

## ABE 5442/ABE 4932- BIOPROCESS ENGINEERING

1. **Catalog Description:** The course will cover engineering principles, processes and techniques for using biological agents such as cells, enzymes or antibodies for the production of chemicals, food, biofuels and pharmaceuticals, and waste treatment. The course will include stoichiometry and kinetics of reactions that employ biological agents; and design, analysis and operation of reactors (fermentors). 3 credits (Fall)
2. **Pre-requisites and Co-requisites:** Life Sciences, Biological, Chemical or Environmental Engineering coursework
3. **Course Objectives:**

The objectives of the course are to develop concepts and mathematical tools required to understand and analyze

  - biological processes involved in production of chemicals, food, biofuels and pharmaceuticals using biological agents.
  - Stoichiometry and kinetics of microbially mediated processes
  - design and operation of reactors utilizing biological agents
4. **Instructor:** Dr. Pratap Pullammanappallil
  - a. Office location: 203 Rogers Hall
  - b. Telephone: (352) 294 6719
  - c. E-mail address: pcpratap@ufl.edu
  - d. Web site: Canvas
  - e. Office hours (Zoom): Wednesdays 10:00 AM -12:00 noon or by appointment
5. **Teaching Assistant:** None
6. **Meeting Times:** Tuesday 10:40 AM – 11:30 PM; Thursday 10:40 AM – 12:35 PM
7. **Class/Laboratory Schedule:** 3 hours a week
8. **Meeting location:** 110 Frazier Rogers Hall
9. **Material and Supply Fees:** None
10. **Textbook (Required):**
  - a. Title: Bioprocess Engineering Principles
  - b. Author: Pauline M. Doran
  - c. Publisher: Academic Press, 2012 (Second Edition)
  - d. ISBN-13: 978-0-12-220851-5 (paperback)
11. **Recommended Reading:**
  - a. Bioreaction Engineering Principles, John Villadsen, Jens Nielsen and Gunnar Lidén, Third Edition 2011, Springer
  - b. Bioprocess Engineering – Basic Concepts, Shuler, Kargi and DeLisa, Third Edition 2017, Prentice Hall
12. **Course Outline:**
  - Introduction
  - Bioprocess Engineering Examples
  - Stoichiometry and energetics of microbial growth and product formation

- Material and Energy Balances
- Principles of Enzyme Catalysis
- Cell Growth and Kinetics
- Analysis of mixed cultures
- Immobilized cells
- Metabolic Engineering
- Operating considerations
  - Bioreactor modes of operation
  - Agitation, Aeration and Heat transfer
  - Nutrient requirements
  - Sterilization

**13. Attendance and Expectations:** Attendance at lectures is expected. Attendance at Zoom office hours and review sessions is optional. Homework is due within one week of when assigned.

**14. Grading:**

Homework	250 points
Exam# 1	200/100 points
Exam# 2	200/100 points
Exam# 3	200/100 points
Total	750 points (two highest exam grades will be doubled)

**15. Grading Scale (Tentative and subject to change):** **A** [95-100%], **A-** [89-94%], **B+** [83-88%], **B** [75-82%], **B-** [65 -74%], **C+** [55 – 64%], **C** [50-54%], **C-** [40-49%], **E** (< 40%)

**16. Make-up Exam Policy:** No make-up exams will be given except for valid medical reasons or unless prior arrangements have been made.

**17. Honesty Policy** – All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others.

**18. Accommodation for Students with Disabilities** – Students requesting classroom accommodation must first register with the Dean of Students Office. That office will provide the student with documentation that he/she must provide to the course instructor when requesting accommodation.

**19. UF Counseling Services** – Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:

- University Counseling Center, 301 Peabody Hall, 392-1575, Personal and Career Counseling.
- SHCC mental Health, Student Health Care Center, 392-1171, Personal and Counseling.
- Center for Sexual Assault/Abuse Recovery and Education (CARE), Student Health Care Center, 392-1161, sexual assault counseling.
- Career Resource Center, Reitz Union, 392-1601, career development assistance and counseling.

**20. Software Use** – All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.