

| Instructor Information | |
|------------------------|--|
| Name | |
| Room NO. | |
| Phone Number | |
| E-mail | |
| Office Hours | |

| Course Information | |
|--------------------|--------------------------------|
| Course Name | Biochemical Engineering |
| Course Number | 0905755 |
| Prerequisites | |
| Credit Hours | 3 |
| Class Meeting | |

| Course Description | |
|--------------------|---|
| Course Objectives | The primary objective of this course is to present an introduction to fundamental and applied aspects of industrial biochemical processing. Basic knowledge of cell structure and composition, cellular metabolism, enzymes and their use in industry, bioreactor analysis and design, bioseparations for product recovery, industrial applications, and an introduction to molecular biology techniques for enhancing productivity |
| Text Books | Shuler and Kargi, Bioprocess Engineering: Basic Concepts, 2nd Edition, Prentice Hall P T R, 2002. |
| References | |

| Course Assessment | |
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| Mid Term exam | 20% |
| Seminars | 20% |
| Participation, Quizzes, take home exams | 10% |
| Final Exam | 50.0% |

| Course Contents | |
|--|--------------|
| Topic | Chapter No. |
| Cell structure and composition | Chapter 2 |
| 1. Enzymes: <ul style="list-style-type: none"> • structure of enzymes and kinetics of enzyme-catalyzed reactions • Why use enzymes? • Enzymes in industrial processes | Chapter 3 |
| Microbial Growth Kinetics <ul style="list-style-type: none"> • Batch Growth Characteristics • Modeling of Continuous Culture • Stoichiometry of Microbial Growth | Chapter 6 |
| Bioreactor Design <ul style="list-style-type: none"> • Suspended Cell Systems • Immobilized Cell Systems • Sterilizing Process Fluids and Equipment | Chapter 9-10 |
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Prerequisite

Student who attend this course **MUST** be familiar with

- ✓ Introduction to the fundamental unit operations required to process biological materials in bioprocessing,
- ✓ Integration of biology and chemistry into biological engineering using basic concepts in heat, mass, and energy conservation and transport
- ✓ Strong background on chemical reaction kinetics
- ✓ Basic knowledge on ordinary differential equation solutions
- ✓ Basic knowledge on mass transfer diffusion concept

Expected Course Outcomes

Upon completion of this course, students should be able to:

- Show a capacity for investigation and experimentation including the analysis and interpretation of data
- Demonstrate the ability to design a biological system or component of one that achieves a cost-effective solution, or contributes there to Exercised their skills within the framework of a multi-disciplinary team or work group
- Demonstrate the ability to solve engineering problems, utilizing fundamental engineering principles as well as the latest technologies and engineering tools, in the process of engineering analysis and design
- Ethical conduct, issues in biological engineering, and professional responsibility Demonstrated the capability to communicate verbally, in writing, and through the use of engineering communication media
- Exhibit an understanding of the role that Biological Engineering plays in our modern global society, that much is to be learned from the past and applied to the present, and that responsible engineers are ethical and will continue to increase their knowledge throughout their professional career

Regulations

I. Attendance:

Attendance of classes is obligatory. Absence must be verified according to the university's regulation, ***please take it serious.***

II. Quizzes and homework

All students are required to finish their homework assignments, and submit them on time. Late homework ***will not be accepted*** under any circumstances. Popup quizzes will be given without any prior notice. You need to come prepared to class. A hand calculator is recommended to be available in every class. In addition to the final exam, there will be one midterm exam. These exams will be challenging and comprehensive during the class

IV. Conduct in classroom:

While in the class room, all cell phones, Laptops need to be turned off.