



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	2016/2017
Semester Start Date	01/22/2017
Semester End Date	05/18/2017
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 8082565		You can reach me any time by e-mail. Office: 3237 in Building 2. Phone: 8082565

Teaching Assistant(s)

Name	Email
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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 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.

Method of evaluation	70.00% - Presentation 10.00% - Attendance 20.00% - Attendance and 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 01/22/2017 Wed 01/25/2017	Introduction and Overview of Biochemical Pathways
2	Sun 01/29/2017 Wed 02/01/2017	Primary Metabolism – Respiration and Photosynthesis
3	Sun 02/05/2017 Wed 02/08/2017	Lipid and Isoprenoid Metabolism
4	Sun 02/12/2017 Wed 02/15/2017	Regulation of Metabolic Pathways, Compartmentalization, Enzyme kinetics
5	Sun 02/19/2017 Wed 02/22/2017	Feed-back inhibition, Metabolon, Scaffolding
6	Sun 02/26/2017 Wed 03/01/2017	Rate Limiting Step, Pathway Engineering and Flux Analysis
7	Sun 03/05/2017 Wed 03/08/2017	Presentations
8	Sun 03/12/2017 Wed 03/15/2017	Metabolic Engineering: Increasing Nutritional Quality
9	Sun 03/19/2017 Wed 03/22/2017	Metabolic Engineering: Increasing Nutritional Quality
10	Sun 03/26/2017 Wed 03/29/2017	Metabolic Engineering: Production of Drugs and Chemicals
11	Sun 04/02/2017 Wed 04/05/2017	Presentations
12	Sun 04/09/2017 Wed 04/12/2017	Enhancing Photosynthesis Efficiency
13	Sun 04/16/2017 Wed 04/19/2017	Nitrogen Fixation and Biofuel Production
14	Sun 04/23/2017 Wed 04/26/2017	Presentations
15	Sun 04/30/2017 Wed 05/03/2017	Metabolism of Plant Hormones
16	Sun 05/07/2017 Wed 05/10/2017	Examples for Metabolic Engineering and Metabolites Analysis (Practical)
17	Sun 05/14/2017 Wed 05/17/2017	Examples for Metabolic Engineering and Metabolites Analysis (Practical)
18		NA

Note

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