should already know whether they have to reschedule their final exam. In this case, they are strongly encouraged to contact Dr. Mozzachiodi in a timely manner.

  **Requests for rescheduling the final exam will not be considered if received after March 27, 2020.**

  2) If the matter remains unresolved, the student should submit a request for an alternative final exam time in writing to the Office of Student Affairs. This request must be submitted by the drop date, which is Friday April 10, 2020.

  3) The Office of Student Affairs will select which of the exams should be taken at an alternative time and formally contact the faculty member at least 15 working days before the final examination period. Preference for selection of which course would have an alternative final exam time must be based on the course with the smaller class size and, then, courses with final exam times in between other exams.

  4) The faculty member will then arrange an alternative time for the student to take the final exam for that course that does not conflict with the student’s final exam schedule or require the student to take more than two final exams in one day. If students have difficulties in rescheduling the examination, they should consult with the Office of Student Affairs. Final exams given outside the regularly scheduled time may vary in content and format at the discretion of the faculty member.

**K. OTHER INFORMATION**

**Academic Advising**

The College of Science & Engineering requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. Meetings are by appointment only; advisors do not take walk-ins. Please call or stop by the Advising Center to check
availability and schedule an appointment. The College’s Academic Advising Center is located in Center for Instruction 350 or can be reached at (361) 825-3928.

Religious Holidays
Any student who will miss class and/or test days because of recognized religious holidays should notify me as soon as possible so we can make alternative arrangements. Prior notification is required for such absences to be excused.

Academic Continuity
In the event of an unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi; this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.

Instructor’s Notes
In choosing to take this course, you are agreeing to abide by the course rules, regulations, and standards. Should you have concerns or questions, you are encouraged to discuss them with the instructor as soon as possible. However, you are bound by these rules, regulations and standards from the first day of class throughout the duration of the course. Failure to comply with course rules or showing disrespect toward the instructor or other classmates will result in removal from the course.

GENERAL DISCLAIMER
I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus, if and when necessary. I will announce such changes in a timely manner during regularly scheduled lecture periods.