

## **PROCESSES IN ENVIRONMENTAL BIOTECHNOLOGY - Course Syllabus**

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**Course Number:** EnSE 341

**Course Title:** PROCESSES IN ENVIRONMENTAL BIOTECHNOLOGY

|                             |              |                           |              |
|-----------------------------|--------------|---------------------------|--------------|
| <b>Academic Semester:</b>   | Spring       | <b>Academic Year:</b>     | 2015/ 2016   |
| <b>Semester Start Date:</b> | Jan 24, 2016 | <b>Semester End Date:</b> | May 19, 2016 |

**Class Schedule:** Monday and Wednesday: 9:00–10:30

**Classroom Number:**

**Instructor(s) Name(s):** Pascal Saikaly  
**Email:** pascal.saikaly@kaust.edu.sa

**Teaching Assistant name:**  
**Email:**

**Office Location:** Building 4, Level 4, Room 4237

**Office Hours:**

### **COURSE DESCRIPTION FROM PROGRAM GUIDE**

Principles of molecular biology and microbiology applied to the design and operation of engineered environmental systems: treatment of wastewater, bioremediation, energy conversion.

### **COMPREHENSIVE COURSE DESCRIPTION**

A course that introduces graduate students from different engineering and science disciplines to the fundamental principles of microbiology and engineering (quantitative tools) and discusses example applications of microbiological processes (traditional and emerging) for wastewater treatment and resource recovery.

### **GOALS AND OBJECTIVES**

1. To introduce students to concepts in microbiology and biochemistry and enable them to translate and apply these concepts within a coherent engineering based framework to the broad areas of environmental biotechnology.

2. To present an overview of important environmental biotechnologies involved in biotransformation of pollutants and generation of energy.
3. Lay the foundation for building mathematical models of engineered bioreactors.

## REQUIRED KNOWLEDGE

Basic biology or microbiology course (e.g. B211), or permission of instructor.

## REFERENCE TEXTS

1. B. E. Rittmann, P. L. McCarty, Environmental Biotechnology: Principles and Applications, McGraw-Hill, 2001.
2. Seviour R, and P.H. Nielsen, Microbial Ecology of Activated Sludge, IWA Publishing, 2010.

## METHOD OF EVALUATION

| Percentages %                                                             | Graded content                                                                                       |
|---------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| <b>30%</b><br><b>30% (15% for each paper)</b><br><b>30%</b><br><b>10%</b> | <b>2 h exam</b><br><b>Two paper presentations</b><br><b>Term paper</b><br><b>Class participation</b> |

## COURSE REQUIREMENTS

### Assignments

#### ***Paper presentations:***

Each student is responsible for choosing two research articles that describes microbially mediated processes for nitrogen and phosphorous removal in engineered biological systems. The student will give a 20-minute presentation summarizing the chosen paper. In the presentation the student should: (1) include the research problem and/or hypothesis; (2) include the objective of the study; (3) include a description of the methodology used in the paper; (4) summarizes the main findings of the study; and (5) critically evaluates the research paper. Following the presentation, there will be a 20-minute discussion of the paper where all students are encouraged to participate. The articles should be approved by the instructor.

***Term paper:***

Each student is responsible for writing a review paper on a topic in environmental biotechnology with emphasis on sustainable wastewater treatment technologies (e.g. aerobic granular sludge, anaerobic membrane bioreactors, bioelectrochemical systems, anammox). Topics should be approved by the instructor. Papers will be ranked based on content, organization, style, grammar, punctuation, spelling, and neatness. The review paper should be 10 pages (including references, figures and tables), single-spaced, 12 point font Times New Roman, 1 inch margins, and formatted (e.g. in-text citations and references).

**Course Policies**

Attendance is mandatory. Class attendance will be taken and students will be penalized for absence according to the following rules:

A total of two absences for the semester will be permitted w/o penalty. These include instances of sickness and other valid excuses. For every absence beyond the two absences, 2 points will be deducted from the final course grade.

**Additional Information****NOTE**

The instructor reserves the right to make changes to this syllabus as necessary.