

## Chem/VASCI 797T: Frontiers of Biotechnology, Fall 2017

### Course Coordinators:

Jeanne A. Hardy (hardy@chem.umass.edu), 745A Lederle Tower, 5-3486

Barbara A. Osborne (osborne@vasci.umass.edu), ISB 427F, 5-4882

Class Meetings: Tuesdays 5:15-6:30 and Thursdays 5:00 – 6:15 pm  
Integrative Science Building ISB 321

	Unit	Instructor	Guest Lecturer & Affiliation
Tues Sep 5	Introduction	Jeanne Hardy	
Thurs Sep 7			
Tues Sep 12	Cancer Immunotherapy	Barbara Osborne osborne@vasci.umass.edu	Thomas Keating Immunogen
<b>Thurs Sep 14</b>			
Tues Sep 19			
<b>Thurs Sep 21</b>	Antibodies as Therapies	Jeanne Hardy <a href="mailto:hardy@chem.umass.edu">hardy@chem.umass.edu</a>	Gavin Macbeath Abpro Labs
Tues Sep 26			
Thurs Sep 28			
Tues Oct 3	Future of Gene Editing and Gene Therapy	Tom Maresca tmaresca@bio.umass.edu	TJ Cradick CRISPR Therapeutics
<b>Thurs Oct 5</b>			
Thurs Oct 12 (no Class Oct 10)			
Tues Oct 17	Technologies for RNA Therapeutics	Craig Martin CMartin@chem.umass.edu	Ed Miracco Moderna Therapeutics
<b>Thurs Oct 19</b>			
Tues Oct 24	Technologies for targeted protein/ RNA/drug delivery	S Thai Thayumanavan thai@chem.umass.edu	Bob Miller Senior VP Sigilon Therapeutics
<b>Thurs Oct 26</b>			
Tues Oct 31			
<b>Thurs Nov 2</b>			Huawei Qiu Genzyme
Tues Nov 7	Design and Evolution of Protein Therapeutics	Scott C Garman garman@biochem.umass.edu	
Thurs Nov 9			
Tues Nov 14			Gianpiero Palermo The revolution of ART
<b>Thurs Nov 16</b>	Assistive Reproduction Technologies	Rafael Fissore rfissore@vasci.umass.edu	
Tues Nov 28			
Thurs Nov 30			
Tues Dec 5	Metabolic Engineering	Mike Henson mhenson@engin.umass.edu	Nate Tedford Gingko Bioworks
<b>Thurs Dec 7</b>			
Tues Dec 12	Course Analysis & Future Planning	Jeanne Hardy	

Dates for Industrial speakers in **bold**.

Prerequisites: This course is open to graduate students in all life-science programs as well as to students in programs with applications relevant to Biotechnology.

Outline of Course: The goal of *Frontiers in Biotechnology* is to educate students about the scientific advances and resulting tools that have allowed the biotech revolution, to chronicle the implementation of recent advances in biotechnology, and to identify those areas of great unmet need in which biotechnology can play a major role in the future. *Frontiers in Biotechnology* comprises eight individual units focusing on what we view to be eight of the most cutting edge advances in biotechnology. We have designed the course around the concepts that '*Biotechnology*' is a vast enterprise with a huge number of applications and that the ultimate goal of any biotechnology is application to a pressing human need. Thus in each unit we engage industrial experts to provide real-world, real-time snapshots of biotechnology applications.

Each 3-meeting unit consists of one lecture by the indicated UMass BTP Faculty Instructor, one lecture by an outside, industrial expert and concludes with one discussion section on the topic. During each unit the concepts of rigor and reproducibility for the techniques used are emphasized. As relevant, the discussion sections include The involvement of multiple faculty allows students to interact with faculty from multiple disciplines. The interaction with UMass faculty from various departments and with industrial visitors provides a rich source of potential mentors for students in the course.

Grading: Grades will be based on scores from eight assignments, one assignment corresponding to each unit in the course. The assignment for each unit will be designed and graded by the instructor for that unit. Each assignment will be worth 100 points, for a total of 800 points possible in the course.

## **REQUIRED PREREQUISITE READING/ LISTENING**

*The Gene: An Intimate History* by Siddhartha Mukherjee

Background Reading – Particularly Important for Chemists & Engineers:

*The BioTech Primer* by BioTech Primer Inc.

*Biotechnology Demystified* by Sharon Walker

*Biotechnology for Beginners* by Reinhard Renneberg and Arnold L. Demain

Additional Historical Context - For fascinating historical background into many of the groundbreaking discoveries and techniques that have made biotechnology possible:

*The Eighth Day of Creation: Makers of the Revolution in Biology* by Horace Freeland Judson

*Genentech: The Beginnings of Biotech* by Sally Smith Hughes