



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	2018/2019
Semester Start Date	01/27/2019
Semester End Date	05/23/2019
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 and major secondary pathways. 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 metabolic engineering and metabolites analysis.
Course Description from Program Guide	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 metabolite 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., Gruissem, 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	50.00% - Oral presentation 30.00% - Tests 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 01/27/2019 Wed 01/30/2019	Introduction and Overview of Biochemical Pathways, Evaluation Test
2	Sun 02/03/2019 Wed 02/06/2019	Primary Metabolism – Respiration and Photosynthesis
3	Sun 02/10/2019 Wed 02/13/2019	Lipid and Isoprenoid Metabolism, Metabolism of Plant Hormones
4	Sun 02/17/2019 Wed 02/20/2019	Regulation of Metabolic Pathways, Compartmentalization, Enzyme kinetics
5	Sun 02/24/2019 Wed 02/27/2019	Enzyme Kinetics, Feed-back inhibition, Metabolon, Scaffolding, Test
6	Sun 03/03/2019 Wed 03/06/2019	Rate Limiting Step, Pathway Engineering and Flux Analysis, Amino Acids Biosynthesis
7	Sun 03/10/2019 Wed 03/13/2019	Examples for Metabolic Engineering and Metabolites Analysis (Practical)
8	Sun 03/17/2019 Wed 03/20/2019	Examples for Metabolic Engineering and Metabolites Analysis (Practical)
9	Sun 03/24/2019 Wed 03/27/2019	Spring Break
10	Sun 03/31/2019 Wed 04/03/2019	Metabolic Engineering: Increasing Nutritional Quality; Metabolic Engineering: Production of Drugs
11	Sun 04/07/2019 Wed 04/10/2019	Metabolic Engineering, Examples; Nitrogen Fixation and Biofuel Production
12	Sun 04/14/2019 Wed 04/17/2019	Metabolic Engineering, Examples; Enhancing Photosynthesis Efficiency
13	Sun 04/21/2019 Wed 04/24/2019	Metabolic Engineering, Examples; Chemicals
14	Sun 04/28/2019 Wed 05/01/2019	Presentations
15	Sun 05/05/2019 Wed 05/08/2019	Presentations
16	Sun 05/12/2019 Wed 05/15/2019	Presentations
17	Sun 05/19/2019 Wed 05/22/2019	Presentations and General Discussion

Note

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