Topics in Biology: Animal Genetic Model Organisms
Biol 5005-004, Audb 201. Tues/Thurs 9:30-10:50

Dr. Padilla, Professor, Life Science Building B Room 220
Communication via the Blackboard email message system or your email
Dr. Padilla's Office Hours: Friday 9:00-10:30
Blackboard Learn: Course information for class will be posted on blackboard.

Grades: Grades based on participation, writing assignments, scientific paper reviews, presentations. 10 points for each assignment

Objective: Progress as a scientist through review of the scientific literature, and discussing scientific finding, and communicating scientific ideas

Guiding principle for the course: Intentional conversations about a select few research papers to learn and progress in the development of the following skills sets:

The minimally expected skills:
- Understand and learn scientific content in the field of *C. elegans* genetics
- How to read and comprehend scientific papers
- Increase awareness of various scientific approaches
- Develop clarity on the objective and significance for specific scientific studies
- Awareness of the history of a scientific field

The practical skills:
- An understanding of the scientific publication process
- Develop an in-depth understanding of scientific manuscript organizational process
- Dissect and develop the writing style and technical know-how required for scientific publication
- Understanding of needed resource and resource acquisition

The essential but difficult to master skills:
- Develop critical thinking skills
- Develop listening skills
- Allow purposeful curiosity
- Recognize and develop scientific creativity
- Practice and master scientific communication (written and oral form)
- Develop skills in participatory science
- Refute and respond to critiques
- Awareness of the limitations of a scientific field

Disabilities: If you have a qualifying disability as defined by the ODA and need special accommodations, you must provide me with the paperwork by January 28.

"The function of education is to teach one to think intensively and to think critically. Intelligence plus character that is the goal of true education' Martin Luther King, Jr.

<u>Tentative</u> Class Schedule: Schedule subject to change and will be updated online

Tues.	Class Topic	Thurs.	Class Topic
Jan 16	Organization & guiding principles for class discussions	Jan 18	Skill Set Development **Reading & Reviewing Papers** **What is creativity?**
Jan 23	*C. elegans* as a model & Sydney Brenner (1, 2) Scientific History, Reading Reviews	Jan 25	Classic: Worm brain J. White, M. Chalfie Classic Scientists & Discoveries (3-5)
Jan 30	Classic: Worm brain J. White, M. Chalfie Content & Communication (4, 5)	Feb 1	Chemosensation C. Bargmann Notable Scientist & Discoveries (6, 7)
Feb 6	Oxygen Sensing (8) C. Bargmann Content & Communication	Feb 8	No Class- Padilla at UTEP
Feb 13	Aging (9, 10) Kenyon, Ruvkun Notable Scientists & Discoveries	Feb 15	Aging & Stress (11) Kenyon Content & Communication Style
Feb 20	Neuropeptides & Longevity (12, 13) Content & Commentary Style	Feb 22	No Class-Padilla at SACNAS meeting
Feb 27	Cell Death Introduction (14, 15) Notable Scientist & Discoveries R. Horvitz	Mar 1	Apoptosis & Phagocytosis (16) Content & Communication Style
March 6	No class- Padilla at Leadership Conference	Mar 8	Skill Set Development Journal Instructions to Authors **Writing Scientific Papers**
March 13	Spring Break	March 15	Spring Break
March 20	MicrorRNAs (17, 18) V. Ambros	March 22	Germline & Development (19-21) G. Seydoux & S. Strome
March 27	Insulin-like signaling, stress, gene expression (22)	March 29	Glycogen, lifespan & stress (23)
April 3	Glucose Toxicity (24, 25) Writing Project Due	April 5	Writing Project Discussions Student 1
April 10	Writing Project Discussions Student 2	April 12	Writing Project Discussions Student 3
April 17	Writing Project Discussions Student 4	April 19	Writing Project Discussions Student 5
April 24	Writing Project Discussions Student 6	April 26	No class- Padilla at OLLI talk
May 1	Writing Project Discussions Student 7	May 3	Writing Project Discussions Student 8
May 8th	Final exam week		

Scientific Paper References: References include commentaries, primary papers, reviews, classic papers and more recent publications.

1. Corsi AK, Wightman B, Chalfie M. A Transparent window into biology: A primer on Caenorhabditis elegans. WormBook. 2015:1-31. doi: 10.1895/wormbook.1.177.1. PubMed PMID: 26087236; PMCID: PMC4781331.
2. Brenner S. Nobel lecture. Nature's gift to science. Biosci Rep. 2003;23(5-6):225-37. PubMed PMID: 15074543.
3. White JG. Getting into the mind of a worm--a personal view. WormBook. 2013:1-10. doi: 10.1895/wormbook.1.158.1. PubMed PMID: 23801597; PMCID: PMC4781474.
4. White JG, Southgate E, Thomson JN, Brenner S. The structure of the ventral nerve cord of Caenorhabditis elegans. Philos Trans R Soc Lond B Biol Sci. 1976;275(938):327-48. PubMed PMID: 8806.
5. Chalfie M, Sulston JE, White JG, Southgate E, Thomson JN, Brenner S. The neural circuit for touch sensitivity in Caenorhabditis elegans. J Neurosci. 1985;5(4):956-64. PubMed PMID: 3981252.
6. Bargmann CI. Chemosensation in C. elegans. WormBook. 2006:1-29. doi: 10.1895/wormbook.1.123.1. PubMed PMID: 18050433; PMCID: PMC4781564.
7. Bargmann C. How the Chan Zuckerberg Science Initiative plans to solve disease by 2100. Nature. 2018;553(7686):19-21. doi: 10.1038/d41586-017-08966-z. PubMed PMID: 29300028.
8. Gray JM, Karow DS, Lu H, Chang AJ, Chang JS, Ellis RE, Marletta MA, Bargmann CI. Oxygen sensation and social feeding mediated by a C. elegans guanylate cyclase homologue. Nature. 2004;430(6997):317-22. doi: 10.1038/nature02714. PubMed PMID: 15220933.
9. Kenyon C, Chang J, Gensch E, Rudner A, Tabtiang R. A C. elegans mutant that lives twice as long as wild type. Nature. 1993;366(6454):461-4. doi: 10.1038/366461a0. PubMed PMID: 8247153.
10. Kimura KD, Tissenbaum HA, Liu Y, Ruvkun G. daf-2, an insulin receptor-like gene that regulates longevity and diapause in Caenorhabditis elegans. Science. 1997;277(5328):942-6. PubMed PMID: 9252323.
11. Wei Y, Kenyon C. Roles for ROS and hydrogen sulfide in the longevity response to germline loss in Caenorhabditis elegans. Proc Natl Acad Sci U S A. 2016;113(20):E2832-41. doi: 10.1073/pnas.1524727113. PubMed PMID: 27140632; PMCID: PMC4878494.
12. Abergel R, Gross E. Can oxygen anosmia extend lifespan? Aging (Albany NY). 2017;9(11):2241-2. doi: 10.18632/aging.101337. PubMed PMID: 29190215; PMCID: PMC5723683.
13. Abergel R, Livshits L, Shaked M, Chatterjee AK, Gross E. Synergism between soluble guanylate cyclase signaling and neuropeptides extends lifespan in the nematode Caenorhabditis elegans. Aging Cell. 2017;16(2):401-13. doi: 10.1111/acel.12569. PubMed PMID: 28054425; PMCID: PMC5334569.
14. Yuan J, Horvitz HR. A first insight into the molecular mechanisms of apoptosis. Cell. 2004;116(2 Suppl):S53-6, 1 p following S9. PubMed PMID: 15055582.
15. Horvitz HR. Nobel lecture. Worms, life and death. Biosci Rep. 2003;23(5-6):239-303. PubMed PMID: 15074544.

16. Johnsen HL, Horvitz HR. Both the apoptotic suicide pathway and phagocytosis are required for a programmed cell death in Caenorhabditis elegans. BMC Biol. 2016;14:39. doi: 10.1186/s12915-016-0262-5. PubMed PMID: 27185172; PMCID: PMC4867531.
17. Ambros V. Victor Ambros: the broad scope of microRNAs. Interview by Caitlin Sedwick. J Cell Biol. 2013;201(4):492-3. doi: 10.1083/jcb.2014pi. PubMed PMID: 23671307; PMCID: PMC3653358.
18. Burke SL, Hammell M, Ambros V. Robust Distal Tip Cell Pathfinding in the Face of Temperature Stress Is Ensured by Two Conserved microRNAS in Caenorhabditis elegans. Genetics. 2015;200(4):1201-18. doi: 10.1534/genetics.115.179184. PubMed PMID: 26078280; PMCID: PMC4574240.
19. Smith J, Calidas D, Schmidt H, Lu T, Rasoloson D, Seydoux G. Spatial patterning of P granules by RNA-induced phase separation of the intrinsically-disordered protein MEG-3. Elife. 2016;5. doi: 10.7554/eLife.21337. PubMed PMID: 27914198; PMCID: PMC5262379.
20. Seydoux G. Part 1: From egg to Worm: How to create a body axis 2017. Available from: https://www.ibiology.org/development-and-stem-cells/body-axis/ - part-1.
21. Strome S. Specification of the germ line. WormBook. 2005:1-10. doi: 10.1895/wormbook.1.9.1. PubMed PMID: 18050414; PMCID: PMC4781390.
22. Iser WB, Wilson MA, Wood WH, 3rd, Becker K, Wolkow CA. Co-regulation of the DAF-16 target gene, cyp-35B1/dod-13, by HSF-1 in C. elegans dauer larvae and daf-2 insulin pathway mutants. PLoS One. 2011;6(3):e17369. doi: 10.1371/journal.pone.0017369. PubMed PMID: 21408062; PMCID: PMC3052305.
23. Gusarov I, Pani B, Gautier L, Smolentseva O, Eremina S, Shamovsky I, Katkova-Zhukotskaya O, Mironov A, Nudler E. Glycogen controls Caenorhabditis elegans lifespan and resistance to oxidative stress. Nat Commun. 2017;8:15868. doi: 10.1038/ncomms15868. PubMed PMID: 28627510; PMCID: PMC5481799.
24. Svensk E, Devkota R, Stahlman M, Ranji P, Rauthan M, Magnusson F, Hammarsten S, Johansson M, Boren J, Pilon M. Correction: Caenorhabditis elegans PAQR-2 and IGLR-2 Protect against Glucose Toxicity by Modulating Membrane Lipid Composition. PLoS Genet. 2016;12(6):e1006112. doi: 10.1371/journal.pgen.1006112. PubMed PMID: 27257966; PMCID: PMC4892886.
25. Svensk E, Devkota R, Stahlman M, Ranji P, Rauthan M, Magnusson F, Hammarsten S, Johansson M, Boren J, Pilon M. Caenorhabditis elegans PAQR-2 and IGLR-2 Protect against Glucose Toxicity by Modulating Membrane Lipid Composition. PLoS Genet. 2016;12(4):e1005982. doi: 10.1371/journal.pgen.1005982. PubMed PMID: 27082444; PMCID: PMC4833288.

Refer to wormbook, worm atlas, and wormbase for additional information needed.