

BIOL2040 3.0 “Genetics”

Lectures: Mondays and Wednesdays 2:30 pm – 4:00 pm; CLH A

Instructor: Dr. Kyle (Vladimir) Belozerov

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Office hours: Mon 1:30 pm – 2:30 pm, Wed 1:30 pm – 2:30 pm. Also by appointment.

Prerequisites: SC/BIOL 1000 3.00 + SC/BIOL 1001 3.00, or SC/BIOL 1010 6.00

Calendar description: A study of the organization and behaviour of genes and chromosomes; and their roles in cells, organisms, populations and evolution. Three lecture hours, one tutorial.

BIOL 2040 (Genetics) is a course designed to help you explore, understand, and apply the foundations of genetics. In this course, we'll be looking at genetics as a method of scientific discovery to solve problems in terms of health and disease, as well as modelling evolutionary processes. Some of the concepts we discuss will seem quite familiar, but if you don't really get them, you won't really understand any of the higher-level concepts. So, that being said, approach this course with an open mind. If we review something, and spend time on it, try to consider why it might be important to review the concept. In this course we'll be moving beyond the basic terminology, but having a firm grasp of that terminology is absolutely essential for success in building a conceptual understanding of genetics. Conceptual understanding of the foundation of genetics is necessary to understand genetic diseases (including non-hereditary ones), breakthroughs in modern medicine, and risks to species on Earth.

Textbook: Griffiths et al. (2012) Introduction to Genetic Analysis, 10th ed. WH Freeman & Company. A few copies of the textbook are available on short-term reserve in Steacie Library (2-hour reserve times). You can use a previous edition of the text, but it is not recommended. If you use a previous edition or another genetics text, but you are responsible for using the index/table of contents to determine relevant portions of your book. Again, there are copies of our current text on reserve in Steacie.

Student Solutions Manual: for Griffiths et al., 10th ed. WH Freeman & Company. The solutions manual will be on reserve in Steacie Library for 2-hour reserve times.

Turning Point clicker (with or without LCD screen). Most of you will have your clickers from BIOL 1000/1001 (if so, it should already be registered). Clickers can be purchased through Computing Services (<http://www.yorku.ca/prs/students/purchase.htm>) for \$42 (taxes included).

Course Website: The BIOL 2040 Moodle site will include all announcements, course materials, online quizzes, resources, discussion forums, and information regarding tutorials. <http://www.yorku.ca/moodle/>

Evaluation: *Midterm #1* (June 15, two-stage*, 90 min) **15%**

Midterm #2 (July 27, two-stage*, 90 min) **20%**

Reading assignment **5%**

Tutorials **20%**

10 pop quizzes (given on random dates throughout semester, 5-10 min each, 4-6 clicker questions) **10%**

Final (cumulative) **30%**

* Two-stage exams: individual part (60 min, 80%) + group part (20 min, 20%). Random groups of 4 students.

Learning objectives: upon successful completion of BIOL2040, you will be able to:

1. Relate concepts from BIOL 1000 and 1001 to those in BIOL 2040.
2. Communicate information, arguments, and analyses accurately and reliably in verbal and written form during class/tutorial activities, and on assignments, quizzes, and exams.
3. Work effectively with others in a tutorial, class, and exam setting.
4. Use genetic terminology in its correct scientific context.
5. Describe the molecular anatomy of genes and genomes.
6. Compare different types of mutations and describe how each can affect genes and the corresponding mRNAs and proteins.
7. Explain the molecular basis, at the protein level, for alleles with different genetic outcomes.
8. Describe the mechanisms by which an organism's genome is passed on to the next generation.
9. Describe the phenomenon of linkage and how it affects assortment of alleles during meiosis.
10. Describe the approaches and methods used to conduct genetic studies in model organisms.
11. Justify the value of studying genetics in organisms other than humans.
12. Analyse phenotypic data and deduce possible modes of expression/inheritance (e.g., incomplete dominance, autosomal, X-linked) from family histories (pedigrees).
13. Extract information about genes, alleles, and gene functions from genetic crosses and pedigree analysis.
14. Interpret results from molecular analyses to determine the inheritance patterns and identities of human genes that can mutate to cause diseases.
15. Apply the results of molecular genetic studies in model organisms to understand aspects of human genetics and genetic diseases.
16. Describe the processes that can affect the frequency of phenotypes (and genotypes) in a population over time.

Additional learning objectives will be provided for individual topics throughout the course.

Course policies:

1. Makeup exams will only be offered to those students who missed a test with a legitimate documented reason. Only a "York Attending Physician's Statement Form" or a similarly detailed doctor's note (i.e. not a form stating that you visited a clinic) will be accepted for medical excuses. Booking holiday airfare coinciding with exam dates will not be considered a legitimate excuse. **Please make sure that all documentation (hard copies!!!) supporting your legitimate excuse is received by me within 1 week of the missed test.**
2. There will be NO makeup midterms. If I accept your documented excuse, the weight of the missed midterm will be transferred onto the final.
3. Exams and other evaluations may include written questions. If you believe that an answer was marked incorrectly, please contact me within 1 week of getting your graded work back. Remarking is only possible if you wrote in ink. Please keep in mind that re-marking can result in your score being raised, confirmed, or lowered. Second round of re-marking will not be offered.
4. Standard accommodation policies as set by the university will be followed in the course.
5. All students in the course must be familiar with York University's policies on academic integrity. Please consult the following website for more detail: <http://www.yorku.ca/academicintegrity/students/index.htm>