

## **GENERAL GENETICS Syllabus 2021-22 – 0455-2526**

**Martin Kupiec, Tzachi Hagai**

**Textbook:** "Introduction to Genetic Analysis" by Griffith et al., Freeman and co., New-York. 11<sup>th</sup> edition textbooks are available in the library. All editions, starting from the 8<sup>th</sup>, are OK. Edition 8<sup>th</sup> can be downloaded legally and for free (but lacks some content from Edition 11<sup>th</sup>). Below: All "**Reading**" and "**Targilim**" given are from the 11<sup>th</sup> Edition.

**Grade:** There is a final exam, of 3 hs. The student can bring any written material (notes, books) and calculators, but not computers or phones.

### **Lesson 1: 10/10/21 Martin**

The Genetics Revolution; Single-Gene Inheritance. Independent Assortment of Genes. Dominance/recessiveness

**Reading: Ch. 1 + Ch. 2.**

**Tirgul 1: SECOND WEEK OF THE SEMESTER.** NOTE THAT THERE IS NO TIRGUL DURING THE FIRST WEEK. In every week following the first, we have a Tirgul on the **previous** lesson.

**In 11th edition: Ch. 2:** 32, 33, 35, 25, 41, 43-49, 58. **Ch3.28.**

### **Lesson 2: 17/10/21 Martin**

Family trees. Dominance/recessiveness. Sex determination. Gene interactions: haploinsufficiency, co-dominance, ABO blood types.

**Reading: Ch. 2:** Pages 87-104. **Ch. 6:** 215-241

**Tirgul 2**

**Ch.2:** 50-57, 59, 60, 61, 63, 65, 75, 76, 77, 78 **Ch.6:** 21,22, 23, 24, 25, 36, 40, 42-47, 64. **Ch. 3:** 30, 31.

### **Lesson 3: 24/10/21 Martin**

Mapping Eukaryote Chromosomes by Recombination

**Reading: Ch. 4:** Pages 127-142, 144-148, 154

**Tirgul 3:** Week of Nov 8

**Ch4:** 12-14, 17, 18, 20, 25, 29, 30, 56, 59, 63.

### **Lesson 4: 31/10/21 Tzachi**

What is a gene? Genotype-to-Phenotype. How does the genotype determine phenotype? Biochemical pathways (Tatum and Beadle, one gene-one enzyme), co-linearity DNA-protein.

**Reading: Ch.6:** 223-238, **Ch.20:** 766-771

**Tirgul 4:** Week of Nov 15

**Ch.6:** 30, 31, 32, 35, 37, 38, 47, 60

**Lesson 5: 7/11/21 Martin**

Benzer and the T4 phage: Gene fine structure, complementation, genetic mapping. Cracking the genetic code (genetic experiments).

**Reading: Ch. 7:** 259-272. **Ch. 9:** 324-335.

**Tirgul 5:** Week of Nov. 22.

**Ch.5:** 34 (w/o c); **Ch. 6:** 77

**Ch. 9:** 12, 18, 20, 21, 39, 40, 42, 44, 45

**Lesson 6: 14/11/21 Martin**

Gene regulation in Prokaryotes. How do mutants lead to models? The Operon and its implications. Positive and negative regulation.

**Reading: Ch. 11:** 397-407

**Tirgul 6:** Week of Nov.29.

**Ch. 11:** 1-22.

**Lesson 7: 21/11/21 Tzachi**

Eukaryotic gene expression; transcription regulation; regulatory elements; regulation in *cis* and in *trans*; Reverse Genetics and Library screens; CpG Islands; TATA-box

**Reading:** Yeast model: 796-797; **Ch. 8:** 301-309; **Ch. 12:** 431-459, **Ch. 14:** 536-538.

**Tirgul 7:** Week of Dec.6.

**Ch 12:** 11, 12, 15, 17, 24, 36,

**Ch 8:** 17, 18, 22, 23, 28, 33

Note, some of topics in Chapter 12 will be discussed in more detail in lesson 10.

**Lesson 8: 28/11/21 Martin**

Evolution, mutations and DNA repair. The origin of mutations, mechanisms of accurate and inaccurate DNA repair. Mutation and the environment.

**Reading: Ch. 16:** 583-608

**Tirgul 8:** Week of Dec 20.

**Ch.16:** 33, 34, 35

**Dec. 5: HANNUKA, no class or tirgulim.**

**Lesson 9:** 12/12/21 **Tzachi**

SNPs, Computational & Population Genetics

**Reading: Ch 18:** 665-687; 691-698

**Tirgul 9.**

**Lesson 10:** 19/12/21 **Tzachi**

The Inheritance of Complex Traits, Genetics versus environment: the immune response to pathogens as an example. Digital karyotypes, histone modifications and epigenetics. Transcription factors and their roles in gene expression regulation

**Reading:**

**Ch19:** 715-727; 742-755.

**Ch. 1:** 14-17; **Ch. 17:** 649-652; **Ch. 16:** 609-612

**Tirgul 10**

**Lesson 11:** 26/12/21 **Tzachi**

Gene and genome evolution, transposable elements

**Reading:**

**Ch15, Ch 20**

**Ch. 1:** 14-17; **Ch. 17:** 649-652; **Ch. 16:** 609-612

**Tirgul 11**

**Lesson 12:** 2/1/22 **Tzachi**

The Genomics Revolution: the human genome project and functional genomics; Cancer genomics; Neanderthal genomes and human evolution; Ethical issues

**Reading: Ch1:** 14-17, 23-37; **Ch10** pp 387-391; **Ch12:** 460-463; **Ch14:** 527-539

There is NO TIRGUL scheduled for lesson 12