

# LABORATORY IN GENETICS, V23.0031

**Points:** 4

**Instructor:** Hubbard

**Prerequisites:** Molecular and Cellular biology V23.0021, .0022, Genetics V23.0030, AND permission of instructor

(By E. Jane Hubbard at the New York University)

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**Description:** Course will cover genetic principles by means of a project-based laboratory. Students will characterize mutants genetically and phenotypically. In the first part of the course, classical genetic analyses will be performed in the context of a so-called modifier screen. We will address topics such as dominance, linkage, recombination, dosage effects and complementation. The second part of the course will use "functional genomics" approaches made possible by the availability of complete genome sequence.

**Aims of the course:** This course will introduce students to the awesome power of the genetics, using the well-characterized "model organism" *Caenorhabditis elegans*. The first part of the course will provide a hands-on experience of the "forward" or classic genetics. This approach begins with a mutant with a particular phenotype and asks "what genes have been perturbed to elicit the phenotype"? Students will select mutants with the desired phenotype. Next, they will begin a classical genetic analysis by mapping the gene identified by the mutant allele. Finally, they will perform additional analyses to further characterize their mutant.

The second part of course will consist of "functional genomics", made possible by the availability of the full sequence of the *C. elegans* genome and a technique known as RNAi. Students will identify a set of genes of interest (e.g., genes similar human disease genes, or related to a molecular pathway involved in a particular aspect of developmental or behavior, or a region of the genome of interest), deplete the activity of genes using the RNAi technique, and note the phenotypic consequences. These experiments are done in selected mutant backgrounds and are novel. This type of approach is currently in wide use in research laboratories and companies across the world.

**Grading:** Grades will be based on (1) four required written lab reports (70%), (2) a final exam (20%) and (3) laboratory conduct (10%). The reports must be written **individually** even though the lab work will be done as a team. Evidence of collaboration on writing of reports will result in no credit for all persons involved. The in-class final examination will consist of problems to test students' knowledge of the concepts they applied during the semester. Students will be required to participate in general laboratory maintenance procedures and ten percent of their grade will be based on their performance of these tasks.