

The University of Alabama in Huntsville
Summer 2012

EE 610: ST: Physics and Chemistry of Biosensors

Lectures	Monday/Tuesday/Wednesday/Thursday 10:15 AM – 12:15 PM, EB219.	
Description	The course will give a general introduction into basic life science principles with a special focus on the chemistry and physics of biosensors.	
Instructor	Dr. Kerstin Thurow, Professor for Automation / Life Science Automation University of Rostock e-mail: Kerstin.Thurow@celisca.de	
Textbook	Hans-Jürgen Butt, Karlheinz Graf, Michael Kappl, <i>Physics and Chemistry of Interfaces</i> , Wiley 2003, ISBN 978-3527404131	
Grading	Project Proposal	20%
	Homework	30%
	Graduate project	30%
	Final Exam and Documentation	20%
Important Dates	Classes begin:	Tuesday, May 29, 2012.
	Project proposal due:	Monday, June 4, 2012.
	Last day of lectures:	Thursday, June 7, 2012.
	Project due:	Friday, June 29, 2012.
	Final exam:	Friday, June 29, 2012, 8 – 10:30 AM.

Course Outline

I. Introduction

General Introduction into the topic; definition of life sciences and life sciences applications; general introduction to biosensors

II. Basic Biochemistry

Introduction to carbohydrates, lipids, proteins as basic biological elements of biosensors

III. Main Biochemical Processes

Introduction to main metabolic pathways; Cellular respiration; Cory cycle; Urea Cycle as main biological processes in biosensors

IV. Basic Introduction into Toxicology

Contaminants and environment; historical development of environmental pollution; definition of general terms; definition of safety values; Occurrence / sources; toxicokinetics; effects of selected compound classes

V. Toxicology of Nanomaterials

Definition of Nanomaterials; occurrence / sources; properties; toxicokinetic effects of Nanomaterials

VI. How to measure Toxicity

Measuring principles for biological and analytical detection of toxicity and specific compounds to be used in biosensors

VII. Basic Electrochemical Principles

Definition and properties of electrolytes; electrical conductivity; measurement of electrical conductivity; Daniel element; introduction into physics of double layers electromotoric power; Nernst Equation; measuring principles to be used in biosensors