BIOTECHNOLOGY LABORATORY TECHNICIAN

PROGRAM REVIEW

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Appendix A

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PROGRAM OUTCOMES

COURSE OF STUDY

BIT COURSE OUTCOMES
After completing the BIT program, the successful student will be able to:

- Carry out routine laboratory tasks and commonly used techniques with confidence, quality and appropriate documentation.

- Apply theoretical knowledge of assay principles and strategies, purification principles, and the scientific method to laboratory situations

- Troubleshoot laboratory problems and devise appropriate solutions

- Plan and organize tasks to allow efficient completion of complex procedures, including planning and carrying out multiple procedures that proceed simultaneously. Coordinate with others to work as part of a team.

- Effectively communicate the procedures, results and interpretations of laboratory activities to other scientific staff in several standard forms of scientific communication, including the laboratory notebook, written report, casual conference and formal presentation.

- Demonstrate an appropriate attitude towards safety in the laboratory, and compliance that includes oneself, co-workers the work area and the laboratory environment.
# AAS in BIOTECHNOLOGY

## Course of Study

### BASIC REQUIREMENTS (first year course of study):

<table>
<thead>
<tr>
<th>FL</th>
<th>BI 101 or 211</th>
<th>Biology</th>
<th>5</th>
<th>Students wishing to transfer to PSU should take the 200-level science courses (see Biotechnology advisor)</th>
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<tbody>
<tr>
<td>CH</td>
<td>104 or 221</td>
<td>Chemistry</td>
<td>5</td>
<td></td>
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<tr>
<td>MTH</td>
<td>111</td>
<td>College Algebra</td>
<td>4</td>
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<tr>
<td>WR</td>
<td>121</td>
<td>English Composition</td>
<td>3</td>
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<table>
<thead>
<tr>
<th>WN</th>
<th>BI 102 or 212</th>
<th>Biology</th>
<th>4</th>
<th>To complete the General Education requirement for the AAS, students need at least one course from Arts and Humanities, one from Social Science and the third may be from either category (the Science and Math area is covered)</th>
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<tbody>
<tr>
<td>CH</td>
<td>105 or 221</td>
<td>Chemistry</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>CAS</td>
<td>170</td>
<td>Beginning Excel</td>
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<tr>
<td>Gen Ed</td>
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### BIOTECHNOLOGY SEQUENCE (second year)

<table>
<thead>
<tr>
<th>WN</th>
<th>BIT 101</th>
<th>Intro to Biotech</th>
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<tr>
<td>BIT</td>
<td>105</td>
<td>Lab Safety</td>
<td>3</td>
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<tr>
<td>BIT</td>
<td>107</td>
<td>Laboratory Math</td>
<td>3</td>
<td>Prereq or concurrent reg with BIT 109</td>
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<tr>
<td>BIT</td>
<td>109</td>
<td>Basic Lab Tech &amp; Instruments</td>
<td>3</td>
<td>Prerequisite for 200-level lab classes</td>
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<tr>
<td>BIT</td>
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<td>Quality Systems in Biotechnology</td>
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<tr>
<th>SP</th>
<th>BIT 205</th>
<th>Bioseparations I</th>
<th>4</th>
<th>Prerequisite is BIT 109</th>
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<tbody>
<tr>
<td>BIT</td>
<td>211</td>
<td>Biomolecular Princip.</td>
<td>4</td>
<td>Prerequisite is BIT 109</td>
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<tr>
<td>BIT</td>
<td>221</td>
<td>Techniques in Molec Biol I</td>
<td>5</td>
<td>Prerequisite is BIT 109</td>
</tr>
<tr>
<td>BIT</td>
<td>207</td>
<td>Tissue Culture I</td>
<td>4</td>
<td>Prerequisite is BIT 109</td>
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<tr>
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<th>BIT 201</th>
<th>Applied Immunology</th>
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<tbody>
<tr>
<td>BIT</td>
<td>215</td>
<td>Bioseparations II</td>
<td>5</td>
<td>Prerequisite is BIT 205</td>
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<tr>
<td>BIT</td>
<td>223</td>
<td>Techniques in Molecular Biology II</td>
<td>4</td>
<td>Prerequisite is BIT 221</td>
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<tr>
<td>BIT</td>
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<td>Tissue Culture II</td>
<td>4</td>
<td>Prerequisite is BIT 207</td>
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<th>SM</th>
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<tr>
<td>BIT</td>
<td>280A</td>
<td>Work Experience</td>
<td>8</td>
<td>Coregistration in BIT 280B required</td>
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<tr>
<td>BIT</td>
<td>280B</td>
<td>Work Experience Seminar</td>
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**AAS Total Credits** 110
BIOTECHNOLOGY COURSE OUTCOMES

BIT 101 INTRODUCTION TO BIOTECHNOLOGY
• Interpret and evaluate biotechnology activities and issues across the broad spectrum of applications (medical, agricultural, forensic, environmental)

BIT 105 Laboratory Safety
• Identify hazards that are relevant to the biotechnology laboratory appropriate steps to minimize exposure to oneself, ones coworkers and the environment in routine work.
• Describe proper handling and disposal of chemicals, radioisotopes and biohazardous materials that are commonly used in a biotechnology laboratory.
• Work within the federal and state regulations and guidelines that apply to the use of hazardous materials in the laboratory.

BIT 107 LABORATORY MATH
• Utilize mathematics as a vocabulary and problem solving tool in an exact way for communication in preparation for further course and laboratory work
• Recognize interpret formulate and apply common mathematical situations in the biomolecular laboratory with consistency and confidence
• Represent data and master sound solution methods to draw trustworthy conclusions based on data

BIT 109 BASIC LAB TECHNIQUES AND INSTRUMENTS
• Carry out fundamental and commonly used routine laboratory tasks with confidence, quality and appropriate documentation.
• Maintain laboratory equipment and environment

BIT 225 QUALITY SYSTEMS IN BIOTECHNOLOGY
• Identify the regulatory compliance issues attending the development and manufacture of a new biotechnology product
• Describe the key elements of a Quality System for the FDA-regulated manufacture of a biotechnology product (drug, biologic or device).
• Write a functional Standard Operating Procedure (SOP) for a familiar laboratory process
ADVANCED BIT LAB COURSES

BIT 211  BIOMOLECULAR PRINCIPLES
- Recognize the major functional organic groups of biological molecules and associate them with the properties they confer on biological molecules.
- Demonstrate working knowledge of the relationships between structure, properties and function of the major classes of biological molecules (carbohydrates, lipids, protein and nucleic acids)
- Communicate effectively the purpose, process and results of an experiment.

BIT 205  BIOSEPARATIONS I
- Carry out selected projects illustrating protein purification methods based on different molecular properties.
- Report procedures, results and interpretation in standard forms of scientific communication (laboratory notebook, written report, casual and/or formal oral communication)
- Develop teamwork and communication skills.
- Demonstrate working knowledge of key concepts and terminology of separation techniques and principles.

BIT 215  BIOSEPARATIONS II
- Carry out a multi-step purification procedure to isolate a single protein from a complex mix, using an established protocol.
- Report procedures, results and interpretation in standard forms of scientific communication (laboratory notebook, written report, casual and/or formal oral communication)
- Develop teamwork and communication skills.

BIT 201  APPLIED IMMUNOLOGY
- Recognize the major functional organic groups of biological molecules and associate them with the properties they confer on biological molecules.
- Demonstrate working knowledge of the relationships between structure, properties and function of the major classes of biological molecules (carbohydrates, lipids, protein and nucleic acids)
- Communicate effectively the purpose, process and results of an experiment.
BIT 221  TECHNIQUES IN MOLECULAR BIOLOGY I
• Construct and analyze a new plasmid prepared by the subcloning of a restriction fragment from one plasmid to another.

BIT 223  TECHNIQUES IN MOLECULAR BIOLOGY II
• Working from biological material, produce a selected region of DNA for cloning and analysis
• Demonstrate working knowledge of key concepts and terminology of a variety of selected molecular biology techniques and principles.
• Be able to use standard DNA manipulation software.

BIT 207  TISSUE CULTURE I
• Prepare media (both liquid and agar-containing) to support the growth of a variety of cell types, including bacteria, yeasts, plant and animal cells.
• Establish and maintain a tissue culture laboratory
• Maintain and manipulate adherent and suspension animal cell lines.

BIT 217  TISSUE CULTURE II
• Apply understanding of cell systems and manipulation techniques toward the investigation of some phenomenon or parameter in cell culture.
• Work as an effective member of an investigative team.
• Adapt skills and knowledge of cell culture to special and evolving techniques in this technology

BIT 280A  WORK EXPERIENCE
• Identify learning goals and develop a work experience plan to meet the goals
• Increase personal and professional competence by practicing techniques and procedures learned in courses, learning new job-specific skills, and gaining a more in-depth understanding of this career area.

BIT 280 B  WORK EXPERIENCE SEMINAR
• Describe and explain the purpose, results and interpretations of scientific work that is part of an investigation or process in a biotechnology laboratory.
• Identify and explain specific and integrated applications of familiar laboratory techniques and skills in a workplace context.