

Biotechnology: Science for the New Millennium, 2E

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 Carnegie Learning, www.emcp.com/biotech
 G-Biosciences, www.gbiosciences.com/BTSNM.aspx

Looking for a 1-year Biotechnology course using BS4NM text, lab manual and/or kits?

Here's a curriculum guide with a focus on
 Biotech Standard Lab Operating Procedures and
 the production of a real biotech product, rAmylase



Chapter/Topics * (Estimated time)	BS4NM Lab #	G-Bio BS4NM Lab Kit	Concept/Process
1 (1-2 weeks) Biotech Intro: What, Who, Where, Why, and How	1a – Lab Notebook 1b – Lab Safety 1c - Cheese Biotech•	Cheese Production: The Evolution of Cheese-Making Technology (Lab 1C)•	Scientific Methodology Biotech Products Biotech Workplaces Biotech Careers
2 (3-4 weeks) Biotech Biology Basics Cells, Macromolecules, Processes	2c – Cell Microscopy 2d – Microscopic Measurement 4l – Gram Staining• 4b – Genomic DNA Spooling 4h – DNA Extraction from Bacteria•	Bacterial Gram Staining (Lab 4L) • Micropipeting: Measuring Small Volumes in Biotechnology (Lab 3B)• Genomic DNA Spooling (Lab 4B)•	Cell Structure Measurement Cell Process Cell Observation Macromolecules Intro to DNA Isolation and Analysis
3 (2-3 weeks) Biotech Biochemistry Solution Preparation	3d – 3f Solution Prep 3g – Measuring pH 3j – Making Dilutions		Making solutions at any volume, concentration or pH
4 (4-5 weeks) Cell Culture	4e - 4g Sterile Technique Cell Culture	Gel Box Science (Lab 4J) Crime Scene DNA Analysis using RFLP	DNA extraction from Cell Culture DNA gel

DNA Isolation/Analysis/ Manipulation	4j – DNA Electrophoresis	Technology (Lab 4M) GFP Genetic Engineering of Bacteria (Lab 4N)	Electrophoresis Genetic Engineering
5 (2-3 weeks) <i>The rAmylase Project</i> Protein Assays and Analysis	5b – Apple Juice Enzyme Assay 5f - Characterizing Proteins by PAGE•	Characterizing Proteins by PAGE (Lab 5F)•	Enzyme Assays Vertical Gel Electrophoresis
6 (3-4 weeks) <i>The rAmylase Project</i> Protein Amylase Assays and Analysis	6d – Amylase Activity Assay• 6e - Amylase ELISA• 6g – Amylase Western Blot•	Assaying for Amylase Activity (Lab 6D) Direct ELISA of Bacterial α -Amylase (Lab 6E)• Western Blot to Identify α -Amylase (Lab 6G)•	Enzyme Activity Assay ELISAs Western Blots
7 (2 weeks) <i>The rAmylase Project</i> Amylase Spectrophotometry/ Concentration Assays	7c – Using the Spectrophotometer to Study Amylase 7d – Amylase Concentration Assay•	Determining the Concentration of Amylase in a Solution (Lab 7D)•	Spectrophotometry Amylase Concentration Assay
8 (3-4 weeks) <i>The rAmylase Project</i> Genetic Engineering Transformation Plasmid Recovery	8b – pAmylase2014 Analysis• 8c – pAmylase Transformation of Bacteria•	Restriction Digestion to Verify the pAmylase Plasmid (Lab 8B)• Transformation of E. coli with pAmylase (Lab 8C)• Using A Miniprep Kit for Plasmid Isolation (Lab 8G) •	Recombinant DNA Vector Analysis Bacterial Transformation Genetic Engineering Plasmid Recovery and Analysis
9 (1-2 weeks) <i>The rAmylase Project</i> rProtein Recovery/Analysis	6c – Amylase Isolation Using Ion Exchange Column Chromatography•	Using Ion Exchange Chromatography to Separate Proteins (Lab 9C)•	Protein Purification Column Chromatography
13 (2-3 weeks) <i>The rAmylase Project</i> Amylase Gene Analysis PCR	13f – Human DNA Extraction 13g – Human Alu Insert PCR 13h – Amylase Gene PCR•	Confirming the Amylase Gene Using PCR (Lab 13H)•	DNA recognition using Polymerase Chain Reaction

* Chapter in the text and lab manual

• Labs with the option of using G-Biosciences kit or BS4NM lab manual protocol