

Psychology 328 (Fall 2016)

(This syllabus is subject to change. Students will be responsible for all changes.)

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Class Time: Lecture/Labs are held Tuesdays 1 – 5 PM

Location: Rm 537 AIC East Wing

Lab Facilitator: Dr. Blair Duncan

Lab Assistant: Nicholas Johnson

Course Pre-requisites: Psychology 301; Psychology 320 or 323;
Biology 101, Psychology 321 recommended

Readings:

This class is primarily a skill acquisition course; however, to maximize students' understanding of the protocols and procedures, there will be assigned readings posted on Canvas that will be assigned two weeks prior to class and will include questions that will be graded. Students are expected to have read pre-assigned materials prior to class. For review, Powerpoint lecture slides will also be made available on Canvas following class. As background material, students are encouraged to peruse the Worm Biology Manual (found at www.wormbook.org).

The Course:

This course will provide an overview of *C. elegans* biology, behavior and genetics with the goal of performing an experiment investigating mechanisms of learning and memory in the worm model system. Students will gain experience in conducting behavioral experiments and manipulating protein expression to discern the role of acetylcholine as well as the Wnt signaling pathway in behavior and learning and memory. This is a novel experiment and data resulting from this course may be included in an original research publication. If this is successful, students would serve as co-authors on the paper.

For this experiment, students will begin by observing basic worm behaviors. Students will then perform a series of assays for RNAi plasmid confirmation before employing RNAi to induce gene knockdown. The gene of interest for this 328 section is *cam-1*, that codes for the Wnt signaling receptor in *C. elegans*. Previous studies have linked the Wnt signaling pathway with regulation of acetylcholine receptor localization to postsynaptic regions, a key component of activity-dependent synaptic plasticity. Knockdown of CAM-1 expression may have effects both behaviorally, and potentially in mediating plasticity. Students will observe the role of this gene on behavior and learning by performing RNAi knock-down and then examining learning and

memory. Techniques that will be covered include: pipetting, worm transfer, basic light microscopy, *C. elegans* associative chemotaxis, knock-down plasmid transformation and RNAi as well as computer analysis of behavior and data preparation. No prior knowledge of these techniques is necessary for this course.

As mentioned, the ultimate goal of these data collection assays are to compile a meaningful dataset to be included in an original research article for publication. These data would be combined with data collected in the Winter 2017 428 class where students will perform additional analyses on this research question including examining protein expression within a whole animal using fluorescence microscopy of transgenic worm strains carrying fluorescent reporter constructs.

Course Objectives:

The primary goal of this course is to demonstrate how mechanisms of behavior can be studied in a laboratory using an invertebrate model system and thereby expose students to behavioral and molecular laboratory techniques. Lab notebook assignments are intended to familiarize students with documenting experimental procedures and results to gain a clearer understanding of the different roles of a researcher. By the end of this course, students will have gained experience in:

1. Develop a comprehensive view of how neuron circuit signaling results in behavior
2. Understanding manipulation of gene expression in *C. elegans* using RNAi
3. *C. elegans* behavioral learning and memory assays
4. Documenting and analyzing data
5. Preparing data from several analyses and delivering in an oral presentation

These course objectives target many of the **BNS content competencies** by providing relevant experience to contribute to a student's understanding of:

- fundamental principles in molecular, cellular, and systems neuroscience and the neural basis of normal and abnormal behavior
- the process and limitations of basic and applied biomedical research, especially as they relate to neuroscience
- laboratory/diagnostic techniques and equipment common to the natural sciences, especially neuroscience

Further, through this laboratory-class experience and associated assignments, students will have the opportunity to increase their proficiency in several **BNS process competencies** including:

- think integratively and creatively about issues related to the natural sciences, especially neuroscience.
- think critically, in a scientific and quantitative manner, about issues related to the natural sciences, especially neuroscience.
- communicate precisely and effectively, in written and spoken word, in general and in matters related to neuroscience.
- to engage independently and collaboratively in the scientific process.

Responsibilities: You are responsible for **all** material contained in the handouts, all readings assigned for each lecture and lab, and for completion of all assignments by the due date. Students are also expected to maintain a lab notebook: entries will serve as a weekly assignment to be

submitted via Canvas (see below). Details regarding lab procedure as well as hypotheses, results and discussion should be recorded in the lab notebook. Illustrations are encouraged (see Canvas for more information and helpful links). **Lab notebooks will be handed in at the end of the quarter so it is recommended that you take class notes in a separate notebook.**

Lectures: The lectures will provide you with basic background information to understand why a particular technique is employed and to understand what information will result from the different assays. Punctual attendance is expected. Because the most effective learning generally occurs in an interactive environment, speak up at any point if something is unclear or if you have a comment relevant to the topic at hand. If you miss a lecture, it is your responsibility to get notes from another student in the class.

Discussion Board: If questions about the material arise outside of lecture, the instructors and the student TA(s) will be monitoring the Discussion Board for this course on the Canvas site. This is an opportunity to post questions, comments or interesting facts that contribute to the greater body of knowledge and understanding for the course. Students are welcome to answer other student questions and expect periodic input from the student TA or instructor.

Summary of Assessment Criteria and Important Dates:

Homework Reading Assignments	15%
Talk or Poster Presentation	25%
Lab Notebook	30%
<u>Lab Participation & Technical Proficiency</u>	<u>30%</u>
Total	100%

Assessment of Learning Objectives:

Lab Notebook: Pictures or Scans of lab report pages are to be uploaded to Canvas by the posted deadline (typically the Friday after the respective lab class, with a few exceptions). Often times lab notebooks are the only reference to how a study was performed and when someone leaves a laboratory position, their notebook becomes a valuable resource for understanding how that person performed protocols and experiments; thus allowing for the research direction to continue after the person's departure. Students will be graded on keeping concise lab records detailing their lab experiments and activities, as well as making note of unexpected outcomes or issues during the experiment. Feedback will be given to help improve lab report notation. Sample pages from Dr. Duncan's lab book will be uploaded to Canvas help serve as a model.

Participation and Technical Proficiency: Attendance will be taken for each class and technical proficiency of laboratory procedures will be noted. Efforts to learn and/or improve will be considered. At the end of the quarter, lab partners will submit a peer review for grading (3% of final grade): the peer review submitted will be graded by Dr. Rose (3% of final grade).

Poster Presentation: During our assigned final exam time (Dec. 6th 1-3PM), students will present either a talk or a poster that will include the cumulative data from all groups collected over the quarter. Although the class will share data, each group will prepare and present their

own talk or poster. Grading will take into consideration both the visual organization and the oral presentation of the material. Students should consider saving data and images collected over the course of the quarter to be included in their final presentations. Posters will be displayed as a single slide using the classroom projector to avoid unnecessary printing. All visual material files (PowerPoint presentations, etc.) must be uploaded to Canvas for grading prior to the presentation. Groups will have a maximum of 15 minutes to present the experiment and resultant data and should expect ~5 minutes for questions.

Grading:

90+ = A 85-90 = A- 80-85 = B+ 75-80 = B 70-75 = B- 67-70 = C+
64-67 = C 60-64 = C- 57-60 = D+

Extra Learning Requirements: Reasonable accommodation for persons with documented disabilities should be established within the first week of class and arranged through Disability Resources for Students: telephone 650-3083; email drs@wwu.edu; and on the web at Disability Resources.

Make-up Assignments: The assignment due dates in this syllabus are non-negotiable. If you have a conflict with one or more of the assignment deadlines due to personal commitments, you should consider dropping the class. Accommodation for missed assignments or a make-up assignment may be offered but **only** for UNIVERSITY APPROVED EXCUSES:

- (1) Medical emergency (verified by a medical professional)
- (2) Family emergency (verified by the Dean of Students Office)

Other serious emergencies should be presented to the Dean of Students Office who will determine the course to follow with regards to missed assignments. Family holiday, friend/relative wedding, etc. – are NOT approved excuses. Any assignment missed for reasons other than the two university approved excuses or without consultation with the Dean of Students Office or other support services on campus will result in an assignment grade of zero.

Western encourages students to seek assistance and support at the onset of an illness, difficulty, or crisis.

- a medical concern or question, contact the Health Center: 650-3400 or visit **Student Health**.
- an emotional or psychological concern or question, please contact the **Counseling Center**: 650-3400 or visit the WWU Counseling Services webpage.
- a health and safety concern, please contact the **University Police**: 650-3555 or visit the Police.
- In the case of a family or personal crisis or emergency, please contact the **Dean of Students**: 650-3450 or visit Dean of Students.
- To seek confidential support related to sexual violence, please contact CASAS (650-3700), the Student Health Center, and/or the Counseling Center. To report sexual violence, please contact University Police, Bellingham Police, and/ or the Title IX Coordinator in Western's Equal Opportunity Office (650-3307). Faculty are responsible employees who are required to report sex discrimination, including sexual violence that they learn about to the Title IX Coordinator.

Equal Opportunity in Educational Context:

I, and Western, are committed to an environment free of discrimination and harassment. Federal and State laws, as well as University policies, protect students, faculty and staff against discrimination based on the following legally protected characteristics: Race, Color, Creed, Religion, National Origin, Sex, (including pregnancy and parenting status), Age, Disability, Marital Status, Sexual Orientation, Gender Identity and Expression, Genetic Information and Veteran Status. For more information, see the **WWU Equal Opportunity Office** website and Western's Policies on Providing Equal Opportunity and Nondiscrimination and Preventing Sexual Harassment.

Integrity and Academic Honesty:

A Note on Plagiarism: Learning to write a research paper is one of the primary goals of this course. One of the cardinal sins in writing a research paper is to plagiarize. Please review course catalog Appendix D. **These policies and procedures on academic dishonesty apply to this course.** Pay particular attention to the definition of plagiarism, which is reproduced below:

Plagiarism, which is presenting as one's own in whole or in part the argument, language, creations, conclusions, or scientific data of another without explicit acknowledgement. Examples include, but are not limited to:

- (1) Using another person's written or spoken words without complete and proper citation.
- (2) Using information from a World Wide Web site, CD-ROM or other electronic source without complete and proper citation.
- (3) Using statistics, graphs, charts and facts without acknowledging their source.
- (4) Submitting a paper purchased from a term-paper service.
- (5) Paraphrasing, which is imitating someone else's argument using other words without acknowledging the source.
- (6) Claiming credit for someone else's artistic work, such as a drawing, script, musical composition or arrangement.
- (7) Using someone else's lab report as a source of data or results.
- (8) Using one's own or substantially similar work, produced in connection with one course, to fulfill a requirement in another course without prior permission. A student may use the same or substantially the same work for assignments in two or more courses only with written permission from the instructors of all the classes involved.

If you have questions about plagiarism, please ask Dr. Rose or view the WWU Academic Honesty Policy and Procedure at <http://catalog.wvu.edu/content.php?catoid=12&navoid=2373>
Better to be safe than sorry!

**If you are caught plagiarizing, you will receive a grade of "F" for the entire course.
If in doubt, ask your TA to look at your work and the sources that you are citing from
before you hand in an assignment.**