

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DEPARTMENTS OF BIOLOGY, BIOLOGICAL ENGINEERING, AND SLOAN SCHOOL OF MANAGEMENT

7.546/15.480/20.586
The Science and Business of Biotechnology
Spring 2020

Thursdays 4:00 to 7:00 pm
Auditorium, Whitehead Institute for Biomedical Research

Instructors: Professors Harvey Lodish, Angela Koehler, Jing-Ke Weng, Jianzhu Chen, and Andrew Lo

Class	Date	Hour 1	Hour 2	Hour 3
1	February 6	Harvey Lodish Introduction to Drug Development: Recombinant therapeutic proteins	Andrew Lo Drug Development 101	Carla DeMaria Director, Intellectual Property and Sponsored Programs Whitehead Institute Technology Licensing – the transition from research laboratories to commercialization
2	February 13	Harvey Lodish Nucleic Acid Therapies shRNAs causing degradation of target messenger RNA Oligonucleotides that affect splicing of pre-mRNA Duchenne Muscular Dystrophy Spinal Muscular Atrophy	Avak Kahvejian, PhD General Partner, Flagship Pioneering Venture capital	Harvey Lodish Adeno Associated Viral (AAV) Vectors and Gene Therapy Hemophilia Hereditary Blindness Spinal Muscular Atrophy
3	February 20	Harvey Lodish Gene Therapy: Retroviral Vectors Severe combined immune deficiency	Jianzhu Chen Antibody response and antibody therapeutics	Donald Ware Partner and Co-Chair, Patent Litigation Practice, FoleyHoag LLP, Boston

		Wiscott Aldrich Syndrome Beta thalassemia Sickle Cell Disease	Brief intro of immune system Antibody structure B cell antibody response Antibodies targeting TNF α	Drafting, prosecuting, and litigating patents
4	February 27	Harvey Lodish Gene Editing Zinc finger nucleases TALENs CRISPR Base editing	David Williams Chief Scientific Officer and Senior Vice President, Boston Children's Hospital Planning and executing a clinical trial for gene therapy	Jianzhu Chen T cells and cancer immunotherapy T cell biology Checkpoint regulation Checkpoint inhibition for cancer immunotherapy
5	March 5	Harvey Lodish Novel Cell Therapies Embryonic Stem (ES) and induced pluripotent Stem (iPS) cells Production of insulin - producing islet cells Engineered red blood cells to treat PKU	Angela Koehler The Pros and Cons of Small Molecules in the Pharma Race – Molecular and Market Perspectives	Jeff Walsh , Chief Financial and Strategy Officer, bluebird bio Building a gene therapy company
6	March 12	Angela Koehler Precision Medicine: FDA Approval of Larotrectinib as the First Tissue-Agnostic, Mutation-Specific Cancer Drug	Paulina Hill , Omega Funds Financing Biotechnology from a VC perspective	All instructors: Discussion of student projects and formation of groups of ~ 5 students from different backgrounds and expertises
7	March 19	Jianzhu Chen Adoptive cell therapy for cancer Cancer-immunity cycle Tumor-infiltrating lymphocyte therapy Chimeric antigen receptors (CAR)	Jing-Ke Weng Ag biotech GM, non-GM, and other emerging Ag biotechnologies	Andrew Lo How to Start a Biotech Company, If You Must

		CAR-T/NK/macrophage therapies		
	March 26	No Class- MIT Vacation		
8	April 2 HL Away	Kipp Weiskopf Cancer immunotherapy based on macrophages	Jing-Ke Weng The rising cannabis industry and the biology of cannabinoids	Ponsi Trivisvavet , CEO, and Catherine Feuillet , CSO, Inari Agriculture Ag Biotechnology as a business
9	April 9	Jing-Ke Weng Metabolic engineering of drugs and other commodity chemicals	Angela Koehler New Therapeutics Arise from the Ashes of Thalidomide - Molecular Glues and Proteolysis Targeting Chimeras	Gerald Chan , CEO, Morningside Ventures
10	April 16	Jing-Ke Weng Drug discovery for neurological disorders	Hadley Sikes, MIT and Charlie Mace, Tufts New generation of paper-based diagnostic tests	Andrew Lo Pricing, Financing, and Ethics
11	April 23 HL Away	Jianzhu Chen Other immune therapies Targeting innate immunity Vaccines for infection Cancer vaccines Tolerance induction for treating autoimmune diseases	John Maraganore Starting and building biotech companies	Drug approval by the FDA
12	April 30	Student Project Presentations		
13	May 7	Student Project Presentations		