

Syllabus of Biological Reaction Engineering

Lecturer	Prof. Tai Hyun Park
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Level of Students	Graduate student or senior level undergraduate student
Description of the Class	Development of bioprocess is essential for the industrial production of biological products. This course covers the basic concept and principles of bioprocess engineering for the cell cultivation.
Textbook	M. L. Shuler, F. Kargi, and M. Delisa, "Bioprocess Engineering", 3rd ed. Prentice-Hall, 2017.
Contents	<ol style="list-style-type: none"> 1. An Overview of Biological Basics: An Engineer's Perspective <ul style="list-style-type: none"> Cell Types Cell Construction Cell Nutrients 2. Batch Growth of Cells <ul style="list-style-type: none"> Quantifying Cell Concentration Growth Pattern and Kinetics Effect of Environmental Conditions 3. Kinetic Parameters for Cell Growth <ul style="list-style-type: none"> Specific Growth Rate Yield Coefficients 4. Growth Kinetic Models <ul style="list-style-type: none"> Unstructured Model Structured Model Nonsegregated Model Segregated Model 5. Product Formation Kinetics <ul style="list-style-type: none"> Growth-Associated Kinetics Nongrowth-Associated Kinetics Mixed-Growth-Associated Kinetics 6. Stoichiometry of Cell Growth and Product Formation <ul style="list-style-type: none"> Elemental Balances 7. Operation of Bioreactor <ul style="list-style-type: none"> Choosing the cultivation Method 8. Fed-Batch Operation of Bioreactor <ul style="list-style-type: none"> Feeding Strategy Optimization of Fed-Batch Operation 9. Continuous Operation of Bioreactor <ul style="list-style-type: none"> Optimization of Continuous Operation 10. Animal Cell Cultures & Medical Applications
Exam & Grade	<p>Midterm and Final will be closed book.</p> <p>Grade</p> <p>Midterm: 40%, Final: 40%, Attendance: 10%, Homework: 10%</p>