

# ENTM 249 – Seminar in Invertebrate Neuroethology

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Office hours: TBD

**Schedule:** TBD  
**Location:** TBD

## About

This course is designed to be a graduate-level discussion of current literature in invertebrate neuroethology. We will cover important topics in neuroethology, including circadian rhythms, navigation, learning and memory, and social behavior, among others. Using current literature, we will examine experimental methods and analysis techniques that advance our understanding of these topics.

## Learning outcomes

- Understand important experimental and analysis methods for addressing neuroethological research questions.
- Understand the research context of each paper and evaluate the conclusions of each paper.
- Develop skills in leading a discussion and stimulating participation of peers.

## Assessments

**Attendance (15%):** Because discussion is an important part of this course, attendance will be required. I do understand that life happens, so you may miss one class for any reason.

**Participation (25%):** You are expected to read the paper *prior* to each in class discussion and be prepared to make comments, ask questions and discuss it with your classmates.

**Presentation (60%):** You will be responsible for presenting one research article and leading discussion of the paper in class. Articles/topics will be selected from the syllabus. A successful presentation must discuss key components of a paper including journal and author's profile, abstract, introduction describing previous studies and paper aims, figures with their respective methodologies, conclusions, and selected important follow up papers. The goal is that you learn how to lead the discussion of a research article with a critical perspective while promoting discussion among your peers.

## Reading schedule

| Week | Class Topic                   | Topic + Reading                                      |
|------|-------------------------------|--|
| 1    | Introduction to Neuroethology | Wagner et al. 2024 <i>J of Comparative Physiol A</i> |
| 2    | Sensory Systems I             | Nityananda et al. 2018 <i>Current Biology</i>        |
| 3    | Sensory Systems II            | Sieriebriennikov et al. 2024 <i>Science Advances</i> |
| 4    | Motor Control                 | Sen et al. 2019 <i>Current Biology</i>               |
| 5    | Courtship                     | Koganezawa et al. 2016 <i>Current Biology</i>        |
| 6    | Circadian Rhythms             | Tainton-Heap et al. 2021 <i>Current Biology</i>      |
| 7    | Learning and Memory           | Bridges et al. 2024 <i>Nature</i>                    |
| 8    | Navigation                    | Kamhi et al. 2020 <i>Current Biology</i>             |
| 9    | Predation and defense         | Woo et al. 2023 <i>Nature</i>                        |
| 10   | Social Behavior               | Kennedy et al. 2021 <i>Molecular Ecology</i>         |

### Reading links:

Week 1: Wagner et al. 2024. Model organisms and systems in neuroethology: one hundred years of history and look into the future. *J of Comparative Physiology A*. 210: 227-224.  
<https://link.springer.com/article/10.1007/s00359-023-01685-z>

Week 2: Nityananda et al. 2018. A novel form of Stereo Vision in the Praying Mantis. *Current Biology*. 28: P588-393  
[https://www.cell.com/current-biology/fulltext/S0960-9822\(18\)30014-9?code=cell-site&innerTabvideo-abstract\\_mmc8=](https://www.cell.com/current-biology/fulltext/S0960-9822(18)30014-9?code=cell-site&innerTabvideo-abstract_mmc8=)

Week 3: Sieriebrennikov et al. 2024. Olfactory-Dependent survival of odorant receptor neurons in ants *Sci Adv* 10  
<https://www.science.org/doi/full/10.1126/sciadv.adk9000>

Week 4: Sen et al. 2019. TwoLumps Ascending Neurons Mediate Touch-Evoked Reversal of Walking Direction in *Drosophila*  
[https://www.cell.com/current-biology/fulltext/S0960-9822\(19\)31443-5](https://www.cell.com/current-biology/fulltext/S0960-9822(19)31443-5)

Week 5: Koganezawa et al. 2016. The Neural Circuitry that Functions as a Switch for Courtship versus Aggression in *Drosophila* Males. *Current Biology*. 26: P1395-1403.  
[https://www.cell.com/current-biology/fulltext/S0960-9822\(16\)30339-6](https://www.cell.com/current-biology/fulltext/S0960-9822(16)30339-6)

Week 6: Tainton-Heap et al. 2021. A Paradoxical Kind of Sleep in *Drosophila melanogaster*. *Current Biology*. 31:P578-590.

Week 7: Bridges et al. 2024. Bumblebees socially learn behaviour too complex to innovate alone. *Nature* 627:572-578.  
<https://www.nature.com/articles/s41586-024-07126-4>

Week 8: Kamhi et al. 2020. Vertical Lobes of the Mushroom Bodies are Essential for View-Based Navigation in Australian *Myrmecia* Ants. *Current Biology* 30: P3432-3437.

Week 9: Woo et al. 2023. The dynamics of pattern matching in camouflaging cuttlefish. *Nature* 619: 122-128  
<https://www.nature.com/articles/s41586-023-06259-2>

Week 10: Kennedy et al. 2021. Use of waggle dance information in honey bees is linked to gene expression in the antennae, but not in the brain. *Molecular Ecology*. 30: 2676-2688.  
<https://onlinelibrary.wiley.com/doi/full/10.1111/mec.15893>

### Paper discussion and presentations guidelines

Students are expected to have read the paper assigned for discussion in each class and be prepared to make comments, ask questions and discuss it with their peers.

During week 1, Before you lead discussion, you should plan to meet with Prof. Giraldo during the office hours preceding their presentation to get feedback and guidance. Email your final presentation to Prof. Giraldo in PowerPoint format the morning of the day you will be presenting to the class. Follow the guidelines for making this presentation and include all presentation components required (provided in Week 1). Use high quality resolution figures or screenshots for your presentation slides.

**Accommodations**

UC Riverside is committed to providing equal access to learning opportunities to students with documented disabilities. To ensure access to this class, and your program, please contact the Student Disability Resource Center (SDRC) to engage in a confidential conversation about the process for requesting accommodations in courses, classrooms, labs, etc. More information is available at <https://sdrc.ucr.edu>. If you are a student registered with the SDRC, please ensure you send your accommodation letters to faculty through [sdrc@ucr.edu](mailto:sdrc@ucr.edu) each quarter/term.