



Course Syllabus: Biochemistry and Metabolic Engineering - PS 302

Division	Biological and Environmental Sciences & Engineering Division
Course Number	PS 302
Course Title	Biochemistry and Metabolic Engineering
Academic Semester	Spring
Academic Year	2017/2018
Semester Start Date	01/28/2018
Semester End Date	05/24/2018
Class Schedule (Days & Time)	02:30 PM - 04:00 PM Sun Wed

Instructor(s)				
Name	Email	Phone	Office Location	Office Hours
Salim Al-Babili	Salim.Babili@KAUST.EDU.S A	+966128082565		You can reach me any time by e-mail. Office: 3237 in Building 2. Phone: 8082565

Teaching Assistant(s)	
Name	Email

Course Information	
Comprehensive Course Description	The course will provide an overview on cell metabolism and biochemical pathways, covering primary, lipid and isoprenoid metabolism. This will be followed by an introduction of the concept of Metabolic Engineering, highlighting key factors that regulate natural and synthetic pathways. Examples for engineered pathways will be presented and discussed in depth. The course also includes practical introduction in metabolites analysis.
Course Description from Program Guide	This course provides in depth knowledge in major topics of plant biochemistry and an introduction to metabolic analysis.
Goals and Objectives	The student will get a deep understanding of key metabolic processes and a comprehensive overview on achievements and bottlenecks of metabolic engineering.
Required Knowledge	Profund basis knowledge of chemistry and biochemistry and strong interest in metabolic processes.
Reference Texts	Reviews and primary literature will be assigned during the semester. For background on specific topics, the following books are recommended. Stephanopoulos, G.N., Aristidou, A.A., Nielsen, J. (2000). <i>Metabolic Engineering: Principles and Methodologies</i> . Academic Press. Del Carmen Cortassa, S., Aon, MA (2011) <i>An Introduction to Metabolic and Cellular Engineering</i> (2nd Edition). World Scientific. Berg, J.M., Tymoczko, J.L., Gregory J. Gatto Jr. G.J., Stryer, L. (2015) <i>Biochemistry</i> (8th Edition). Macmillan Learning Heldt H-W (2011) <i>Plant Biochemistry</i> . Fourth Edition. Elsevier Academic Press. Buchanan, B., Grisse, W., Jones, R. (2015) <i>Biochemistry & Molecular Biology of Plants</i> , John Wiley & Sons. Nelson, D.L., Cox, M.M. (2017) <i>Principles of Biochemistry</i> (7th Edition). Macmillan Education

Method of evaluation	30.00% - Tests 50.00% - Scientific review article presentation 20.00% - Active participation
Nature of the assignments	Assigned reading and paper presentation.
Course Policies	Unexplained absences for any class will result in point being deducted from the final grade
Additional Information	

Tentative Course Schedule <i>(Time, topic/emphasis & resources)</i>		
Week	Lectures	Topic
1	Sun 01/28/2018 Wed 01/31/2018	Introduction and Overview of Biochemical Pathways
2	Sun 02/04/2018 Wed 02/07/2018	Primary Metabolism – Respiration and Photosynthesis
3	Sun 02/11/2018 Wed 02/14/2018	Lipid and Isoprenoid Metabolism
4	Sun 02/18/2018 Wed 02/21/2018	Regulation of Metabolic Pathways, Compartmentalization, Enzyme kinetics
5	Sun 02/25/2018 Wed 02/28/2018	Feed-back inhibition, Metabolon, Scaffolding
6	Sun 03/04/2018 Wed 03/07/2018	Rate Limiting Step, Pathway Engineering and Flux Analysis
7	Sun 03/11/2018 Wed 03/14/2018	Amino Acids Biosynthesis; Metabolism of Plant Hormones
8	Sun 03/18/2018 Wed 03/21/2018	Test; Metabolic Engineering: Increasing Nutritional Quality
9	Sun 03/25/2018 Wed 03/28/2018	Metabolic Engineering: Increasing Nutritional Quality
10	Sun 04/01/2018 Wed 04/04/2018	Metabolic Engineering: Production of Drugs and Chemicals
11	Sun 04/08/2018 Wed 04/11/2018	Presentations
12	Sun 04/15/2018 Wed 04/18/2018	Enhancing Photosynthesis Efficiency
13	Sun 04/22/2018 Wed 04/25/2018	Nitrogen Fixation and Biofuel Production
14	Sun 04/29/2018 Wed 05/02/2018	Presentations
15	Sun 05/06/2018 Wed 05/09/2018	Presentations
16	Sun 05/13/2018 Wed 05/16/2018	Examples for Metabolic Engineering and Metabolites Analysis (Practical)
17	Sun 05/20/2018 Wed 05/23/2018	Examples for Metabolic Engineering and Metabolites Analysis (Practical)
18		NA

Note

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