Molecular Biology: A Compendium of Video Lectures

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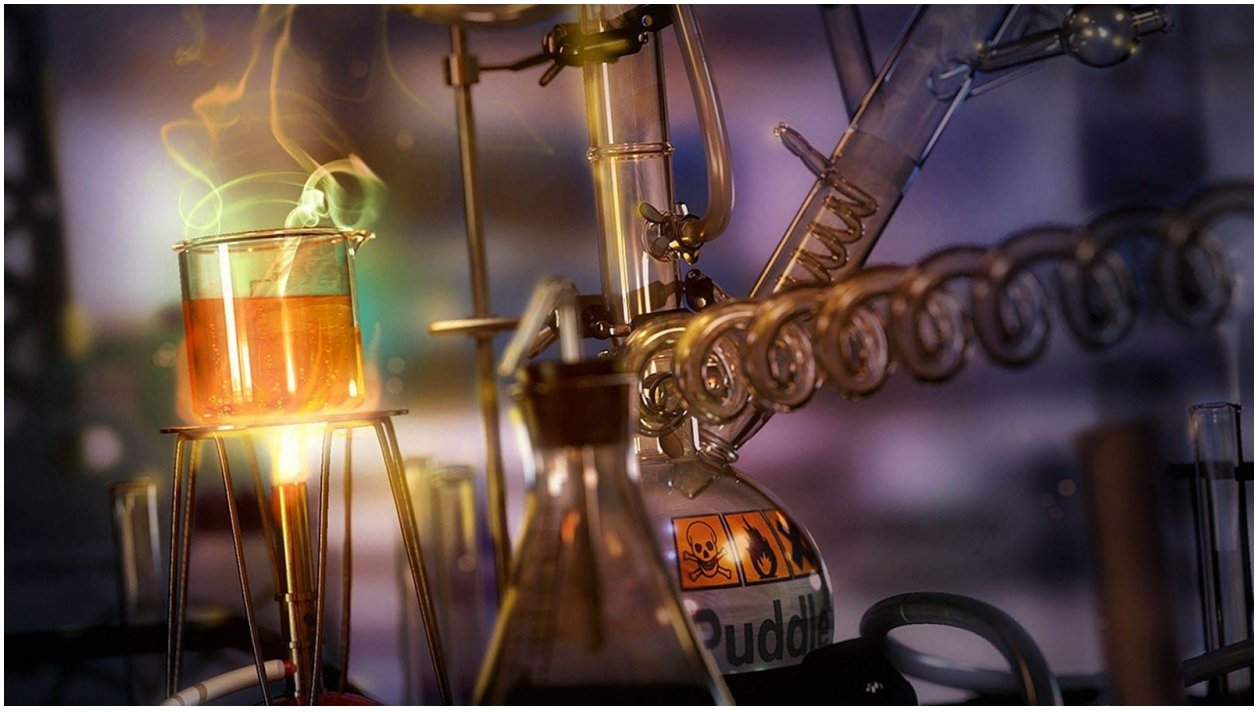

PREFACE

This is the second volume of this novel series of books that present lectures by eminent scientists arranged in the form of a text book but comprising video links. The use of such a video-book can have many advantages. Firstly the single biggest problem in providing quality education across the world is the non-availability of high quality faculty. The video-book addresses this problem by providing access to lectures by eminent scientists. Secondly if both the students and teachers study the lectures in advance, then the time in the class room can be devoted to clarifying concepts through interactive sessions between the teachers and students. Thirdly since these materials are being offered free, they can be more useful to students in developing countries where funds may be limited.

We hope that the material contained in this book, which is free, will be widely used. We acknowledge with thanks the contributions of the scientists who have contributed these lectures.

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Chapter 1: Fundamentals Biology

1.1. Alternative Approaches to Molecular Biology

https://www.youtube.com/watch?v=TnpCMgtDPgk&list=PLF83B8D8C87426E44

1.2. Macromolecules: Lipids, Carbohydrates, Nucleic Acid, Excerpt

https://www.youtube.com/watch?v=1eGsdK1fPLM&list=PLF83B8D8C87426E44&index=2

https://www.youtube.com/watch?v=ojrjUVh9N4&index=13&list=PLF83B8D8C87426E44

1.3. Constructing and Screening a Recombinant DNA Library

https://www.youtube.com/watch?v=BIIWlZqWxKg&list=PLF83B8D8C87426E44&index=3

1.4. DNA Libraries and Expression Libraries

https://www.youtube.com/watch?v=zQfcPQpKZUk&list=PLF83B8D8C87426E44&index=6

1.5. Glycolysis, Respiration, and Fermentation

https://www.youtube.com/watch?v=0ZxeQqtAVl0&list=PLF83B8D8C87426E44&index=7

1.6. Proteins, levels of Structure, Non-covalent Forces, excerpt

https://www.youtube.com/watch?v=dt4sSAb-7cE&index=8&list=PLF83B8D8C87426E44

1.7. Photosynthesis

https://www.youtube.com/watch?v=SxaoWJ2gkzc&list=PLF83B8D8C87426E44&index=9

1.8. Overview of Recombinant DNA

https://www.youtube.com/watch?v=htYyCEdc8B4&index=10&list=PLF83B8D8C87426E44

1.9. Covalent Bonds, Hydrogen Bonds

https://www.youtube.com/watch?v=pJDHi91yAaE&list=PLF83B8D8C87426E44&index=11

1.10. Biochemical Reactions, Enzymes, and ATP

https://www.youtube.com/watch?v=OBloWTHFPZc&list=PLF83B8D8C87426E44&index=12

1.11. Transcription and Translation

https://www.youtube.com/watch?v=tMr9XH64rtM&index=14&list=PLF83B8D8C87426E44

https://www.youtube.com/watch?v=uBRdfsz_YB4&list=PLF83B8D8C87426E44&index=15

https://www.youtube.com/watch?v=x_vlxGFrZLY&list=PLF83B8D8C87426E44&index=33

1.12. Types of Organisms, Cell Composition

https://www.youtube.com/watch?v=zLGHH9Rwvlw&list=PLF83B8D8C87426E44&index=16

1.13. Proteins, Levels of Structure, Non-Covalent Forces

https://www.youtube.com/watch?v=3edzxv_mYZk&list=PLF83B8D8C87426E44&index=17

1.14. DNA Replication

https://www.youtube.com/watch?v=DRBREvFL19g&index=18&list=PLF83B8D8C87426E44

1.15. Basic Mechanisms of Cloning

https://www.youtube.com/watch?v=CdAgzk5tQhs&index=19&list=PLF83B8D8C87426E44

https://www.youtube.com/watch?v=reYwbnuhFU0&list=PLF83B8D8C87426E44&index=25

https://www.youtube.com/watch?v=sAD1Xr3rmI&list=PLF83B8D8C87426E44&index=28

1.16. Overview of Recombinant DNA
https://www.youtube.com/watch?v=uDXH6Uu0ghc&index=20&list=PLF83B8D8C87426E44

1.17. DNA Structure and Classic experiments
https://www.youtube.com/watch?v=PRy4rRdDbk&index=21&list=PLF83B8D8C87426E44

https://www.youtube.com/watch?v=YCeKtM6Hnmc&list=PLF83B8D8C87426E44&index=23

1.18. Types of Organisms, Cell Composition
https://www.youtube.com/watch?v=PzY0MWEEE6U&list=PLF83B8D8C87426E44&index=22

1.19. Linkage and Recombination, Genetic maps
https://www.youtube.com/watch?v=o_1dTvszV4Y&list=PLF83B8D8C87426E44&index=24

1.20. Mendel's Laws
https://www.youtube.com/watch?v=9dHBTckFvME&list=PLF83B8D8C87426E44&index=26
https://www.youtube.com/watch?v=CT9lYy6qSfg&index=27&list=PLF83B8D8C87426E44

1.21. Transformation and Protein Expression
https://www.youtube.com/watch?v=K5n0BMKZR_Q&list=PLF83B8D8C87426E44&index=29

1.22. Covalent Bonds
https://www.youtube.com/watch?v=nCBTC3xsLM&list=PLF83B8D8C87426E44&index=30

1.23. Pedigrees
https://www.youtube.com/watch?v=qY0ixUWJx0g&list=PLF83B8D8C87426E44&index=31

1.24. Complementation

https://www.youtube.com/watch?v=uERjKWXO4NQ&index=32&list=PLF83B8D8C87426E44

https://www.youtube.com/watch?v=LvLbaVW84nE&list=PLF83B8D8C87426E44&index=35

1.25. Lac Operon

https://www.youtube.com/watch?v=2TL8rY9Rc_A&list=PLF83B8D8C87426E44&index=34

1.26. Lipids, Carbohydrates, and Nucleic Acids Practice Problem

https://www.youtube.com/watch?v=MqNq9S1_Ct8&list=PLF83B8D8C87426E44&index=36

1.27. Polymerase Chain Reaction (PCR)

https://www.youtube.com/watch?v=OK7_ReXhVaQ&index=37&list=PLF83B8D8C87426E44

1.28. Explanation of 5' and 3', C terminus, and N terminus

https://www.youtube.com/watch?v=Rn9zldxtZko&index=38&list=PLF83B8D8C87426E44

1.29. Genomic and cDNA Libraries

https://www.youtube.com/watch?v=SvjeCxVu2dI&index=39&list=PLF83B8D8C87426E44

2.

Chapter2: General Biology

General Biology Lecture - General introduction to cell structure and function, molecular and organism genetics, animal development, form and function.

2.1. Biology

i. https://www.youtube.com/watch?v=v8DfRYUG4MM&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=1
ii. https://www.youtube.com/watch?v=YZbC6niiqgU&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=2
iii. https://www.youtube.com/watch?v=V9ef3XWaWWU&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=3
iv. https://www.youtube.com/watch?v=9QNkX2XGYbU&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=4
v. https://www.youtube.com/watch?v=kTRwOCc6878&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=5
vi. https://www.youtube.com/watch?v=kTRwOCc6878&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=5
vii. https://www.youtube.com/watch?v=vhWcw6FzeDg&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=6
viii. https://www.youtube.com/watch?v=SNFKbV6e3Nc&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=7
ix. https://www.youtube.com/watch?v=nNvOmSosIJk&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=8
x. https://www.youtube.com/watch?v=oEJsbNgILjA&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=9
xi. https://www.youtube.com/watch?v=wfl1m_RuEqQ&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=10
xii. https://www.youtube.com/watch?v=YYM9Q5SMQwA&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=11
xiii. https://www.youtube.com/watch?v=l8aXMWgYpto&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=12
xiv. https://www.youtube.com/watch?v=ut1OzxuhxL4&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=13
xv. https://www.youtube.com/watch?v=NUcMBhiou7M&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=14
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xvii. https://www.youtube.com/watch?v=qDf4VeUYUbA&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=15
xviii. https://www.youtube.com/watch?v=xma_6Xvtpbo&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=16
xix. https://www.youtube.com/watch?v=R8MwmhJE6_A&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=17
xx. https://www.youtube.com/watch?v=PK6aokc5K0s&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=18
xxi. https://www.youtube.com/watch?v=oWGbddDR3wU&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=19

xxii. https://www.youtube.com/watch?v=J-MpVHJenvg&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=20
xxiii. https://www.youtube.com/watch?v=XYqxiJIDqPs&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=21
xxiv. https://www.youtube.com/watch?v=vmbTL4CiJY8&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=22
xxv. https://www.youtube.com/watch?v=Z8q7lTG--8c&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=23
xxvi. https://www.youtube.com/watch?v=LdwBVDHjqig&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=24
xxvii. https://www.youtube.com/watch?v=o8Pk0bRZ2FQ&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=25
xxviii. https://www.youtube.com/watch?v=wXIVblCvysU&index=26&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L
xxix. https://www.youtube.com/watch?v=4hKWcmerUEY&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=27
xxx. https://www.youtube.com/watch?v=Vn1ej6PKIrk&index=28&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L
xxxi. https://www.youtube.com/watch?v=JCA-MUc14Hk&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=29
xxxii. https://www.youtube.com/watch?v=_hNeZx1mUss&index=30&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L
xxxiii. https://www.youtube.com/watch?v=Pjbjgg_Wcl4&index=31&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L
xxxiv. https://www.youtube.com/watch?v=di0ws4B1hq0&index=32&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L
xxxv. https://www.youtube.com/watch?v=fr4KWmkUviE&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L&index=33
xxxvi. https://www.youtube.com/watch?v=27lKNyauc6k&index=34&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L
xxxvii. https://www.youtube.com/watch?v=w1pYsoHBKNI&index=35&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L
xxxviii. https://www.youtube.com/watch?v=oAqV3KE4PJc&index=36&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L
xxxix. https://www.youtube.com/watch?v=FdZ-8xtl-sA&index=37&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L
xl. https://www.youtube.com/watch?v=ldUccvQl6yc&index=38&list=PL-XXv-cvA_iDuZ4BUn54ujg2kZttNk27L

3.

Chapter 3: DNA to Organisms

3.1. Introduction
http://ocw.uci.edu/lectures/bio_sci_93_dna_to_organisms_lec_1_introduction.html

3.2. Single Cell Dynamics, Membrane
Structurehttp://ocw.uci.edu/lectures/bio_sci_93_dna_to_organisms_lec_2_single_cell_dynamics_membrane_structure.html

3.3. Membrane Function, Passive & Active
Transporthttp://ocw.uci.edu/lectures/bio_sci_93_dna_to_organisms_lec_3_membrane_function_passive__active_transport.html

3.4. Cytoskeleton-motor Protiens
http://ocw.uci.edu/lectures/bio_sci_93_dna_to_organisms_lec_4_cytoskeletonmotor_protiens_ecm.html

3.5. Nucleus, Ribosomes and the Endomembrane System

http://ocw.uci.edu/lectures/bio_sci_93_dna_to_organisms_lec_5_nucleus_ribosomes_and_the_endomembrane_system.html

3.6. Cytoskeleton: Eukaryotic Cells

http://ocw.uci.edu/lectures/bio_sci_93_dna_to_organisms_lec_6_cytoskeleton_eukaryotic_cells.html

3.7. Atoms, Molecules, and Water

http://ocw.uci.edu/lectures/bio_sci_93_dna_to_organisms_lec_7_atoms_molecules_and_water.html

3.8. Carbon, Carbohydrates, and Lipids

http://ocw.uci.edu/lectures/bio_sci_93_dna_to_organisms_lec_8_carbon_carbohydrates_and_lipids.html

3.9. Proteins and Nucleic Acids

http://ocw.uci.edu/lectures/bio_sci_93_dna_to_organisms_lec_9_proteins_and_nucleic_acids.html

3.10. ATP, Enzymes

http://ocw.uci.edu/lectures/bio_sci_93_dna_to_organisms_lec_10_atp_enzymes.html

3.11. Cellular Respiration

http://ocw.uci.edu/lectures/bio_sci_93_dna_to_organisms_lec_11_cellular_respiration.html

3.12. Photosynthesis

http://ocw.uci.edu/lectures/bio_sci_93_dna_to_organisms_lec_12_photosynthesis.html

3.13. Cell Cycle, Mitosis

http://ocw.uci.edu/lectures/bio_sci_93_dna_to_organisms_lec15_cell_cycle_mitosis.html

3.14. Meiosis

http://ocw.uci.edu/lectures/bio_sci_93_dna_to_organisms_lec16_meiosis.html

3.15. DNA Replication

http://ocw.uci.edu/lectures/bio_sci_93_dna_to_organisms_lec17_dna_replication.html

3.16. Gene Expression: Transcription

http://ocw.uci.edu/lectures/bio_sci_93_dna_to_organisms_lec_18_gene_expression_transcription.html

3.17. Gene Expression: Translation

http://ocw.uci.edu/lectures/bio_sci_93_dna_to_organisms_lec19_gene_expression_translation.html

3.18. Recombinant DNA and Cloning

http://ocw.uci.edu/lectures/bio_sci_93_dna_to_organisms_lec20_recombinant_dna_and_cloning.html

3.19. Simple Mendelian

http://ocw.uci.edu/lectures/bio_sci_93_dna_to_organisms_lec21_simple_mendelian.html

3.20. Exceptions to Mendel + Pedigrees

http://ocw.uci.edu/lectures/bio_sci_93_dna_to_organisms_lec22_exceptions_to_mendel__pedigrees.html

3.21. Sex Chromosomes and Inheritance

http://ocw.uci.edu/lectures/bio_sci_93_dna_to_organisms_lec_23_sex_chromosomes_and_inheritance.html

3.22. Genetic Basis of Development

http://ocw.uci.edu/lectures/bio_sci_93_dna_to_organisms_lec_24_genetic_basis_of_development.html

3.23. Fertilization and Formation of the Blastula

http://ocw.uci.edu/lectures/bio_sci_93_dna_to_organisms_lec_25_fertilization_and_formation_of_the_blastula.html

3.24. Gastrulation and Organogenesis

http://ocw.uci.edu/lectures/bio_sci_93_dna_to_organisms_lec_26_gastrulation_and_organogenesis.html

3.25. Neuronal Physiology and Membrane Potential

http://ocw.uci.edu/lectures/bio_sci_93_dna_to_organisms_lec_27_neuronal_physiology_and_membrane_potential.html

3.26. Transmitting an Action Potential

http://ocw.uci.edu/courses/biosci_93_dna_to_organisms.html

4.

Chapter 4: Molecular Biology

4.1. Nucleic Acid

https://www.youtube.com/watch?v=17gF4gpguHM&list=PLVrU6c2sRfu4vZckiIZUckWiozSWegtIK
https://www.youtube.com/watch?v=NNASRkIU5Fw&index=3&list=PLVrU6c2sRfu4vZckiIZUckWiozSWegtIK

4.2. Gene Regulation

https://www.youtube.com/watch?v=3S3ZOmleAj0&index=2&list=PLVrU6c2sRfu4vZckiIZUckWiozSWegtIK

4.3. Molecular Biology

https://www.youtube.com/watch?v=yYIZgS-L5Sc&list=PLVrU6c2sRfu4vZckiIZUckWiozSWegtIK&index=4

4.4. Basic Molecular Biology

https://www.youtube.com/watch?v=Itn5JhMijSI&index=5&list=PLVrU6c2sRfu4vZckiIZUckWiozSWegtIK

4.5. DNA Replication- Leading vs Lagging Strand
https://www.youtube.com/watch?v=H_l0rnvPcTA&list=PLVrU6c2sRfu4vZckiIZUckWiozSWegtIK&index=6

4.6. Human Genetic Disorders
https://www.youtube.com/watch?v=seWhCxOFVSU&list=PLVrU6c2sRfu4vZckiIZUckWiozSWegtIK&index=7

4.7. Molecular Biology and Cancer Introduction

https://www.youtube.com/watch?v=80MC3Erd76U&index=8&list=PLVrU6c2sRfu4vZckiIZUckWiozSWegtIK

4.8. Molecular Biology Techniques
https://www.youtube.com/watch?v=VbIbpPcKoC4&index=11&list=PLVrU6c2sRfu4vZckiIZUckWiozSWegtIK

4.9. Microbial Genetics and evolution-ch
https://www.youtube.com/watch?v=hEYZtI6_eZ0&list=PLVrU6c2sRfu4vZckiIZUckWiozSWegtIK&index=27

4.10. I, PCR. Microbial Genetics and Evo
https://www.youtube.com/watch?v=Bn_avOK7XK4&index=28&list=PLVrU6c2sRfu4vZckiIZUckWiozSWegtIK

4.11. DNA Replication and the PCR.
https://www.youtube.com/watch?v=smJ4BdzejKw&index=29&list=PLVrU6c2sRfu4vZckiIZUckWiozSWegtIK

4.12. Linkage and Recombination, Genetic maps
https://www.youtube.com/watch?v=o_1dTvszV4Y

4.13. Basic Transmission Genetics
http://oyc.yale.edu/ecology-and-evolutionary-biology/eeb-122/lecture-2#ch0

5.

Chapter 5: Plant and Microbial Biology

Plant Molecular Genetics - A consideration of plant genetics and molecular biology. Principles of nuclear and organellar genome structure and function: regulation of gene expression in response to environmental and developmental stimuli; clonal analysis; investigation of the molecular and genetic bases for the exceptional cellular and developmental strategies adopted by plants.

5.1. Genetic II, The Mechanism of Mendelian Heredity
https://www.youtube.com/watch?v=isFKJeHoWX8&index=1&list=PL2B7E0C3DBF1D43ED

5.2. Eukaryote Genome
https://www.youtube.com/watch?v=nKkEeCueXL8&index=2&list=PL2B7E0C3DBF1D43ED

5.3. DNA Transposons , Evolution Genome and Repeated DNA
https://www.youtube.com/watch?v=lcGb40vJHok&list=PL2B7E0C3DBF1D43ED&index=3

5.4. The Promoters, DNA binding Domains, and activation domain evolve over time
https://www.youtube.com/watch?v=OgApX669J0I&list=PL2B7E0C3DBF1D43ED&index=4

5.5. T –DNA Transfer
https://www.youtube.com/watch?v=5TkzaZB3XwI&index=5&list=PL2B7E0C3DBF1D43ED

5.6. Mutagenesis and Transposons
https://www.youtube.com/watch?v=kAkaDleazPc&index=6&list=PL2B7E0C3DBF1D43ED

5.7. Mutagenesis and Gene Cloning
https://www.youtube.com/watch?v=pDqNnmxe2EI&index=7&list=PL2B7E0C3DBF1D43ED

5.8. Shoot Meristem Structure and Function
https://www.youtube.com/watch?v=z9tLjfM9w4&list=PL2B7E0C3DBF1D43ED&index=8

5.9. Cell-Cell Communication in Meristem
https://www.youtube.com/watch?v=wO8kHYs64X8&index=9&list=PL2B7E0C3DBF1D43ED

5.10. Hormone Regulation of Meristem

https://www.youtube.com/watch?v=dyL6xPpxhck&list=PL2B7E0C3DBF1D43ED&index=10

5.11. Genetics
https://www.youtube.com/watch?v=0yvsgng6Bb4&list=PL2B7E0C3DBF1D43ED&index=11

5.12. Crop Domestication
https://www.youtube.com/watch?v=EDNBYxNUfZk&list=PL2B7E0C3DBF1D43ED&index=12

5.13. Identification for Mutant that are Hypersensitive to ethylene
https://www.youtube.com/watch?v=taMQ9steePo&index=13&list=PL2B7E0C3DBF1D43ED

5.14. Plant DNA Sequence
https://www.youtube.com/watch?v=9xaF0bBwstg&index=14&list=PL2B7E0C3DBF1D43ED

5.15. Plant and Microbial Biology
https://www.youtube.com/watch?v=DsDUNvUXaJE&list=PL2B7E0C3DBF1D43ED&index=17

5.16. T-DNA Mutagenised Plants
https://www.youtube.com/watch?v=TPNgbG_qpqA&list=PL2B7E0C3DBF1D43ED&index=18

5.17. Leaf Arrangement
https://www.youtube.com/watch?v=w0T9LRHVwU&list=PL2B7E0C3DBF1D43ED&index=19

5.18. Leaf Polarity
https://www.youtube.com/watch?v=JPJ_EiewG14&list=PL2B7E0C3DBF1D43ED&index=20

5.19. Root Structure and Function
https://www.youtube.com/watch?v=H7g6WMp8QbE&index=21&list=PL2B7E0C3DBF1D43ED

5.20. How do Plant Perceive light?
https://www.youtube.com/watch?v=PkdyLkkcRJs&list=PL2B7E0C3DBF1D43ED&index=22

5.21. Circadian rhythms and Clocks
https://www.youtube.com/watch?v=11GUosnmOAE&index=24&list=PL2B7E0C3DBF1D43ED

5.22. Flower Organ Identity
https://www.youtube.com/watch?v=Im2WwL7EF4U&list=PL2B7E0C3DBF1D43ED&index=27

5.23. Floral Variation

https://www.youtube.com/watch?v=7iWeMdxwtnk&list=PL2B7E0C3DBF1D43ED&index=28

5.24. Floral Symmetry
https://www.youtube.com/watch?v=G929W8DC6NI&list=PL2B7E0C3DBF1D43ED&index=29

5.25. Genetic Analysis
https://www.youtube.com/watch?v=dDVYnuPwQBI&index=30&list=PL2B7E0C3DBF1D43ED

5.26. Genetics and Epigenetic
https://www.youtube.com/watch?v=vRfHVJvdCdY&list=PL2B7E0C3DBF1D43ED&index=31

5.27. Movie about Histones, nucleosomes. HAT and HDAC
https://www.youtube.com/watch?v=VqCNQR6HszI&index=32&list=PL2B7E0C3DBF1D43ED

5.28. Plant and Medical Biology
https://www.youtube.com/watch?v=HnzeZfkTIpo&list=PL2B7E0C3DBF1D43ED&index=33
https://www.youtube.com/watch?v=ZE003jyIzq0&index=34&list=PL2B7E0C3DBF1D43ED
https://www.youtube.com/watch?v=rjm_1iDdL6c&list=PL2B7E0C3DBF1D43ED&index=35
https://www.youtube.com/watch?v=HmwAjtvwswM&list=PL2B7E0C3DBF1D43ED&index=37

5.29. Plant Defense
https://www.youtube.com/watch?v=9mUQet0fVLs&index=36&list=PL2B7E0C3DBF1D43ED

6.

Chapter 6: Molecular and Cell Biology

6.1. Diversity of life
https://www.youtube.com/watch?v=d1MO8wI9N4I&index=1&list=PL59C08AE05E752758

6.2. Prokaryotic Genome

https://www.youtube.com/watch?v=8eKrtuSj718&list=PL59C08AE05E752758&index=2
https://www.youtube.com/watch?v=DtO1rMuqgPU&index=3&list=PL59C08AE05E752758

6.3. Metagenomic and Microbial Diversity
https://www.youtube.com/watch?v=TLKa7azo85M&list=PL59C08AE05E752758&index=4

6.4. Metatranscriptomics
https://www.youtube.com/watch?v=L6SRN_h46LA&list=PL59C08AE05E752758&index=5

6.5. DNA replication nucleoid Partitioning and Cell Division must be Coordinated
https://www.youtube.com/watch?v=EnqRDVhty0k&index=6&list=PL59C08AE05E752758
https://www.youtube.com/watch?v=nwz0gOu3jkI&index=7&list=PL59C08AE05E752758

6.6. Conjugation
https://www.youtube.com/watch?v=H9VPJifLbi4&index=8&list=PL59C08AE05E752758

6.7. Polarity Recap
https://www.youtube.com/watch?v=LhkTJu47f54&list=PL59C08AE05E752758&index=9

6.8. Life Cycle of Lytic Phage; T4
https://www.youtube.com/watch?v=Gyr0QqegAYs&list=PL59C08AE05E752758&index=10

6.9. Lambda Phage
https://www.youtube.com/watch?v=OF5RjCDykF0&index=11&list=PL59C08AE05E752758

6.10. Lytic Cycle
https://www.youtube.com/watch?v=u67TKtrlHAU&index=12&list=PL59C08AE05E752758

6.11. Genome defense
https://www.youtube.com/watch?v=iDt7L3dbrZM&index=13&list=PL59C08AE05E752758

6.12. Transposons and Transposition
https://www.youtube.com/watch?v=EEFQmw0T94U&index=14&list=PL59C08AE05E752758

6.13. Transposon Mutagenesis
https://www.youtube.com/watch?v=VuVJWUnM1l4&index=15&list=PL59C08AE05E752758

6.14. **Gene Regulation by a Repressor**
https://www.youtube.com/watch?v=4DlNfsNA1JU&list=PL59C08AE05E752758&index=16

6.15. **Regulation by Cis- acting RNA Structure and Riboswtiches**
https://www.youtube.com/watch?v=HjyT04zFScY&list=PL59C08AE05E752758&index=17

6.16. **MicF locus**
https://www.youtube.com/watch?v=k2KgmnCl_Ws&list=PL59C08AE05E752758&index=18

7.

Chapter 7: Biological Engineering: Instrumentation and Measurement

7.1. **Introduction to the lab AFM**
http://ocw.mit.edu/courses/biological-engineering/20-309-biological-engineering-ii-instrumentation-and-measurement-fall-2006/tools/tutorial-1/

7.2. **Hands-on 1: AFM force spectroscop**
http://ocw.mit.edu/courses/biological-engineering/20-309-biological-engineering-ii-instrumentation-and-measurement-fall-2006/tools/hands-on-1/

7.3. **More about force Spectroscopy**
http://ocw.mit.edu/courses/biological-engineering/20-309-biological-engineering-ii-instrumentation-and-measurement-fall-2006/tools/tutorial-2/

7.4. **AFM Force Spectroscopy**
http://ocw.mit.edu/courses/biological-engineering/20-309-biological-engineering-ii-instrumentation-and-measurement-fall-2006/tools/hands-on-2/

7.5. **AFM Noise Measurement**
http://ocw.mit.edu/courses/biological-engineering/20-309-biological-engineering-ii-instrumentation-and-measurement-fall-2006/tools/tutorial-3/

8.

Chapter 8: Foundation of Computational and System Biology

8.1. Introduction of Computational and Systems Biology
http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-1-course-introduction-history-of-computational-biology-overview-of-the-course-course-policies-and-mechanics-dna-sequencing-technologies/

8.2. Lecture 2: Local Alignment (BLAST) and Statistics
http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-2-local-alignment-blast-and-statistics/

8.3. Global Alignment of Protein Sequences (NW, SW, PAM, BLOSUM)
http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-3-global-alignment-of-protein-sequences-nw-sw-pam-blosum/

8.4. Comparative Genomic Analysis of Gene Regulation
http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-4-comparative-genomic-analysis-of-gene-regulation/

8.5. Library Complexity and Short Read Alignment (Mapping)
http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-5-library-complexity-and-short-read-alignment-mapping/

8.6. Genome Assembly
http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-6-genome-assembly/

8.7. ChIP-seq Analysis; DNA-protein Interactions
http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/leture-7-chip-seq-analysis-dna-protein-interactions/

8.8. RNA-sequence Analysis: Expression, Isoforms
http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-8-rna-sequence-analysis-expression-isoforms/

8.9. Modeling and Discovery of Sequence Motifs

http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-9-modeling-and-discovery-of-sequence-motifs-gibbs-sampler-alternatives/

8.10. Markov and Hidden Markov Models of Genomic and Protein Features
http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-10-markov-and-hidden-markov-models-of-genomic-and-protein-features/

8.11. RNA Secondary Structure – Biological Functions and Prediction
http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-11-rna-secondary-structure-2013-biological-functions-and-prediction/

8.12. Introduction to Protein Structure; Structure Comparison and Classification
http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/leture-12-introduction-to-protein-structure-structure-comparison-and-classification/

8.13. Predicting Protein Structure
http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-13-predicting-protein-structure/

8.14. Predicting Protein Interaction
http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-14-predicting-protein-interactions/

8.15. Gene Regulatory Networks
http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-15-gene-regulatory-networks/

8.16. Protein Interaction Networks
http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-16-protein-interaction-networks/

8.17. Logic Modeling of Cell Signaling Networks

http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-17-logic-modeling-of-cell-signaling-networks.-guest-lecture-doug-lauffenburger/

8.18. Analysis of Chromatin Structure

http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-18-analysis-of-chromatin-structure/

8.19. Discovering Quantitative Trait Loci (QTLs)

http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-19-discovering-quantitative-trait-loci-qtls/

8.20. Human Genetics, SNPs, and Genome Wide Associate Studies

http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-20-human-genetics-snps-and-genome-wide-associate-studies/

8.21. Synthetic Biology: From Parts to Modules to Therapeutic Systems

http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-21-synthetic-biology-from-parts-to-modules-to-therapeutic-systems.-guest-lecture-ron-weiss/

8.22. Causality, Natural Computing, and Engineering Genomes

http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-22-causality-natural-computing-and-engineering-genomes.-guest-lecture-george-church/

9.

Chapter 9: Introduction to Computational and Systems Biology

9.1. Introduction to Computational and Systems Biology

http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-1-course-introduction-history-of-computation

al-biology-overview-of-the-course-course-policies-and-mechanics-dna-sequencing-technologies/

9.2. Local Alignment (BLAST) and Statistics

http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-2-local-alignment-blast-and-statistics/

9.3. Global Alignment of Protein Sequences (NW, SW, PAM, BLOSUM)

http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-3-global-alignment-of-protein-sequences-nw-sw-pam-blosum/

9.4. Comparative Genomic Analysis of Gene Regulation

http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-4-comparative-genomic-analysis-of-gene-regulation/

9.5. Library Complexity and Short Read Alignment (Mapping)

http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-5-library-complexity-and-short-read-alignment-mapping/

9.6. Genome Assembly

http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-6-genome-assembly/

9.7. ChIP-seq Analysis; DNA-protein Interactions

http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/leture-7-chip-seq-analysis-dna-protein-interactions/

9.8. RNA-sequence Analysis: Expression, Isoforms

http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-8-rna-sequence-analysis-expression-isoforms/

9.9. Modeling and Discovery of Sequence Motifs

http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-9-modeling-and-discovery-of-sequence-motifs-gibbs-sampler-alternatives/

9.10. Markov and Hidden Markov Models of Genomic and Protein Features

http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-10-markov-and-hidden-markov-models-of-genomic-and-protein-features/

9.11. RNA Secondary Structure – Biological Functions and Prediction

http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-11-rna-secondary-structure-2013-biological-functions-and-prediction/

9.12. Introduction to Protein Structure; Structure Comparison and Classification

http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/leture-12-introduction-to-protein-structure-structure-comparison-and-classification/

9.13. Predicting Protein Structure

http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-13-predicting-protein-structure/

9.14. Predicting Protein Interactions
http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-14-predicting-protein-interactions/

9.15. Gene Regulatory Networks
http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-15-gene-regulatory-networks/

9.16. Protein Interaction Networks
http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-16-protein-interaction-networks/

9.17. Logic Modeling of Cell Signaling Networks
http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-17-logic-modeling-of-cell-signaling-networks.-guest-lecture-doug-lauffenburger/

9.18. Analysis of Chromatin Structure
http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-18-analysis-of-chromatin-structure/

9.19. Discovering Quantitative Trait Loci (QTLs)
http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-19-discovering-quantitative-trait-loci-qtls/

9.20. Human Genetics, SNPs, and Genome Wide Associate Studies
http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-20-human-genetics-snps-and-genome-wide-associate-studies/

9.21. Synthetic Biology: From Parts to Modules to Therapeutic Systems
http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-21-synthetic-biology-from-parts-to-modules-to-therapeutic-systems.-guest-lecture-ron-weiss/

9.22. Causality, Natural Computing, and Engineering Genomes
http://ocw.mit.edu/courses/biology/7-91j-foundations-of-computational-and-systems-biology-spring-2014/video-lectures/lecture-22-causality-natural-computing-and-engineering-genomes.-guest-lecture-george-church/

10.

Chapter 10: Evolutionary Medicine

10.1. Evolutionary Medicine
http://oyc.yale.edu/ecology-and-evolutionary-biology/eeb-122/lecture-21

11.

Chapter 11: Immunology with Hematology

11.1. The Immune System and Host Defense
https://www.youtube.com/watch?v=mhsIv0Irze0&index=3&list=PLqOZ6FD_RQ7mE7nE6HHoM265SKfK0z_T2

11.2. Innate Immunity

https://www.youtube.com/watch?v=885KZClVwXE&list=PLqOZ6FD_RQ7mE7nE6HHoM265SKfK0z_T2&index=4

https://www.youtube.com/watch?v=BvLLZgNVkvI&index=5&list=PLqOZ6FD_RQ7mE7nE6HHoM265SKfK0z_T2

11.3. Principle of Adaptive Immunity

https://www.youtube.com/watch?v=zlVPUpmpQyM&index=6&list=PLqOZ6FD_RQ7mE7nE6HHoM265SKfK0z_T2

11.4. Antibody Structure and B-Cells

https://www.youtube.com/watch?v=mIXgseokGQc&index=7&list=PLqOZ6FD_RQ7mE7nE6HHoM265SKfK0z_T2

https://www.youtube.com/watch?v=WiYLSFPE-g8&index=8&list=PLqOZ6FD_RQ7mE7nE6HHoM265SKfK0z_T2

11.5. Function of Antibodies

https://www.youtube.com/watch?v=edIPKRAKa-Y&list=PLqOZ6FD_RQ7mE7nE6HHoM265SKfK0z_T2&index=9

11.6. Antibodies Function and B-Cell Development

https://www.youtube.com/watch?v=qPOZtD1EtgY&list=PLqOZ6FD_RQ7mE7nE6HHoM265SKfK0z_T2&index=10

11.7. B-Cell Development

https://www.youtube.com/watch?v=yas02S19d7g&index=11&list=PLqOZ6FD_RQ7mE7nE6HHoM265SKfK0z_T2

11.8. Antigen Recognition by T-Cells

https://www.youtube.com/watch?v=IFnjXq2TLmg&list=PLqOZ6FD_RQ7mE7nE6HHoM265SKfK0z_T2&index=12

11.9. Antigen Processing & MHC Genetics

https://www.youtube.com/watch?v=zMFLWtBBtzw&list=PLqOZ6FD_RQ7mE7nE6HHoM265SKfK0z_T2&index=13

11.10. Development of T- Lymphocytes

https://www.youtube.com/watch?v=foQlWB9tRio&index=14&list=PLqOZ6FD_RQ7mE7nE6HHoM265SKfK0z_T2

https://www.youtube.com/watch?v=tkCpB7VrMGk&index=15&list=PLqOZ6FD_RQ7mE7nE6HHoM265SKfK0z_T2

11.11. Immunity by B-cells and Antibodies

https://www.youtube.com/watch?v=heo_h6aGizw&list=PLqOZ6FD_RQ7mE7nE6HHoM265SKfK0z_T2&index=16

11.12. T-Cells Mediated Immunity

https://www.youtube.com/watch?v=CqVeYcftd40&list=PLqOZ6FD_RQ7mE7nE6HHoM265SKfK0z_T2&index=17

https://www.youtube.com/watch?v=HyNdI9ICIWY&index=18&list=PLqOZ6FD_RQ7mE7nE6HHoM265SKfK0z_T2

11.13. Bodily Defense Against Infection

https://www.youtube.com/watch?v=uofYyndk_G4&list=PLqOZ6FD_RQ7mE7nE6HHoM265SKfK0z_T2&index=19

https://www.youtube.com/watch?v=HMml1o_qq8A&list=PLqOZ6FD_RQ7mE7nE6HHoM265SKfK0z_T2&index=20

11.14. Failures of Body's Defense

https://www.youtube.com/watch?v=8iET_bGSgYY&list=PLqOZ6FD_RQ7mE7nE6HHoM265SKfK0z_T2&index=21

https://www.youtube.com/watch?v=qSJdA-CncHA&index=22&list=PLqOZ6FD_RQ7mE7nE6HHoM265SKfK0z_T2

11.15. Immune System Over Reaction:

https://www.youtube.com/watch?v=ARinqe516xw&list=PLqOZ6FD_RQ7mE7nE6HHoM265SKfK0z_T2&index=23

https://www.youtube.com/watch?v=j5cCzqAj3R4&index=24&list=PLqOZ6FD_RQ7mE7nE6HHoM265SKfK0z_T2

12.

Chapter 12: Bioengineering

12.1. Bioengineering Introduction

http://ocw.mit.edu/courses/biological-engineering/20-010j-introduction-to-bioengineering-be-010j-spring-2006/videos/Lecture-1-bioengineering/

12.2. Biological Foundation of Bioengineering

http://ocw.mit.edu/courses/biological-engineering/20-010j-introduction-to-bioengineering-be-010j-spring-2006/videos/lecture-2-biological-foundations-of-bioengineering/

12.3. Chemical Foundations of Bioengineering

http://ocw.mit.edu/courses/biological-engineering/20-010j-introduction-to-bioengineering-be-010j-spring-2006/videos/lecture-3-chemical-foundations-of-bioengineering-cont./

12.4. Biological computing

http://ocw.mit.edu/courses/biological-engineering/20-010j-introduction-to-bioengineering-be-010j-spring-2006/videos/lecture-4-biological-computing/

12.5. Interview: Prof. Charles Cooney

http://ocw.mit.edu/courses/biological-engineering/20-010j-introduction-to-bioengineering-be-010j-spring-2006/videos/interview-prof.-charles-cooney/

12.6. Interview: Prof. Linda Griffith

http://ocw.mit.edu/courses/biological-engineering/20-010j-introduction-to-bioengineering-be-010j-spring-2006/videos/interview-prof.-linda-griffith/

12.7. Interview: Prof. Alan Grodzinsky

http://ocw.mit.edu/courses/biological-engineering/20-010j-introduction-to-bioengineering-be-010j-spring-2006/videos/interview-prof.-alan-grodzinsky/

12.8. Prof. Kimberly Hamad-Schifferli

http://ocw.mit.edu/courses/biological-engineering/20-010j-introduction-to-bioengineering-be-010j-spring-2006/videos/interview-prof.-kimberly-hamad-schifferli/

12.9. Interview: Prof. Matthew Lang

http://ocw.mit.edu/courses/biological-engineering/20-010j-introduction-to-bioengineering-be-010j-spring-2006/videos/interview-prof.-matthew-lang/

12.10. Interview: Prof. Douglas Lauffenburger

http://ocw.mit.edu/courses/biological-engineering/20-010j-introduction-to-bioengineering-be-010j-spring-2006/videos/interview-prof.-douglas-lauffenburger/

12.11. Interview: Prof. Paul Matsudair

http://ocw.mit.edu/courses/biological-engineering/20-010j-introduction-to-bioengineering-be-010j-spring-2006/videos/interview-prof.-paul-matsudaira/

12.12. Interview: Prof. Christine Ortiz

http://ocw.mit.edu/courses/biological-engineering/20-010j-introduction-to-bioengineering-be-010j-spring-2006/videos/interview-prof.-christine-ortiz/

12.13. Interview: Prof. Ram Sasisekharan

http://ocw.mit.edu/courses/biological-engineering/20-010j-introduction-to-bioengineering-be-010j-spring-2006/videos/interview-prof.-ram-sasisekharan/

12.14. Interview: Prof. Greg Stephanopoulos

http://ocw.mit.edu/courses/biological-engineering/20-010j-introduction-to-bioengineering-be-010j-spring-2006/videos/interview-prof.-greg-stephanopoulos/

12.15. Interview: Prof. Subra Suresh

http://ocw.mit.edu/courses/biological-engineering/20-010j-introduction-to-bioengineering-be-010j-spring-2006/videos/interview-prof.-subra-suresh/

12.16. Interview: Prof. Todd Thorsen

http://ocw.mit.edu/courses/biological-engineering/20-010j-introduction-to-bioengineering-be-010j-spring-2006/videos/interview-prof.-todd-thorsen/

13.

Chapter 13: Frontiers of Biomedical Engineering

13.1. Bioengineering Introduction

http://ocw.mit.edu/courses/biological-engineering/20-010j-introduction-to-bioengineering-be-010j-spring-2006/videos/Lecture-1-bioengineering/

http://oyc.yale.edu/biomedical-engineering/beng-100/lecture-2

13.2. Genetic Engineering

http://oyc.yale.edu/biomedical-engineering/beng-100/lecture-3
http://oyc.yale.edu/biomedical-engineering/beng-100/lecture-4

13.3. Cell Culture Engineering

http://oyc.yale.edu/biomedical-engineering/beng-100/lecture-5
http://oyc.yale.edu/biomedical-engineering/beng-100/lecture-6

13.4. Cell Communication and Immunology

http://oyc.yale.edu/biomedical-engineering/beng-100/lecture-7
http://oyc.yale.edu/biomedical-engineering/beng-100/lecture-8

13.5. Biomolecular Engineering: Engineering of Immunity

http://oyc.yale.edu/biomedical-engineering/beng-100/lecture-9
http://oyc.yale.edu/biomedical-engineering/beng-100/lecture-10

13.6. Biomolecular Engineering: General Concepts

http://oyc.yale.edu/biomedical-engineering/beng-100/lecture-11
http://oyc.yale.edu/biomedical-engineering/beng-100/lecture-12

13.7. Cardiovascular Physiology

http://oyc.yale.edu/biomedical-engineering/beng-100/lecture-13
http://oyc.yale.edu/biomedical-engineering/beng-100/lecture-14
http://oyc.yale.edu/biomedical-engineering/beng-100/lecture-15