

Bacteriology 875
Chem & Biol Eng 562
Spring 2005

Foundations of Biotechnology Research (I)
Special Topics in Chemical Engineering

Instructors	Prof. Timothy Donohue Bacteriology Department Room 390, 420 Henry Mall Phone: (608) 262-4663 e-mail: tdonohue@bact.wisc.edu	
	Prof. John Yin Department of Chemical and Biological Engineering 3633 Engineering Hall phone: (608) 265-3779, e-mail: yin@engr.wisc.edu	
Class meetings	Wednesdays 2:25 pm	Room 132 Biochemistry (tentative)
Course homepage	http://courses.engr.wisc.edu/che/562/yin/ User: Biotech, password: 'password'	
Grading	Oral and written progress reports	80%
	Group self-assessments	20%

This two-course sequence provides an opportunity for graduate students drawn from biology, chemistry, engineering, and computer science to gain research experience as a member of a cross-disciplinary team. Each team will:

1. identify a societal need in a defined biotechnological or biomedical area, determine the magnitude of the need or problem, and define and quantify specifications for a solution that address technical, environmental, legal and ethical components of the problem
2. supply evidence that demonstrates the feasibility of the proposed solution. Evidence may be drawn from the literature, preliminary wet-lab experiments, preliminary theoretical/computational studies, or from collaborators outside the team. In the absence of compelling evidence, teams should propose relevant experimental or theoretical/simulation studies.
3. learn to work effectively. Members each multidisciplinary team will communicate progress and findings in formal written and oral reports to a review board composed of experienced biologists, chemists, engineers, and computer scientists. Build on feedback to plan further development.

The course instructors (and review board) will provide tools and resources to multi-disciplinary teams. These will include:

1. workshops on library resources, literature and patent searching, oral presentation and report writing, tools for working in groups, intellectual property and patenting, identifying and resolving ethical issues.

2. workshop on method for open-ended problem solving: state initial problem, redefine problem, develop specifications for its solution, brainstorm alternative solutions, analyze alternatives, select best solution, test solution, restate problem and iterate through cycle to further define the problem and focus its solution.
3. members of the review board will provide feedback on reports and presentations. Questions from the board should focus on enabling teams to recognize progress they have made and guide themselves into the next phase of development.

Spring 2005 Schedule

TOPIC

January	19	Introduction, selection of teams (Yin, Donohue)
	26	Iterative Problem Solving (Yin)
February	2	Biotech Focus Area : “Challenges in Bio-defense” Prof. Dara Frank, Medical College of Wisconsin
	9	Hands-on Search Techniques: Literature, Markets, Patents UW libraries, Emily Wixson (Chemistry Library) Location: 108 Wendt Library
	16	Interdisciplinary team-based approaches to defining and solving complex problems Prof. Teri C. Balsler, Department of Soil Science, UW-Madison
	23	The Art of Technical Persuasion (giving talks) Prof. David Nelson, Biochemistry
March	2	Progress Report 1 (Oral/Written), TEAM A Panel Review by BTP steering committee members
	9	Progress Report 1 (Oral/Written), TEAM B Panel Review by BTP steering committee members
	16	Patents & Protection of IP Michael Falk, Patents and Licensing Department Wisconsin Alumni Research Foundation
	23	Spring Recess
	30	Progress Report 2 (Oral/Written), TEAM A Panel Review by BTP steering committee members

April	6	Progress Report 2 (Oral/Written), TEAM B Panel Review by BTP steering committee members
	13	Open session (feedback from TEAMS to BTP) Strategies to building contacts/collaborations.
	20	Challenges and opportunities in starting a company Panel Q&A: with Prof. Nick Abbott (Chemical & Biological Eng.) Prof. Jim Dahlberg (Biomolecular Chemistry) Prof. Lynn Allen-Hoffmann (Pathology, Medical School)
	27	Ethical issues in technology development Prof. Linda Hogle (Medical History and Bioethics in the Medical School)
May	4	Final Oral Presentations, Written Reports due Panel Review by BTP steering committee

Course participant	Undergraduate institution	UW-Madison Graduate program
Heidi Behrens	Univ. of California-Irvine	Chemistry
Elise Huang	Univ. of California-Berkeley	Chemical engineering
Kraig Kumfer	Brandeis University	Cellular and molecular biology
Ryan Marcheschi	Iowa State University	Biochemistry
Lorraine Meyer	M.I.T.	Biophysics
David Miller	Univ. of Notre Dame	Chemistry
Mark Staudt	Univ. of Texas-Austin	Biomolecular chemistry

Final Project

Option 1: Research Proposal (NSF)

Project Summary

The proposal must contain a summary of the proposed activity suitable for publication, not more than one page in length. It should not be an abstract of the proposal, but rather a self-contained description of the activity that would result if the proposal were funded. The summary should be written in the third person and include a statement of objectives and methods to be employed. It must clearly address in separate statements (within the one-page summary): (1) the intellectual merit of the proposed activity; and (2) the broader impacts resulting from the proposed activity. (See Chapter III for further descriptive information on the NSF merit review criteria.) It should be informative to other persons working in the same or related fields and, insofar as possible, understandable to a scientifically or technically literate lay reader.

Project Description

The Project Description should provide a clear statement of the work to be undertaken and must include: objectives for the period of the proposed work and expected significance; relation to longer-term goals of the PI's project; and relation to the present state of knowledge in the field, to work in progress by the PI under other support and to work in progress elsewhere.

The Project Description should outline the general plan of work, including the broad design of activities to be undertaken, and, where appropriate, provide a clear description of experimental methods and procedures and plans for preservation, documentation, and sharing of data, samples, physical collections, curriculum materials and other related research and education products. It must describe as an integral part of the narrative, the broader impacts resulting from the proposed activities, addressing one or more of the following as appropriate for the project: how the project will integrate research and education by advancing discovery and understanding while at the same time promoting teaching, training, and learning; ways in which the proposed activity will broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.); how the project will enhance the infrastructure for research and/or education, such as facilities, instrumentation, networks, and partnerships; how the results of the project will be disseminated broadly to enhance scientific and technological understanding; and potential benefits of the proposed activity to society at large.

*Materials here and additional information; see National Science Foundation
Grant Proposal Guide
http://www.nsf.gov/pubs/gpg/nsf04_23/*

Option 2: Business Plan

A business plan precisely defines your business, identifies your goals, and serves as your firm's resume. The basic components include a current and pro forma balance sheet, an income statement, and a cash flow analysis. It helps you allocate resources properly, handle unforeseen complications, and make good business decisions. Because it provides specific and organized information about your company and how you will repay borrowed money, a good business plan is a crucial part of any loan application. Additionally, it informs sales personnel, suppliers, and others about your operations and goals.

Plan Your Work

The importance of a comprehensive, thoughtful business plan cannot be overemphasized. Much hinges on it: outside funding, credit from suppliers, management of your operation and finances, promotion and marketing of your business, and achievement of your goals and objectives.

"The business plan is a necessity. If the person who wants to start a small business can't put a business plan together, he or she is in trouble," says Robert Krummer, Jr., chairman of First Business Bank in Los Angeles.

Despite the critical importance of a business plan, many entrepreneurs drag their feet when it comes to preparing a written document. They argue that their marketplace changes too fast for a business plan to be useful or that they just don't have enough time. But just as a builder won't begin construction without a blueprint, eager business owners shouldn't rush into new ventures without a business plan.

Before you begin writing your business plan, consider four core questions:

1. What service or product does your business provide and what needs does it fill?
2. Who are the potential customers for your product or service and why will they purchase it from you?
3. How will you reach your potential customers?
4. Where will you get the financial resources to start your business?

*Materials here and additional information; see US Small Business Administration
<http://www.sbaonline.sba.gov/>*