Modular Digital Course in Undergraduate Biological Education

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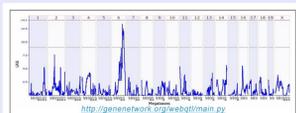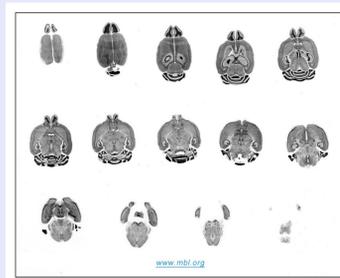
(1) BIOINFORMATICS

Students quantify mouse brain phenotype and perform a Quantitative Trait Locus (QTL) analysis to link variation in the phenotype with chromosomal loci.

http://mdcune.psych.ucla.edu/modules/bioinformatics/

- Students measure olfactory bulbs areas from digital images of BxD mice brains.

- Students analyze data with multiple regression and ANOVA.

- Students run a QTL analysis on residual scores to identify chromosomal sections associated with the phenotypic variance.

- Students find genes that are highly expressed in olfactory bulbs.

- Students determine the complete and coding sequences of the genes.

(2) BIRD SONG SYSTEM

Students quantify zebra finch song nuclei to determine sex differences and the effects of various doses of estradiol (E_2) given to post-hatch females.

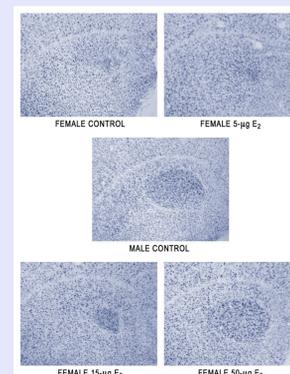http://mdcune.psych.ucla.edu/modules/birdsong/

- Students measure Area X, HVC and RA regions from digital images of zebra finch brains.
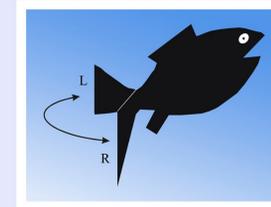
- Students analyze data with ANOVA and post-hoc tests.
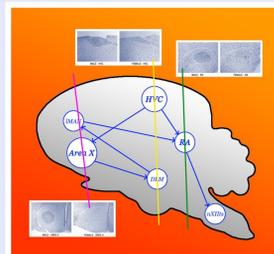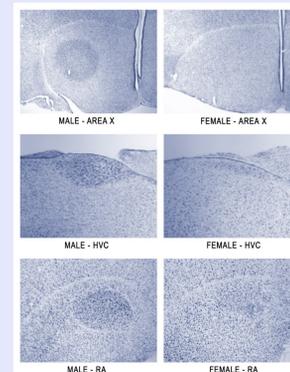
- Students determine the sensitivity of the female song system to E_2.

- Students determine if the extent of masculinization is proportional to the amount of E_2 treatment.

(3) SWIMMY

Students observe and learn about neurophysiological phenomena and mechanisms of motor pattern generation using the virtual neural circuits of a fish.

http://mdcune.psych.ucla.edu/modules/swimmy/

- Students are introduced to SwimmyGUI, a program that simulates the neural circuitry of a swimming fish.

- Students explore and manipulate simplified and pre-defined neuronal circuits.
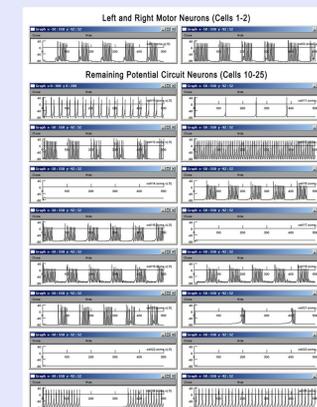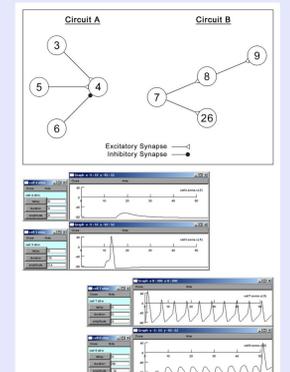
- Students determine which cells are involved in the swimming circuit of a virtual fish.

- Students determine the circuitry of all swimming cells.

- Students determine pattern generators and pattern mechanisms.
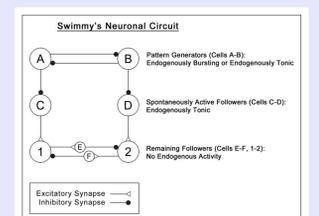
(4) RESOURCES

All materials for these modules are available for free at:
http://mdcune.psych.ucla.edu/

(5) ACKNOWLEDGEMENTS

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