Course Title	**Metabolism and diseases**				
Course Code	ABS410				
Course Type	Program Specific Elective				
Level	BSc (Level 1)				
Year / Semester	4th / 7th Semester				
Teacher's Name	Kyriacos Kyriacou				
ECTS	6	Lectures / week	3	Laboratories / week	2
Course Objectives	Building on the fundamental knowledge acquired from courses ABS103 and ABS 106, titled Principles of Biochemistry I and II, this course will cover the general principles of metabolic disorders by focusing on dysregulated pathways, inborn errors of metabolism and their associated diseases. The main objectives of the course are: To provide students with the principles , theoretical knowledge and practical skills needed to acquire a sound understanding of metabolic disorders and their underlying mechanisms, including their genetic basis To understand how the different metabolic pathways interact with each other and how dysregulation leads to disease To learn the basic practical methods that are used to investigate and diagnose metabolic disorders and inborn errors of metabolism				
Learning Outcomes	At the completion of the course the students will be able to: • Understand the meanings of regulation and control of metabolic pathways • Describe the major metabolic pathways and their control, in health and disease , e.g. glucose, lipid and nucleic acid metabolism. • Demonstrate critical understanding of selected mechanisms that can lead to human metabolic diseases, including their genetic basis. • Describe intracellular signaling pathways activated by major plasma membrane and nuclear receptors and their role in controlling gene transcription in health and disease • Develop a sound understanding on metabolic pathway interrelationships and how they interact with each other • Demonstrate critical understanding of selected biochemical mechanisms that underpin the metabolisms studied. • Analyze data relating to metabolic defects and report results. • Understand and critically evaluate the diagnostic tests used to diagnose metabolic disorders and inborn errors of metabolism				
Prerequisites	ABS103, ABS 106		Required		Yes

Course Content	Theory: Major pathways of Carbohydrate metabolism and their control/ discussion of disorders like diabetes Major pathways of lipid metabolism and their control/ discussion of disorders like hyperlipidaemia Amino acid and heme metabolism/ discussion of disorders like phenylketonuria/thalassemia Purine and pyrimidine metabolism and control Inborn errors of metabolism in neonates and adults Disorders of energy metabolism Bioenergetics, mitochondria and oxidative phosphorylation Biological membranes, receptors and cell signalling Biochemistry of hormones <u>Laboratory workshops/exercises:</u> Through the use laboratory workshops students will be taught: Methods of studying metabolism/ analysis of metabolites in blood and urine (Chromatography/immunoassay/NMR) • Diagnostic procedures/Automation • The laboratory investigation of diabetes • The laboratory investigation of inborn errors of metabolism • The laboratory investigation of defects in energy metabolism • The laboratory investigation of defects in hormones
Teaching Metabolism and diseases	The teaching of the course includes lectures to help students understand the theoretical background and laboratory exercises in order to help them comprehend the main principles that regulate and control Biochemical pathways. Using diabetes and other examples the mechanisms of metabolic disorders including inborn errors of metabolism, will be explained and discussed. Methods such as discussion, questions/answers, and pros/cons, are used to enhance student's participation. PowerPoint and image-rich material and short animations are used to better understand the principles of Metabolism and metabolic disorders. The laboratory exercises are conducted in the Biology and Biochemistry Laboratory using the appropriate laboratory equipment, under the instructor's supervision. Appropriate preparation and demonstration by the laboratory supervisor precedes each laboratory exercise. Assessment of laboratory exercises includes laboratory reports submitted by each student at the end of each lab exercise.
Bibliography	<u>Textbooks:</u> 1. Understanding the control of metabolism, Author: Fell, David ISBN: 185578047X 2. Fundamental of Biochemistry by Vopet ,D and Voet, JG Publ. J Wiley and Sons ISBN: 978-1-118-91840-1 3. Clinical Chemistry by Marshall WJ and Bangert SK, Publ by Mosby-Elsevier ISBN: 9780702079368 4. Principles of Biochemistry, by Horton, HR, Moran,LA et al Publi. Prentice-Hall ISBN-13: 978-0321707338, ISBN-10: 0321707338. 5. Textbook of Biochemistry with Clinical correlations, by Devlin Thomas, Publ. by Wiley-Liss ISBN: 978-0-470-60976-7

	References: A list of recent references within the last two years will be recommended for additional reading
Assessment	Course Work 40% • Mid-term Test 20% • Lab reports 20% Final Exam 60% For student evaluation, the overall grade is determined by a written midterm exam (20%), a laboratory grade (20%) and a written final exam (60%). The mid-term exam is carried out between the 6th and 8th week and it mainly includes short answer- questions and problem- solving questions and examines specific modules of the course. As far as the laboratory grade is concerned, it comprises of the evaluation of the laboratory reports (60% of the laboratory grade) submitted by the students after every experiment and a final laboratory examination (40% of the laboratory grade) which mainly includes short answer questions and problem-solving questions. In their laboratory reports, students are asked to describe the experimental procedure, to evaluate and analyse their results and to answer specific questions. The following criteria are taken into account when evaluating laboratory reports: (a) experimental data collection (30%), (b) data analysis (40%), and application of theory to draw conclusions (30%). The final exam of the course is carried out during the 14th-16th week of each semester and includes short answer questions, decision questions, and problem-solving questions regarding all course modules. The final assessment of the students is formative and summative and is assured to comply with the subject's expected learning outcomes and the quality of the course.
Language	Greek, English