

Biotechnology Independent Research Class

Description of the Course: Biotechnology Independent Research is a laboratory research course designed to give students with substantial lab experience an opportunity to conduct industry-standard research. In research teams, student scientists will model research techniques and strategies used at established biotechnology companies. Progress will be monitored by the CEO (course instructor) and reported regularly to the company employees (class members).

Research Team/Student Objectives

1. To conduct experimental research and produce replicable data that addresses a research topic and specific research questions.
2. To demonstrate daily progress towards:
 - a. preparing an acceptable research proposal, including experimental protocol.
 - b. completing valid experimental research.
 - c. keeping an accurate record of all work in a legal, scientific notebook.
 - d. reporting results and analysis on a regular basis.
 - e. a formal presentation to the scientific community (class) of research results.

Scope and Sequence

Review of Laboratory Research Skills and Identification of Potential Research Interests (2 weeks)

- Personal research skills/topics/personal experiences/resources/expertise/connections
- Establishment of an industry or academic Mentor Scientist/Research Team Relationship
- Extensive, exhaustive literature review and information retrieval on potential research topics
- Identification of the research teams and topics/questions

Experimental Design (2 weeks)

- Background (summary of relevant information for basic understanding of research topic, cited and referenced)
- Purpose Statements or Research Questions
- Reagents, Supplies, and Equipment Needed (volumes, masses, concentrations, and how they will be acquired and prepared)
- Experimental Procedures (in as much detail as possible, what experiment(s) will be conducted in what order using what amounts of which reagents and supplies on which equipment)
 - variable groups identified control groups identified
 - multiple replications metric measurement
 - valid lab techniques data to be collected identified
- Timeline identifying what will be completed by what dates, by whom, and where

Experimental Research

- Preliminary experimentation based on approved experimental procedures (above)

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- Data collection/analysis
- Interim and final written conclusion reports
- PowerPoint ® presentation of experimental procedures and results

Research Team Members Members share equally in all wet lab procedures and tasks. In addition each team member has the following responsibilities.

Staff Scientist

- Acts as a liaison to the CEO and other companies through written and oral communication.
- Keeps team on track and focused. Is ultimately responsible for team productivity, individually and as a group.
- Resolves disputes among team members.
- Files reports to CEO of team members who display lack of effort, poor attendance or promptness.
- Guides the team through research proposal preparation and produces final copy of research proposal.
- Coordinates the preparation and presentation of each six-week progress report to the company.
- Takes over Senior Scientist responsibilities when he/she is absent.

Senior Scientist

- Takes attendance and reports absences and tardies to the Staff Scientist on a weekly basis and to the CEO on a daily basis.
- Responsible for verifying accuracy and completeness of the team's legal, scientific research notebook.
- With the Staff Scientist, divides and assigns prelab preparatory workload between all team members.
- Responsible for ordering and acquisition of reagents, supplies, and equipment.
- Writes first draft of experimental conclusion after discussion with research team.
- Takes over Research Associate responsibilities when he/she is absent.

Research Associate

- Responsible for maintaining team's legal scientific notebook.
- Responsible for recording all research questions, experimental materials, procedures, and data.
- Transcribes the final version of experimental analyses/conclusions into the legal scientific notebook.
- Takes over Lab Technician responsibilities when he/she is absent.

Lab Technician

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- Constructs data tables and graphs of experimental data that are added to legal notebook by RA.
- Maintenance of the team's exhaustive research folder, including a Table of Contents. All entries/photocopies labeled with bibliographical information.
- Maintains and checks lab station for order and cleanliness. Ensures that all lab equipment is cleaned and returned to stock area. Immediately reports broken or missing items to the CEO.
- Makes copies of documents for research team.

Evaluation:

Attendance = 20%	Each student is awarded an individual attendance grade.
Promptness = 20%	Each student is awarded an individual promptness grade.
Record-keeping = 20%	The team's single notebook grade assigned to each member.
Participation = 20%	The Instructors evaluation of a team member's performance.
Skill/Productivity = 20%	The Instructor's evaluation of team performance/productivity

- Make-ups are by appointment only, on _____ at _____, within one week of absence.
- Each absence affects your grade. You may "make-up" up to 4 missed class hours/semester without penalty, after which each absence will affect your attendance grade proportional to the number of class hours/semester. Truancies will be counted as 2 absences.
- Each tardy is counted against the "promptness" grade. Tardy detentions will be served at lunch only on either a ____ or _____. Unserved detentions will result in twice the number of promptness points docked from the "promptness" grade

Independent Research Topics Team Proposal

Phone _____ Name _____

Biotech Courses Completed _____

Other Science Courses Completed: _____

If applicable:

Internship Company _____

Internship Department/Supervisor _____

Internship Project/Job Duties Description

Proficient Lab Skills:

Proficient Computer Skills:

Main Interest Areas in the Field of Biotechnology

Consider being placed into a research team focused on one of the 16 research projects given on the green sheet. Of the research topics, list the top three, in the order of your interest level for being placed on a team. Also, list the team position you prefer for each research project. These may be the same for each or different for some.

1st preference _____

Reasons for this selection:

2nd preference _____

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Reasons for this selection:

3rd preference _____

Reasons for this selection: