

CBE/BE 554

Engineering Biotechnology

Instructor: Scott L. Diamond,

Textbook: Applied Molecular Biology (Miesfeld)
Molecular Biotechnology (Glick)

ReDNA Biotechnology

Introduction: Case Study with Tissue Plasminogen Activator (tPA)
ReDNA: Expression vectors: plasmids, subcloning, selection
PCR, PCR primer design
RT-PCR, cDNA, energy transfer, Taqman, expression profiling, LCR
phages, λ phage, selection methods, cosmids
ssDNA phages, phagemids
phage display applications

Reactor design

Bioreactors and Fermentors
Chemostat Operation
Introduction to Reactor Design, Staged CSTRs

Bioproduction

Bacterial Fermentor Operation
Yeast and Ethanol Production
Mammalian Cell Systems
Hybridomas and Antibodies
Baculovirus Expression
Virus production (gene therapy, vaccines)
siRNA, shRNA, miRNA

Analytical Biotechnology and Downstream Processing

Separation Techniques (Extraction, chromatography)
Lyophilization

Other Topics if time Permits

Stem Cell Technology
Drug Delivery
Device/Drug combinations/Regulation
Diagnostics
FDA
Patents/Licensing
Biotech Business Models

GRADING: Midterm Exam 40 %
Homework 10 %
Final Project 10 %
Final 40 %

EXPLORE (!!): <http://www.ncbi.nlm.nih.gov>

for Pubmed, Gene and Protein Databases.