BIOL 447/PSYC 447
Seminar in Neuroscience

Course: BIOL 447/PSYC 447
Semester: Spring 2022
Faculty Instructor: Dr. Chris Korey
Course Location: RITA 273
Meeting Time: M, 1-4:00 pm
Office Hours: By Appointment

Email: koreyc@cofc.edu
Phone: 843-953-7178
Seminar in Neuroscience
Our Classroom is an Inclusive Community

This course will provide equal access. I am happy to work with all students to ensure that they have equal access to the educational experience of this class. Any student eligible for and needing accommodations because of a disability is requested to speak with me during the first two weeks of class or as soon as you have been approved for services so that reasonable accommodations can be arranged - Center for Disability Services/SNAP.

Veterans and Active Duty Military: Veterans and active duty military personnel with special circumstances (e.g., upcoming deployments, drill requirements, disabilities) are welcome and encouraged to communicate these, in advance if possible, to the instructor.

Preferred Name and Pronoun Information: I will gladly honor your request to address you by the name and gender pronouns of your choice - mine are he/him/his. Please advise me of this early in the semester via your college-issued email account or during office hours so that I may make the appropriate notation on my class list.
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Let’s Get to Know Each Other - Part 1

1. Name:
2. iPhone Lock/Home Screen Picture:
3. Hobbies:
4. Music Genre:
5. Pineapple on Pizza - yes or no
6. Something else you would like me to know about you:
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Delving Into The Literature

- Continue to build upon previous experience reading scientific literature
- Reinforce scientific communication skills you have developed as a neuroscience minor
- Get a better understanding of grant proposals
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OAKs Material

We’ll use it if for:

- All Course Informational Material (Syllabus, Day by Day Detailed Course Guide)
- Course Calendar
- All Readings
- Grading Specifications for the Course and Assignments
- Pre-Class Assignments
- Supplemental Course Material
- Grade Book
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Readings

- We are using primary and secondary literature and reading an occasional book chapter
- All readings will be available on OAKs and I’ll handout a hard copy if you like reading paper versions
- I have chosen the articles we will examine from the Crook Lab - you will choose the last article you would like to focus on
How intelligent is a cephalopod? Lessons from comparative cognition

Alexandra K. Schnell1, Piero Amodio1,2, Markus Boeckle1,3,4 and Nicola S. Clayton1

1 Department of Psychology, University of Cambridge, Cambridge, UK
2 Department of Biology and Evolution of Marine Organisms, Stazione Zoologica Anton Dohrn, Naples, Italy
3 Department of Cognitive Biology, University of Vienna, Vienna, Austria
4 Karl Landsteiner University of Health Science, Krems an der Donau, Austria

ABSTRACT

The soft-bodied cephalopods including octopus, cuttlefish, and squid are broadly considered to be the most cognitively advanced group of invertebrates. Previous research has demonstrated that these large-brained molluscs possess a suite of cognitive attributes that are comparable to those found in some vertebrates, including highly developed perception, learning, and memory abilities. Cephalopods are also renowned for performing sophisticated feats of flexible behaviour, which have led to claims of complex cognition such as causal reasoning, future planning, and mental attribution. Hypotheses to explain why complex cognition might have emerged in cephalopods suggest that a combination of predation, foraging, and competitive pressures are likely to have driven cognitive complexity in this group of animals. Currently, it is difficult to gauge the extent to which cephalopod behaviors are underpinned by complex cognition because many of the recent claims are largely based on anecdotal evidence. In this review, we provide a general overview of cephalopod cognition with a particular focus on the cognitive attributes that are thought to be prerequisites for more complex cognitive abilities. We then discuss different types of behavioral flexibility exhibited by cephalopods and, using examples from other taxa, highlight that behavioral flexibility could be explained by putatively simpler mechanisms. Consequently, behavioral flexibility should not be used as evidence of complex cognition. Fortunately, the field of comparative cognition centres on designing methods to pinpoint the underlying mechanisms that drive behavior. To illustrate the utility of the methods developed in comparative cognition research, we provide a series of experimental designs aimed at distinguishing between complex cognition and simpler alternative explanations. Finally, we discuss the advantages of using cephalopods to develop a more comprehensive reconstruction of cognitive evolution.

Keywords: octopus, cuttlefish, squid, cognitive mechanisms, complex cognition, cognitive evolution, convergent evolution
Seminar in Neuroscience
Research Focus - The Crook Lab

Welcome
The Crook Laboratory at San Francisco State University
Seminar in Neuroscience
Research Focus - The Crook Lab


Dr. Robyn Crook
Associate Professor
San Francisco State University
https://crooklab.org/
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Theory of Mind - Alien Intelligence
Seminar in Neuroscience

Let’s Get to Know Me

Three Things You Want to Know About Me:

1.

2.

3.
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Specifications Grading

- My grading philosophy has evolved over my time as a faculty member...
- There will be clear specifications or goals for an assignment that are provided to you with the assignment
- **None of your assignments will have grades** attached, your assignment will receive either a “complete” or and “incomplete” based on your fulfilling the specifications
- This focuses us on reaching our knowledge goals, rather than focusing on what the difference is between an B and B- on an assignment
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Final Grading and Badges

Your final grade is determined by the number of badges out of 9 you have earned during the semester.

<table>
<thead>
<tr>
<th>Badge</th>
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8 badges = A  
7 badges = B  
6 badges = C  
5 badges = D  
4 or fewer badges = F
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Substantial Interruption of Instruction (Unlikely)

- If in-person classes are suspended, I will provide a detailed plan for a change in modality to ensure the continuity of learning.

- All students must have access to a computer equipped with a web camera, microphone, and Internet access. Resources are available to provide students with these essential tools.

“This one’s dedicated to all the people that didn’t believe in me when I was getting started.”
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Sometimes, *life happens or a pandemic happens*…

I also understand that you all have other courses, life responsibilities, jobs, and families. You may test positive for SARS-CoV-2, develop COVID-19 symptoms, or have to quarantine/self-isolate. Sometimes, life just takes an unexpected turn.

However, that shouldn’t prevent you from being successful in this class. Please do not hesitate to talk to me about any personal issues (you do not have to provide specifics) that arise during the semester so that we can arrange for the assistance you may need and make reasonable accommodations for you to complete missed work.
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Basic COVID Protocols

COVID-19 Positive students both on and off-campus as well as faculty and staff (regardless of vaccination status):

- 5-day isolation away from campus required.
- Your isolation period is determined from the date of the positive COVID-19 test. Day 1 of isolation begins the day after the positive test date.
- If you have no symptoms after five days and you are without fever for 24 hours and not on fever-reducing medicines, you may return to campus but MUST wear a mask while around others for an additional five days.
- If your symptoms have not improved on day 5, a full 10-day isolation away from campus is required.

Close Contact Procedures:
- See the Health and Wellness Page here for the process to follow based on vaccination status
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Detailed Course Calendar

What are important dates I should make note of in my calendar?

I maintain a comprehensive course calendar with the course topics, readings, assignments, and due dates. In the event that our schedule changes (due to weather, class cancellations, etc.), I will update the course calendar online as soon as I can. This information will also be in our OAKs course calendar.

Fall 2021 BIOL/PSYC 447 Detailed Course Plan

Syllabus Symbols: The following symbols provide information about how the class is meeting and will be updated if changes are required due to the pandemic.

Image: Normal Course Mode: Clyde indicates the course is meeting live in-person in RITA 273 during our scheduled class time. Masks that cover your nose and mouth are required to attend these sessions.

Image: Course Disruption: If the course needs to go all online due to the pandemic, the Zoom Symbol will be inserted to indicate that the course is meeting live in zoom during our scheduled class period. The Zoom links will be available in OAKs.

Pre-Class Meeting Assignments: All assignments that are required to be completed prior to our next class meeting will always be due by Sunday at 10pm.
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Contacting Me

- Email is the best way to connect with me if you have questions that are particular to just you or course questions. I’ll answer your emails within 24 hours.
  - Weekdays - Emails sent to me after 5pm will likely be answered the next morning.
  - Weekends - Emails sent after 4pm on Friday will be answered on Sunday night or Monday morning.
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Honor Code and Academic Integrity

- Cases of suspected academic dishonesty will be reported directly by the instructor and/or others having knowledge of the incident to the Dean of Students.

- A student found responsible by the Honor Board for academic dishonesty will receive a XXF in the course, indicating failure of the course due to academic dishonesty. This grade will appear on the student’s transcript for two years after which the student may petition for the XX to be expunged. The F is permanent. The student may also be placed on disciplinary probation, suspended (temporary removal) or expelled (permanent removal) from the College by the Honor Board.

- **Students should be aware that unauthorized collaboration--working together without permission-- is a form of cheating.** Unless the instructor specifies that students can work together on an assignment, quiz and/or test, no collaboration during the completion of the assignment is permitted.

- Students can find [the complete Honor Code](#) and all related processes in the Student Handbook.
Seminar in Neuroscience
First Assignment - Concept Mapping
Spring 2022 BIOL/PSYC 447 Detailed Course Plan

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<tr>
<th>Day</th>
<th>Date</th>
<th>Topics</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>Module 0 - Introductions and Course Design</strong></td>
</tr>
<tr>
<td>M</td>
<td>1/10</td>
<td>Introductions, Course Design, Exploring the Crook Lab</td>
</tr>
<tr>
<td>M</td>
<td>1/17</td>
<td>MLK Holiday - No Classes</td>
</tr>
</tbody>
</table>

**Module One:** Our first module will allow us to take a deep dive into cephalopods and comparative cognition - how can we learn about other minds? We'll use a variety of pre-class assignments and collaborative in-class activities to dissect the current state of knowledge in the field. We’ll also do some initial work on how our values and strengths inform our ultimate career choices.

- **Module 1 - Cephalopod Intelligence - Review Article Discussion**
  *Schnell et al. (2021) How intelligent is a cephalopod? Lessons from comparative cognition*

<table>
<thead>
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<th>Day</th>
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| M   | 1/24 | **Research:** Class Discussion of pp 163-169  
  - **Due Before Class:** Concept Map Assignment |
|     |      | **In Class Film:** *My Octopus Teacher - Part 1* |
| M   | 1/31 | **Research:** Class Discussion of pp 170-174  
  - **Due Before Class:** Concept Map Assignment |
|     |      | **In Class Film:** *My Octopus Teacher - Part 2* |
Module Two: Our second module will facilitate a close examination of peer-reviewed research articles from one lab to see how their research program develops over time and continue our exploration of the semester’s topic. We are focusing on the work of Dr. Robyn Crook. We’ll use a variety of pre-class assignments and collaborative in-class activities to examine experimental approaches, hypotheses, and results. This module will end with an exploration how we fund science in the US.

### Module 2.1 - The Crook Lab - Research Article Discussion (crooklab.org)


<table>
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<tr>
<th>Date</th>
<th>Research</th>
<th>Due Before Class</th>
<th>In Class Film</th>
</tr>
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</table>
| 2/7  | Discussion of Introduction and First Half of Results/ Figures  
• Due Before Class: Introduction Concept Map, Figure Analysis Activity |  | Contact - Part 1 |
| 2/14 | Second Half of Results/ Figures  
• Due Before Class: Figure Analysis Activity |  | Contact - Part 2 |
| 2/21 | Discussion/Future Experiments;  
• Due Before Class: Expand Concept Map, List of Discussion Points |  | |

### Module 2.2 - The Crook Lab - Research Article Discussion (crooklab.org)

**Paper 2:** Crook (2021) Behavioral and Neurophysiological evidence suggests affective pain experience in octopus. iScience24, 102229.

<table>
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<th>Date</th>
<th>Research</th>
<th>Due Before Class</th>
<th>In Class Film</th>
</tr>
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</table>
| 2/28 | Discussion of Introduction and First Half of Results/ Figures  
• Due Before Class: Introduction Concept Map, Figure Analysis Activity |  | Arrival - Part 1 |
| 3/7  | Course Break - No Class: We are halfway - Time to recharge. |  | |
| 3/14 | Second Half of Results/ Figures  
• Due Before Class: Figure Analysis Activity |  | |
| 3/21 | Discussion/Future Experiments  
• Due Before Class: Expand Concept Map, List of Discussion Points  
Professional Development: NIH and NSF Grant Reviewing Criteria  
• Due Before Class: Refine Grant Panel Criteria |  | |
| 3/28 | Grant Study Section Panel Discussion  
• Due Before Class: Next Experiment Mini-Proposal |  | |
**Module Three**: Our third module will facilitate a close examination of a peer-reviewed research article that you have chosen based on our continuing discussions. You’ll pick one paper that interests you for this final project. You’ll do a short presentation on the paper to the class and write a second one-page next experiment proposal for our final study section panel on the last day of class.

### Module 3 - Choose Your Own Adventure in Animal Cognition

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity</th>
<th>Due Before Class</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>M 4/4</strong></td>
<td>Research: In Class Workshop For Presentation and Mini-Proposal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● <strong>Due Before Class</strong>: TBD</td>
<td></td>
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<tr>
<td><strong>M 4/11</strong></td>
<td>Research: In Class Workshop For Presentation and Mini-Proposal</td>
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<tr>
<td></td>
<td>● <strong>Due Before Class</strong>: TBD</td>
<td></td>
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<tr>
<td><strong>M 4/18</strong></td>
<td>Research: Course Mini Symposium</td>
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<tr>
<td></td>
<td>● <strong>Due Before Class</strong>: Final Presentation Slides</td>
<td></td>
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<tr>
<td><strong>M 4/25</strong></td>
<td>Research: Grant Study Section Panel Discussion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● <strong>Due Before Class</strong>: Next Experiment Mini-Proposal</td>
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</tr>
</tbody>
</table>
How is my final grade calculated?
As explained in the syllabus, your overall course grade is determined by how many course badges you earn during the semester. Listed below are the ten badges offered in the course, what these badges demonstrate about your learning, and what it takes to earn them.

8 badges = A  
7 badges = B  
6 badges = C  
5 badges = D  
4 or fewer badges = F

1 halfway completed badge = next highest plus grade  
2+ halfway completed badges = next highest minus grade

Review the syllabus and the information provided here to devise a plan for achieving the course grade you’re aiming for. I’ll keep track of updated grades information in OAKS, but I’ve also included at the end of this handout a worksheet you can use to keep track of your grade.

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<td>Submit six annotated concepts maps of the review and two primary article introductions that meet all grading specifications</td>
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<tr>
<td>Methods Visualization</td>
<td>You can visually illustrate scientific methods and identify critical elements of experiment or study design</td>
<td>Submit four illustrated cartoons visualizing the experimental methods for particular data that meet all grading specifications</td>
</tr>
<tr>
<td>Data Annotation</td>
<td>You can apply critical reading to connect methods, figure legends, and results</td>
<td>Submit four figure annotation activities that meet all grading specifications</td>
</tr>
<tr>
<td></td>
<td>You can critically evaluate methods and data presentation formats</td>
<td></td>
</tr>
<tr>
<td>Data Evaluation</td>
<td>You can examine and discuss author interpretations and claims with scientific colleagues</td>
<td>Participate in weekly in-class data discussion activities that meet all grading specifications</td>
</tr>
<tr>
<td>Experimental Design (A/B Required)</td>
<td>You can demonstrate scientific process skills (generating hypotheses and experimental design) and synthetic thinking</td>
<td>Submit two next experiment mini-grant proposals that meet all grading specifications</td>
</tr>
<tr>
<td>Grant Panel (A/B Required)</td>
<td>You can apply analytical thinking skills and clearly communicate that analysis to scientific colleagues</td>
<td>Actively participate in both in-class grant panel activities</td>
</tr>
<tr>
<td>----------------------------</td>
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<td>-------------------------------------------------</td>
</tr>
<tr>
<td>Life Exploration</td>
<td>You have gained insight into the career path of professionals in the biomedical sciences</td>
<td>Submit two sets of author questions and a final reflection on their responses.</td>
</tr>
<tr>
<td>Interdisciplinary Thinking</td>
<td>You have integrated and explored ideas and concepts from multiple disciplines</td>
<td>Submit four written reflections on book chapters, movies, and/or invited class speakers</td>
</tr>
<tr>
<td>Science Communication (A/B Required)</td>
<td>You can clearly summarize and communicate the findings of a research project/paper</td>
<td>Complete all steps in the development of the presentation and present your 10 minute talk to the class</td>
</tr>
</tbody>
</table>

**What Are Ethos Points?**
You will start the class with three ethos points, which are tokens you can use to get a 24 hour extension on assignment or resubmit within two weeks of the original due date an assignment you submitted that did not meet all expectations and was therefore graded incomplete.

**How Will Plus/Minus Grade Options Be Handled?**
If you recall from the syllabus, your overall course grade is based on the number of badges you complete. Nine badges equals an A, eight a B, and so on. Plus/minus grades will be determined based on the number of badges you’ve attempted, made 50% progress on or more, but haven’t fully completed. One of these types of not-yet-complete badges raises your grade to the next highest plus grade; two or more raise your grade to the next highest minus grade.

**What Will This Look Like in OAKS?**
I will use the Grades page in OAKS to track your progress toward each badge. Rather than earning a letter grade, each individual assignment and badge will earn a grade of either complete or incomplete. I will enter your progress toward a badge (or leave blank if unattempted) until it is complete. Your running total of ethos points will be tracked in real time. If you do not meet these specifications by midterm, I will estimate your course grade based on your progress toward badges and your remaining ethos points, and explain this estimate in feedback provided in the OAKS Grades page.
Course Badges Progress Tracker

Total number of fully earned badges:  

Total number of halfway completed badges:  

Context: Concept Map 1 __ Concept Map 2 __ Concept Map 3 __ Concept Map 4 __ Concept Map 5 __ Concept Map 6 __

Methods Visualization: Exp. Cartoon 1 __ Exp. Cartoon 2 __ Exp. Cartoon 3 __ Exp. Cartoon 4 __

Data Annotation: Figure Analysis 1 __ Figure Analysis 2 __ Figure Analysis 3 __ Figure Analysis 4 __

Data Evaluation: Week 2 __ Week 3 __ Week 4 __ Week 5 __ Week 6 __ Week 7 __ Week 8 __ Week 9 __ Week 10 __ Week 11 __

Experimental Design: Mini-Grant 1 __ Mini-Grant 2 __

Grant Panel: Review Criteria 1 __ Panel 1 __ Review Criteria 2 __ Panel 2 __

Life Exploration: Author Questions 1 __ Author Questions 2 __ Reflection __

Interdisciplinary Thinking: Written Reflection 1 __ Written Reflection 2 __ Written Reflection 3 __ Written Reflection 4 __

Science Communication: Paper Choice __ Concept Map __ Key Figure Activity __ Draft Slides __ Presentation __