

Biochemical/Bioprocess Engineering

***Solving engineering problems generated in commercial
production of various bio-products and making them safe to use
and economically competitive in the market***

Taught by Professor Dr. Fengwu Bai

in the 2009 spring term

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What's the meaning of and difference among bioscience, biotechnology and bioengineering? How can the progress in the fundamental research and applied technology affect our society and contribute to its long-term sustainability?

Did you attend in the IBS-2008 last year in Dalian and get some inspiration from it?

Effective communication in English is the most important no matter what kind of professions you are pursuing in the future!

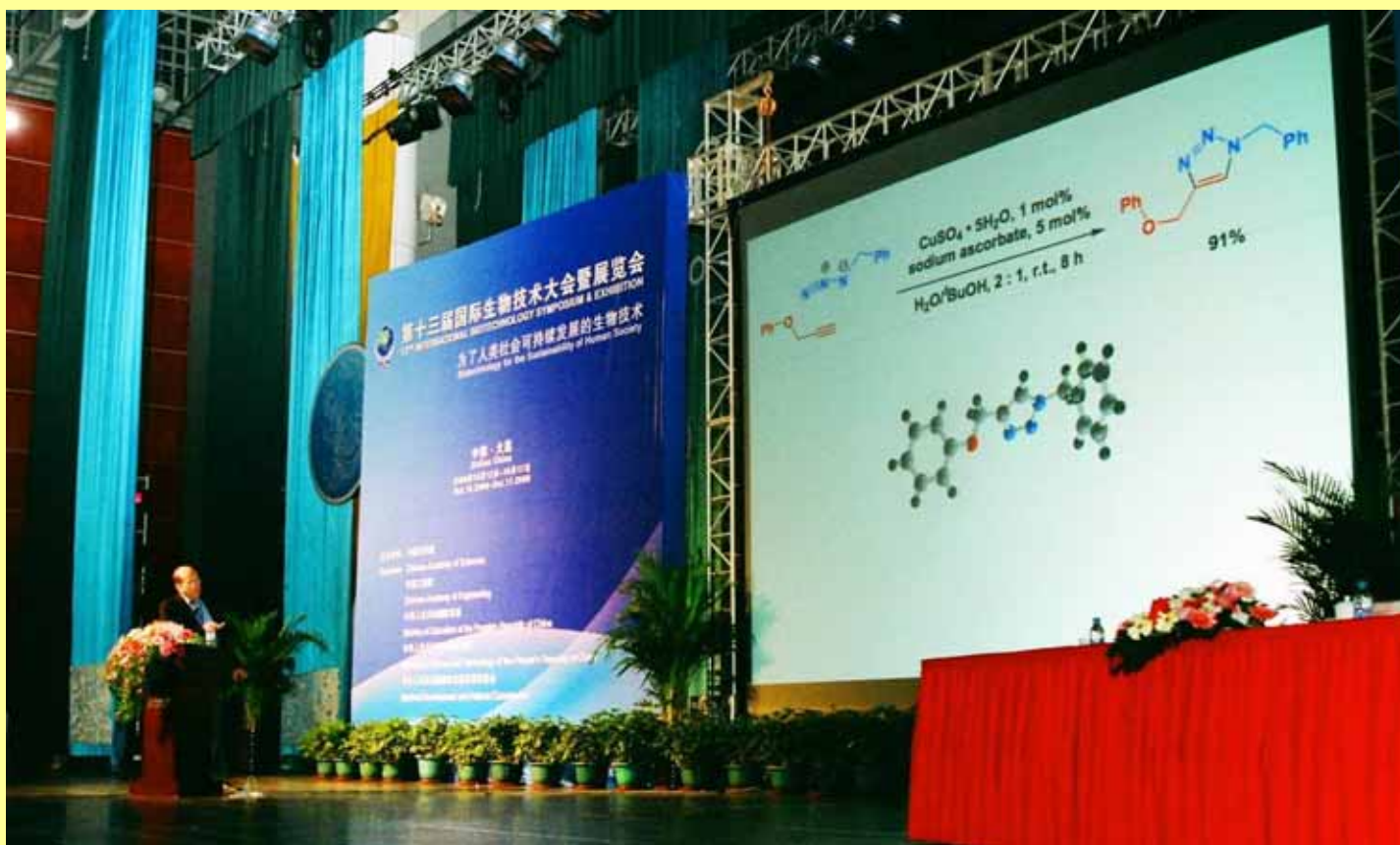
Crude oil is the blood of modern society. Among the 1 billion tons crude oil consumed annually in the US, more than 70% is imported from the Middle East.

Currently, China is consuming about 360 million tons crude oil annually. How much is imported? And how much self-produced? What's the impacts on China's economy and society as well?

What's the role of those fuels and energy derived from renewable biomass resources in the rapidly growing Chinese economy?



**The Opening Ceremony and Plenary Session of the IBS-2008
on Oct. 12, 2008 in Dalian, China**



The 2001 Nobel laureate Prof. K. Barry Sharpless at the Scripps Research Institute, USA is delivering the Plenary Lecture: The secret life of enzymes



13th International Biotechnology Symposium & Exhibition (IBS-2008)

Biotechnology for Sustainability of Human Society

October 12-17, 2008, Dalian, China

www.ibs2008.org

Under the auspices of the International Union of Pure and Applied Chemistry (IUPAC), the IBS series is held every four years on a different continent and recognized as the premier international biotechnology event. The 13th IBS is jointly organized by various Chinese governmental organizations. Thousands of participants from academia, industry and government are expected.

Sponsorships

Industry, publishers, professional societies, government agencies and individuals are cordially invited to be co-sponsors of this prestigious conference.

Please check the website for benefits.

Plenary Lecturers

Three Nobel Laureates (W. Arber, D.A. Glaser and K.B. Sharpless) are confirmed.

Others will be announced in due course.

Theme Areas

Section I: Systems Biology (5 sessions)

Chair: G. N. Stephanopoulos (USA)

Co-Chairs: S. Y. Lee (Korea) and Z. X. Deng (China)

Section II: Tissue Engineering and Cell Cultivation (6 sessions)

Chair: W-S. Hu (USA)

Co-Chair: J-J. Zhong (China)

Section III: Medical Biotechnology (7 sessions)

Chair: M. R. Pillai (India)

Co-Chairs: W. A. Marasco (USA) and Q. M. Zhan (China)

Section IV: Agriculture Biotechnology (7 sessions)

Chair: M. V. Montagu (Belgium)

Co-Chairs: R. M. Raab (USA) and D. F. Huang (China)

Section V: Industrial Biotechnology (7 sessions)

Chair: Z. A. Cao (China)

Co-Chairs: C. Laane (The Netherlands) and M. A. Vijayalakshmi (France)

Section VI: Marine Biotechnology (6 sessions)

Chair: G. Bernardi (Italy)

Co-Chairs: J. C. Hunter-Cevera (USA), X. Xu (China) and S. Qin (China)

Section VII: Environmental Biotechnology (6 sessions)

Chair: H. Ohtake (Japan)

Co-Chairs: U. Stottmeister (Germany), S. N. Agathos (Belgium) and X. Huang (China)

Section VIII: Food Biotechnology (5 sessions)

Chair: D. B. Lund (USA)

Co-Chairs: A. Visconti (Italy), S. Adachi (Japan) and J. Chen (China)

Section IX: Biosafety and Bioeconomy (4 sessions)

Chair: Guy Van den Eede (Italy)

Co-Chairs: J. Valdes (USA) and D. B. Zhang (China)

Special sessions or workshops will be organized upon suggestions.

Color Type	Area of Biotech Activities
Red	Health, Medical, Diagnostics
Yellow	Food Biotechnology, Nutrition Science
Blue	Aquaculture, Coastal and Marine Biotech
Green	Agricultural, Environmental Biotechnology – Biofuels, Biofertilizers, Bioremediation, Geomicrobiology
Brown	Arid Zone and Desert Biotechnology
Dark	Bioterrorism, Biowarfare, Biocrimes, Anticrop warfare
Purple	Patents, Publications, Inventions, IPRs
White	Gene-based Bioindustries
Gold	Bioinformatics, Nanobiotechnology

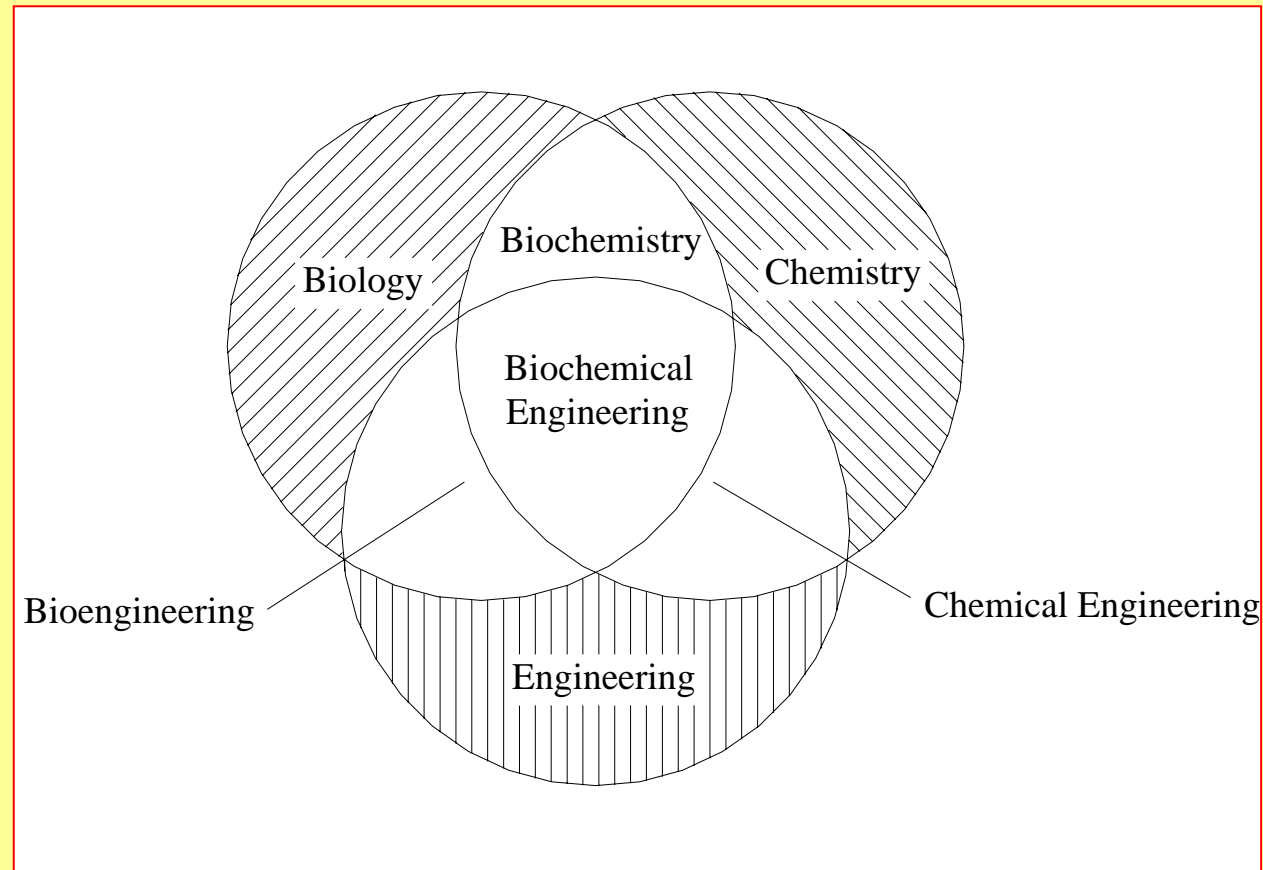
Green biotechnology is the use of biotechnology tools in agricultural processes. An example would be the selection and domestication of plants via micropropagation.

White Biotechnology is the application of biotechnology for industrial purposes, including the practice of using cells or components of cells like enzymes to generate industrially useful products, and particularly alternative fuels and energy and biomaterials that are both renewable and environmentally friendly.

Red biotechnology refers to the use of organisms for the improvement of medical processes. It includes the designing of organisms to manufacture pharmaceutical products like antibiotics and vaccines, the engineering of genetic cures through genomic manipulation, and its use in forensics through DNA profiling.

Blue Biotechnology is concerned with the application of modern biological methods to marine organisms. It involves the use of these organisms, and their derivatives, for purposes such as increasing seafood supply and safety, controlling the proliferation of noxious water-borne organisms, and developing new drugs. Recently, the large scale cultivation of algae for biofuels have generated great attention across the whole world.

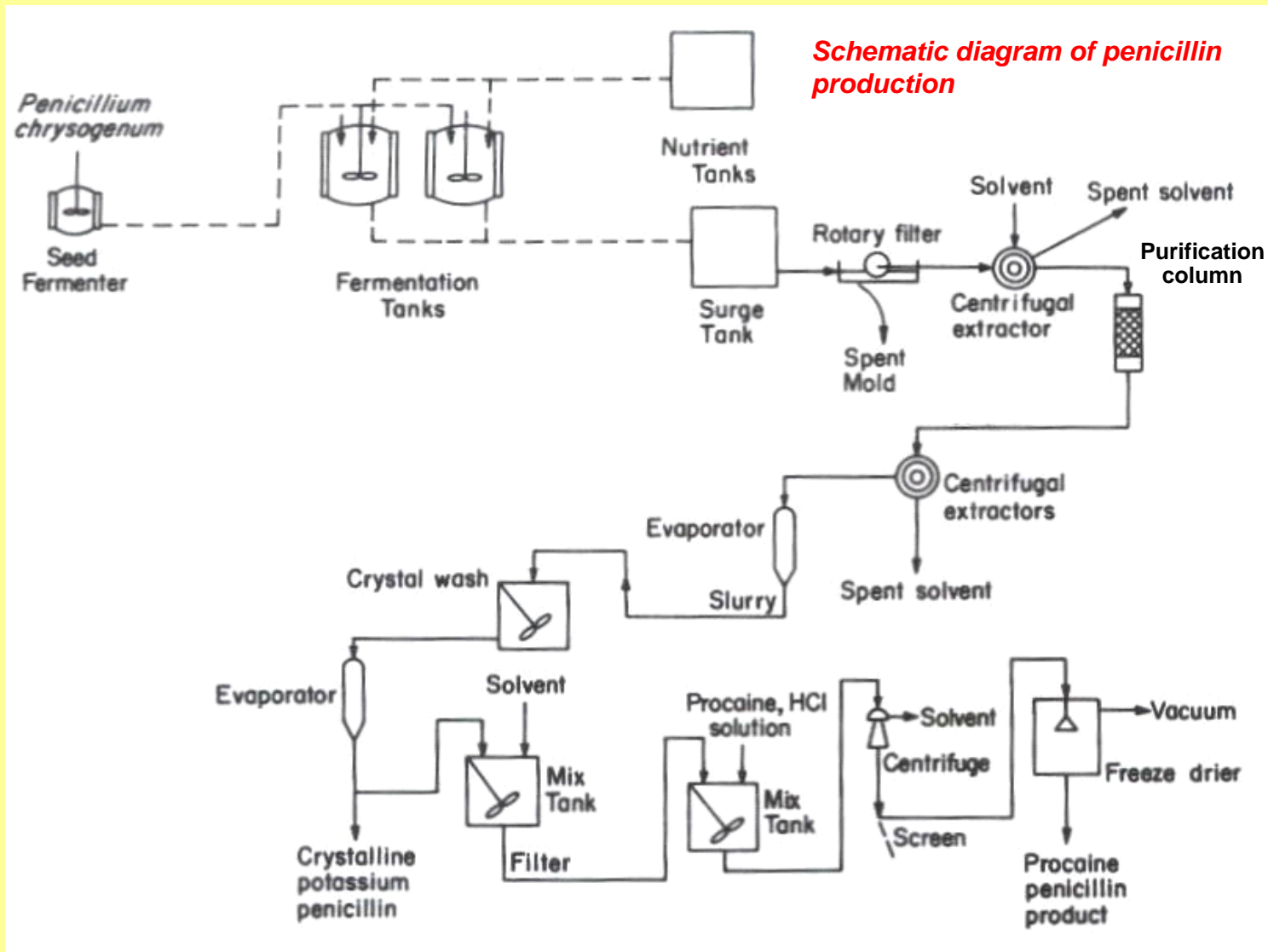
Biochemical Engineering: An inter-discipline among biological sciences and engineering



Bioproceess Engineering

Bioreaction Engineering involving various enzymatic catalysis reactions and cell cultures and fermentations to produce various bioproducts is the primary step and core of the commercial production of those bioproducts.

Bioseparation Engineering consisting of a sequence of recovery and separation steps to obtain final products to satisfy various requirements, standards and criterion in safety and effectiveness is determining the cost of most bioproducts, particularly for those pharmaceuticals for medical cure and diagnosis.



Marking your calendar for the course

Introduction: 1 time unit

Part I: Engineering Principles, 8 time units + 4 tutorials

Part II: Bioreaction Kinetics, 8 time units + 2 tutorials

Part III: Bioreactor Engineering, 6 time units + 2 tutorials

Review and Summarization: 1 time unit

20% from homework, 20% from quiz at class, and 60% from final examination!

No class on the 3rd week from March 10 to 15.