

BB1190 VT17 P4: Genteknik/ Gene Technology

Instructor

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Course Schedule

| Meet No. | Date | Time | Room | Title | Key Concepts | Required prep reading (before lecture) |
|----------|--------|-------|------|---|---|---|
| 1 | T 21/3 | 10-12 | FD5 | L01: Genome features and organization | -What is a gene? -Chromosomes and complexity | -Ch. 2 C&P DNA, RNA, Protein (p 33-58) -Ch. 8 C&P: Genome (231-250) -Optional: Gregory 2014: Junk DNA |
| 2 | W 22/3 | 13-15 | FD5 | L02: PCR and DNA sequencing | -PCR theory and application -DNA sequencing | -Ch. 4 C&P DNA Synthesis (p. 100, 105-120) -Opt: Ch 9&10 Brown: PCR, DNA Seq |
| 3 | F 24/3 | 13-15 | FD5 | L03: DNA synthesis and cloning | -Gene synthesis -Cloning methods | -Ch. 1 Brown, Basic Principles of cloning (all) -Ch. 4 Brown (all) |
| 4 | M 27/3 | 13-15 | FD5 | | | -Ch. 3 C&P Recombinant DNA (p.70-72,76-83) -Opt: Gibson 2009/2010 "Gibson assembly method" |
| 5 | T 28/3 | 10-12 | FD5 | Homework 1: Genome assembly | | Turn in homework at beginning of class |
| 6 | W 29/3 | 13-15 | FD5 | L04: Molecular Diagnostics <i>Guest lecturer:</i> <i>Peter Savolainen KTH</i> | -SNP analysis -Forensic analysis | -Ch. 8 C&P: Genome (231-250) -Figure 8.16, 8.17 |
| 7 | F 31/3 | 13-15 | FD5 | L05: Genetic engineering of E.coli | -Plasmids -Homologous recombination -Laboratory strains | -Opt: Ch. 13 Brown: Proteins from cloned genes (p 225-237) |
| 8 | T 4/4 | 10-12 | FD5 | L06: Synthetic biology | -Simple gene regulation -Genetic "logic" | Alon 2007: Network motifs (p 450-455) -Opt: Collins 2014, Synbio history |

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| 9 | W 5/4 | 13-15 | FD5 | Homework 2: Synthetic Biology | | -Opt: Elowitz 1999 Turn in homework at beginning of class |
| 10 | F 7/4 | 15-17 | FD5 | L07: Gene regulation in a cell factory | -Transcription and translation control -Metabolic modeling | -Ch. 13 C&P Pathway Eng. (p 371-385) -BioNumbers excerpt on mutation -Opt: Pflieger TIGR paper |
| 11 | W 26/4 | 15-17 | FD5 | Homework 3: Gene regulation, cell factory | | -Opt: Paper on codon bias -Opt: Paper on adaptive evolution Turn in homework at beginning of class |
| 12 | H 27/4 | 13-15 | FD5 | L08: Antibody engineering | Antibody diversity in the genome -Natural antibody libraries | -Ch 6 C&P: Antibodies (p 173-191) -Opt: Ch 10 Glick, Antibodies (p 399-422) |
| 13 | W 3/5 | 15-17 | FD5 | L09: Vaccine creation | -Case study: Influenza vaccines -Case study: HIV vaccines | -Ch 6 C&P: Vaccines (p 191-201) -Opt: Ch 12 Glick, Vaccines (p. 460-472) |
| 14 | H 4/5 | 13-15 | FD5 | <i>Cancelled</i> | | |
| 15 | W 10/5 | 15-17 | FD5 | Homework 4: Antibody development | | |
| 16 | H 11/5 | 15-17 | FD5 | L10: Gene therapy | -Case: Glybera -Case: Zinc-finger nucleases | -Ch 17 C&P: Gene Therapy (all) -Ch 5 C&P: Ribozymes (p 152-168) -Opt: Perez 2008 Gene editing of HIV -Opt: Carrol 2014 Review gene editing tools |
| 17 | H 18/5 | 13-15 | FD5 | Homework 5: Gene therapy | | |
| 18 | F 19/5 | 8-12 | FD5 | <i>Review, practice exam</i> | | |
| | T 30/5 | 14-19 | FB52 | <i>EXAM</i> | | |

Laboratory

You will be provided with a laboratory manual that includes all relevant deadlines.

Helpful texts for understanding the lab are from Brown: *Ch 3 "Purification of DNA from cells,"* and *Ch 5 "Introduction of DNA into cells."*
(Uploaded)

Course reading materials

Lecture notes and reading will be uploaded. Optional are not required but give more detail in an area.

-C&P: Clark and Pazdernik **Biotechnology** (2nd ed, both 2009 and 2012 versions OK).

-Brown TA: **Gene cloning and DNA analysis** (6th ed 2010)

-Glick, Pasternak, and Patten: **Molecular Biotechnology** (4th ed 2010)

Grading

Homeworks must be handed in at the beginning of the class period. I will then scan them and hand back to you before we go over the answers.

Homeworks will be graded on a scale of P/F. You will get +1 point on the exam for each homework you complete. You must complete 3/5 homeworks to take the exam.

Homework problems are very indicative of exam problems.

Exam will be based on what we cover in class, homeworks, and the assigned reading (no specific questions from *Optional readings*).

Grading rubric: <50 F, 50-60 E, 60-70 D, 70-80 C, 80-90 B, 90-100 A