Cellular Bases of Behavior BIOL 5311  
Department of Life Sciences  
Fall 2018

A. COURSE INFORMATION

Course number/section: 5311.001  
Class meeting time: MW 5:30 – 6:45 pm  
Class location: CS 114  
Course Website: https://bb9.tamucc.edu/

B. INSTRUCTOR INFORMATION

Instructor: Riccardo Mozzachiodi, Ph.D.  
Office location: EN 321  
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
Using vertebrate and invertebrate animal models, this graduate-level course explores how behaviors emerge from the activity of neural circuits and how experience modulates these circuits.

Extended Course Description
This lecture-based graduate course will take advantage of selected examples of invertebrate and vertebrate animal model to examine the mechanisms by which behaviors emerge from the activity of dedicated neural circuits. We will also explore how experience modulates the activity of behavioral-relevant circuits to produce the modifications necessary to adapt to a continuously changing environment. Each animal model that will be discussed provides a unique combination of behavioral skills and technical advantages. Topics of this course include:
• Encoding and processing of sensory information of different modalities  
• Neuronal activity responsible for the generation of movements  
• Behavioral plasticity

D. PREREQUISITES AND COREQUISITES

Prerequisites
Only graduate. An introductory neurobiology course is recommended.

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) Analyze the architecture of neural circuits and the genesis of behaviors
2) Evaluate the mechanisms of sensory encoding and information processing in the central nervous system
3) Summarize the mechanisms of behavioral selection, programming and execution
4) Discriminate among different cellular and molecular mechanisms of learning and experience
5) Write a review paper on a selected topic within cellular bases of behavior

G. MAJOR COURSE REQUIREMENTS AND GRADING

The first four student learning outcomes outlined above will be assessed throughout the semester by using 4 comprehensive exams (3 during the semester + final exam). The comprehensive nature of the exams (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 fifth 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>
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<tbody>
<tr>
<td>Exams</td>
<td>80%</td>
</tr>
<tr>
<td>Review Paper</td>
<td>20%</td>
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1) Exams: There will be 4 comprehensive exams (3 during the semester + final exam). The comprehensive nature of exams (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. 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). For example, exam 2 will cover material from chapters 4-6, but it may also contain questions about the previous section (chapters 1-3). 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. 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 be returned briefly in class together with the scantron report with detailed information about the scores. Students will not be allowed to keep exams. However, upon request, exams will be made available for students during office hours.

Partial scores for exams will be posted on Blackboard. It is the students’ responsibility to regularly check their scores on Blackboard.

2) 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 topic chosen within the Cellular Bases of Behavior 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. 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
September 24.

- A first draft of the Review Paper is due at the beginning of class on October 22.
- The final draft of the Review Paper is due at the beginning of class on November 19.
- Both the initial and the final drafts of the Review Paper must be sent via email as electronic word files. Due to the need to provide feedback via edits and comments, drafts submitted as PDF files will not be accepted.
- 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.

Final Grade

The final letter grade is based on the sum of four exams (400 points) and the Review Paper (100 points), for a maximum of 500 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:

- 500 - 440 = A
- 439 - 390 = B
- 389 - 340 = C
- 339 - 290 = D
- 289 or below = F

Final grades will be determined by the number of points earned. For example, if you earn 440 (or more) points, the final letter grade will be an A. If you earn 439 points, the final letter grade will be a B, etc. No exceptions.

Please note: For privacy reasons, I cannot reveal grades over the telephone or by e-mail. If you wish to know your grade before the official grade reports are posted, or wish to discuss your grade, please see me in person.

H. COURSE CONTENT/SCHEDULE

The lectures (titles and chapter numbers in parenthesis) listed in the schedule below correspond to the chapters of this book. Also, some of the material illustrated in the lectures and in the handouts is derived from the chapters of this book.

August

27 Syllabus description and course Introduction. Part I. An Introduction to the Cellular Analysis of Behavior. Chapter 1: Neurons as the Building Blocks of Behavior (lecture 1)
29 Part II. Sensory Worlds. Chapter 2: Echolocation in Bats (lecture 2)

September

3 Labor Day, no class
5 Chapter 2: Echolocation in Bats (lecture 2, continued)
10 Chapter 3: Prey Location in Barn Owls (lecture 3)
12 Chapter 3: Prey Location in Barn Owls (lecture 3, continued)
17 Chapter 4: Feature Detection in Toads (lecture 4)
19 Exam 1: chapters: 1, 2 and 3
24 Chapter 4: Feature Detection in Toads (lecture 4, continued)  
(Topic of the Review Paper discussed with the instructor and approved by today)  
26 Part III. Motor Strategies. Chapter 5: Mate Calling in Crickets (lecture 5)  

October  
1 Chapter 5: Mate Calling in Crickets (lecture 5, continued)  
3 Chapter 6: Flight in Locusts (lecture 6)  
8 Chapter 6: Flight in Locusts (lecture 6, continued)  
10 Chapter 7: Escape Behavior in the Crayfish (lecture 7)  
15 Exam 2: chapters: 4, 5 and 6  
17 Chapter 7: Escape Behavior in the Crayfish (lecture 7, continued)  
22 Part IV. Behavioral Plasticity. Chapter 8: The Development of Learning in Songbirds (lecture 8)  
(First draft of the Review Paper due today)  
24 Chapter 8: The Development of Learning in Songbirds (lecture 8, continued)  
29 Chapter 10: Learning and Memory in Simple Reflex Systems in *Aplysia* (lecture 9)  
31 Chapter 10: Learning and Memory in Simple Reflex Systems in *Aplysia* (lecture 9, continued)  

November  
5 Exam 3: chapters: 7 and 8  
7 Visit to the Mozzachiodi lab  
12 Chapter 10: Learning and Memory in Simple Reflex Systems in *Aplysia* (lecture 9, continued)  
14 Chapter 11: Molecular Genetics of Learning and Memory in *Drosophila* (lecture 10)  
19 Chapter 11: Molecular Genetics of Learning and Memory in *Drosophila* (lecture 10, continued)  
(Final draft of the Review Paper due today)  
21 Reading day, no class  
26 Chapter 12: Spatial Navigation in the Rat (lecture 11)  
28 Chapter 12: Spatial Navigation in the Rat (lecture 11, continued)  

December  
3 TBD  
5 General review of the course material and questions in preparation to the final exam  
10 Final exam: 4:30 – 7:00 pm. Final exam will be comprehensive and will also include questions on chapters 10, 11 and 12  
Note: Course changes 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
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.

Cell Phone Use
- The use of cell/smart phones is strictly prohibited during the class period. Cell/smart phones/smart watches must be turned off at the beginning of class and remain so until the class is dismissed.
- During exams, phones must be removed from the table and placed inside bag pack, purse, or on the floor. If a student is caught with the phone on the table, on his/her hand, on his/her lap, or on the chair, the exam will be automatically assigned “0” (zero) points, even if the phone screen was turned off.
Scanning and photographs of any part of exams is prohibited! Being in possession of images of parts of 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
- Copying to any extent the work of another student(s)
- Having access to material related to an exam during an exam
- Possessing or having access to unauthorized copies of an exam
- Departing from any stated exam 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.

**Plagiarism** is defined by the Merriam-Webster Dictionary as "To pass off as one’s own words or ideas of another".

Plagiarism involves:
- Submitting another person's work as one's own
- Submitting work from any source that is not properly acknowledged by footnote, bibliography, or reference within a paper
- Submitting work pieced together from phrases and/or sentences from various sources without acknowledgement
- Submitting work with another person's phrase(s) rearranged without acknowledgement
- Submitting work that uses any phrase, sentence, or stylistic mannerism without acknowledgement
- Omitting quotation marks from any directly quoted material
- Any other actions deemed to be plagiarism by the faculty

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](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 subject 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 ([http://www.tamucc.edu/academics/calendar/](http://www.tamucc.edu/academics/calendar/)) for the last day to drop a course. For the fall 2017 semester, the last day to drop a course is Wednesday November 15, 2017.

• **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](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](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 fall 2017 is available at: [http://registrar.tamucc.edu/Register%20for%20Classes/Final_Exams.html](http://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 October 31, 2017.**

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 Wednesday November 15, 2017.

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.