

# Course Agenda

## BioImmersion: Biotech for the Non-Scientist

A three-day, in-depth course that provides the background required for understanding today's fast-paced biotech marketplace. Beginning with an overview of the basic science needed to understand new drug discovery and development, the course emphasizes healthcare applications. Confused about the exact differences between a small molecule and large molecule drug? Want to learn more about the science behind buzz words like "RNA therapeutics," "CART," "immune checkpoint inhibitors," and "biosimilars?" Curious about the exploding applications of next-generation sequencing technology in the personalized medicine space? For all of this and more, we have got you covered. You will leave with a comprehensive understanding of how the technologies driving the industry come together to deliver new products.

### Day One

9:00-10:15 **Industry Overview**

- Biotechnology Defined
- Industry Sectors: Healthcare, Agriculture, Industry & Environment
- Research Support Companies & Contract Research Organizations
- The Intersection of Academia & Industry

10:15-10:30 **Break**

10:30-11:30 **Biology Basics & Cell Signaling**

- Biotechnology Goals
- Cell Structure & Function
- Proteins: Critical to Cellular Function
- Cellular Communication: Cell Signaling Pathways
- Lab: DNA Isolation & Extraction

11:30-12:30 **DNA: Biotech's Blueprint**

- The History of DNA Discovery
- DNA Structure & Function
- DNA Replication
- Chromosomes & Genes
- How DNA Codes for Proteins
- Protein Structure & Function
- The Proteome

12:30-1:30 **Lunch provided**

- 1:30-2:45     **Genetic Variation**
- Alleles
  - Mutations: The Source of Genetic Variation
  - Genetic Basis of Disease
  - Genome-Wide Association Studies
  - Stratified Medicine & Companion Diagnostics
  - Pharmacogenomics
  - Activity: Genetic Taste Test

2:45-3:00     **Break** 2:45-3:00

- 3:00-4:15     **Making Biologics**
- Biologics vs. Small Molecule Drugs
  - Recombinant DNA
  - Polymerase Chain Reaction (PCR)
  - Production Platforms: Bacterial & Mammalian Cells
  - Production Platforms: Animals & Plants
  - Fusion Protein Therapeutics
  - Biosimilars: Definition & Approval Pathway
  - Patents & Data Exclusivity

4:15-4:30     **Q&A | Review**

## Day Two

- 9:00-10:00     **Biomanufacturing**
- Cell Line Development & Cell Banking
  - Scale-Up
  - Harvest & Purification
  - Formulation
  - Fill & Finish
  - Activity: Column Chromatography

- 10:00-11:15     **Immune System & Intro to Antibodies**
- Cells of the Immune System
  - Non-Specific Immune Response: Inflammation
  - Specific Immune Response: T-Cells & B-Cells
  - Antibodies: Structure & Function
  - Immunological Memory
  - How Vaccines Work
  - Making the Annual Flu Vaccines
  - Advances in Vaccine Technology: DNA Vaccines, Cancer Vaccines

11:15-11:30     **Break**

- 11:30-12:30 **Antibodies as Therapeutics**
- Polyclonal vs. Monoclonal Antibodies
  - Making Therapeutic Antibodies: Hybridomas, Phage Display, Genetically - - -
  - - Engineered Mice
  - Humanized vs. Fully Human Antibodies
  - Antibody Constructs: Fab, Bispecific, & Trispecific Antibodies
  - Monoclonal Antibodies as Therapeutics: Mechanisms of Action
  - Monoclonal Antibodies in Infectious Disease: RSV, Ebola
  - Antibody-Drug Conjugates
  - In Development: Immunotherapy for Alzheimer's
- 12:30-1:30 **Lunch provided**
- 1:30-2:45 **Genomics**
- Genomics Defined
  - Non-Coding DNA: The Regulome
  - DNA Microarrays (Gene Chips)
  - Next Generation Sequencing
  - Applications of Next Generation Sequencing
  - From Big Data to Rare Disease
  - Third Generation Sequencing
  - Personalized Medicine: Integrating the 'Omics
  - Comparative Genomics
  - Activity: Microarray to Determine Drug Metabolism
- 2:45-3:00 **Break**
- 3:00-4:15 **Controlling Gene Expression**
- RNA Therapeutics: Antisense, siRNA, microRNA
  - Changing Gene Expression: Exon-Skipping Therapy
  - Gene Therapy
  - Genome Editing
- 4:15-4:30 **Q&A | Review**

## Day Three

- 9:00-10:00 **Stem Cells & Regenerative Medicine**
- Properties of Stem Cells
  - Promises & Challenges
  - Induced Pluripotent Stem Cells
  - Stem Cells in the Clinic
  - Organ & Tissue Replacement

- 10:00-11:15 **Oncology**
- How Mutations Cause Cancer
  - Cancer Therapies
  - Traditional vs. Biotech Treatment Strategies
  - Druggable Targets
  - Signaling Network Complexity
  - Cancer Genomics
  - Immune System Checkpoint Therapies
  - Chimeric Antigen Receptor Therapies (CART)
  - Future Therapies
- 11:15-11:30 **Break**
- 11:30-12:30 **Drug Discovery**
- Rational Drug Discovery
  - Target Identification & Validation
  - Therapeutic Options
  - Assay Development & High Throughput Screening
  - In Vitro Safety & Efficacy Testing
  - Biomarkers
- 12:30-1:30 **Lunch** provided
- 1:30-2:30 **Drug Development**
- Regulatory Agencies
  - Preclinical & Clinical Trials
  - Pharmacovigilance
  - Drug Development Timeline
  - Desirable FDA Designations
  - Orphan Drugs
- 2:30-2:45 **Break**
- 2:45-4:00 **Newly Approved & In Development**
- DARPINS
  - Viruses & Antivirals
  - New Vaccines: Universal Flu Vaccine, HIV Vaccine, Viral Cancer Vaccine
  - Microbiome & Related Therapies
  - Bispecific Antibodies
  - Circulating Tumor Cells: Detection & Capture
- 4:00-4:30 **Wrap-Up**

All course materials are handed out in the course. There is no pre-work required. Lunch will be provided. All registrants will receive a complimentary copy of our book, [The Biotech Primer](#).