

# EBIO - Biological Engineering

## **EBIO 100 Intro to Biological Engr: 2 Credits (1 Lec, 2 Lab)**

(F) An introduction to engineering measurements, computations, problem solving, and experimental design. Discussion of the breadth of opportunities in chemical and biological engineering. Cross-Listed with ECHM 100.

## **EBIO 125CS Microbes in the Environment: 3 Credits (3 Lec)**

(F) During the semester, students will explore contemporary issues related to microorganisms in the environment through a series of lectures and hands-on activities. Topics will include microbes in environmental, industrial, and medical settings. Examples include the beneficial role microbes play in treating waste water and making beer, wine, cheese and other food products as well as problems caused by microbes in medical infections, hot tubs, drinking water, and other industrial systems. Completing this course will advance a student's awareness and appreciation of scientific thought and critical thinking and will improve communication skills.

## **EBIO 216 Elem Princ of Biological Engineering: 3 Credits (3 Lec)**

PREREQUISITE: ECHM 201, M 172. (Sp) Fundamentals of energy balances in biological engineering applications

## **EBIO 290R Undergraduate Research: 1-6 Credits (1-6 Other)**

PREREQUISITE: Consent of instructor. (F, Sp, Su) Directed undergraduate research/creative activity which may culminate in a written work or other creative project. May be repeated  
Repeatable up to 99 credits.

## **EBIO 291 Special Topics: 1-4 Credits (1-4 Other)**

PREREQUISITE: None required but some may be determined necessary by each offering department. Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number  
Repeatable up to 12 credits.

## **EBIO 292 Independent Study: 1-3 Credits (1-3 Other)**

PREREQUISITE: Consent of instructor and approval of the Associate Dean. (F, Sp, Su) Directed research and study on an individual basis  
Repeatable up to 6 credits.

## **EBIO 324 Bioengineering Transport: 3 Credits (3 Lec)**

PREREQUISITE: EBIO 216, M 274. (F) PREREQUISITE: EBIO 216, M 274. Fundamentals of the phenomena governing the transport of momentum, energy, and mass in biological systems

## **EBIO 393 Turkish Bioengin Electives: 3 Credits (3 Lec)**

() Transfer equivalency.  
Repeatable up to 99 credits.

## **EBIO 396 Turkish Bioengin Electives: 3 Credits (3 Lec)**

Repeatable up to 99 credits.

## **EBIO 407 Biological Engineering Thermodynamics: 3 Credits (3 Lec)**

PREREQUISITE: EBIO 216, M 274 and CHMY 211 or CHMY 321 and CHMY 323. (F) Principles of thermodynamics, conservation of energy and phase equilibria applied to living systems and biological processes

## **EBIO 411R Biological Engineer Design I: 3 Credits (2 Lec, 1 Other)**

PREREQUISITE: ECHM 321, EBIO 324, EBIO 438  
COREQUISITE: EGEN 310R. (F) Senior capstone course. Design and simulation of chemical engineering equipment, processes and plants

## **EBIO 412R Biological Engineering Design II: 3 Credits (2 Lec, 1 Other)**

PREREQUISITE: EBIO 438. (Sp) Senior capstone course. Design and simulation of chemical engineering equipment, processes and plants. Students are required to meet with a faculty one hour a week for the additional credit hour of instruction

## **EBIO 438 Bioprocess Engineering: 3 Credits (3 Lec)**

PREREQUISITE: ECHM 201 and M 274 Biotechnology process engineering - microbial process fundamentals, enzyme catalysis, bioreactor design and analysis, separation of biomaterials

## **EBIO 439 Downstream Processing: 3 Credits (3 Lec)**

PREREQUISITE: ECHM 321  
COREQUISITE: EBIO 438. (Sp) Theory and Quantitative description of separation processes commonly employed in biotechnology and bioengineering. Cell disruption, extraction, crystallization, precipitation, filtration, centrifugation, chromatography, electrophoresis

## **EBIO 442 Bioengineering Lab I: 3 Credits (1 Lec, 4 Lab)**

PREREQUISITE: EBIO 324, EBIO 438, EGEN 350. (F) Department of Chemical & Biological Engineering

## **EBIO 443 Bioengineering Lab II: 3 Credits (1 Lec, 4 Lab)**

PREREQUISITE: EBIO 442. (Sp) Students will develop an experimental objective and experimental design to meet a particular objective. Independently investigate the relevant theory for a proposed experiment, analyze data for statistical significance, draw conclusions from the experimental data. They will then effectively communicate the technical information through written reports

## **EBIO 461 Principles of Biomedical Engineering: 3 Credits (3 Lec)**

PREREQUISITE: ECHM 321 or EBIO 324 or consent of instructor. (Sp) An overview of biomedical engineering including the application of engineering principles to the design of products and processes in the health industries. Topics include ethics, biomechanics, biomaterials, bioinstrumentation, biosensors, pharmacokinetics, and tissue engineering

## **EBIO 490R Undergraduate Research: 1-8 Credits (1-8 Other)**

PREREQUISITE: Senior Standing and consent of instructor. (F, Sp, Su) Directed undergraduate research/creative activity which may culminate in research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research. May be repeated  
Repeatable up to 12 credits.

## **EBIO 491 Special Topics: 1-3 Credits (1-3 Lec)**

PREREQUISITE: Course prerequisites as determined for each offering. Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number  
Repeatable up to 12 credits.

## **EBIO 492 Independent Study: 1-3 Credits (1-3 Other)**

PREREQUISITE: Junior standing, consent of instructor and approval of department head. (F, Sp, Su) Directed research and study on an individual basis  
Repeatable up to 6 credits.

## **EBIO 498 Internship: 1-12 Credits (1-12 Other)**

PREREQUISITE: Junior standing, consent of instructor and approval of associate dean. (F, Sp, Su) An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field  
Repeatable up to 12 credits.

**EBIO 566 Fundamentals of Biofilm Engr: 3 Credits (3 Lec)**

PREREQUISITE: M 274. (F) Development of quantitative descriptions of processes of microbial growth, diffusive and convective solute transport, and cell attachment and detachment. Integration of these processes in mathematical models of biofilm accumulation and activity. Application of these approaches to the analysis of biofilms in diverse industrial and natural environments

**EBIO 575 Research or Prof Paper Project: 1-4 Credits (1-4 Other)**

PREREQUISITE: Graduate standing. (F, Sp, Su) A research or professional dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee. Directed research and study on an individual basis  
Repeatable up to 6 credits.

**EBIO 590 Master's Thesis: 1-10 Credits (1-10 Other)**

PREREQUISITE: Master's standing  
Repeatable up to 99 credits.

**EBIO 591 Special Topics: 1-4 Credits (1-4 Lec)**

PREREQUISITE: Upper division courses and others as determined for each offering. Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number  
Repeatable up to 12 credits.

**EBIO 592 Independent Study: 1-4 Credits (1-4 Other)**

PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies. (F, Sp, Su) Directed research and study on an individual basis  
Repeatable up to 8 credits.

**EBIO 594 Seminar: 1 Credits (1 Other)**

PREREQUISITE: Graduate standing or seniors by petition. (F, Sp)  
Department of Chemical & Biological Engineering

**EBIO 598 Internship: 2 Credits (2 Other)**

PREREQUISITE: Graduate standing, consent of advisor and approval of department head. (F, Sp, Su) An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field

**EBIO 690 Doctoral Thesis: 1-10 Credits (1-10 Other)**

PREREQUISITE: Doctoral standing  
Repeatable up to 10 credits.