

Faculty of Biological, Agronomic and Environmental Engineering

BIR1321 Biochemistry II : metabolic pathways and their regulation

[30h+15h exercises] 3.5 credits

This course is taught in the 1st semester

Teacher(s): Françoise Foury, Michel Ghislain (coord.), Yvan Larondelle
Language: French
Level: First cycle

Aims

All cells extract energy from their environment and use this energy to convert simple molecules into cellular components. The purpose of this course is to introduce the basic concepts of energy transduction and cell chemistry which take place through a highly integrated network of chemical reactions called metabolism. It will provide a foundation for more specialised courses on metabolism.

Main themes

The course describes the processes that enable a living cell to extract energy and reducing power from the environment. It also explains how the cell synthesises the building blocks of its macromolecules including carbohydrates, lipids and proteins. This course aims to illustrate the organism's capacity to react to variations of the external and internal environments. The chemistry of the reactions is emphasised as well as the regulation and coordination between different metabolic pathways. The lectures are illustrated by industrial or medical applications. Basic concepts are explained during laboratory exercises which describe the scientific methods used to measure metabolism activity.

Content and teaching methods

Topics covered by the lectures include: Principles of bioenergetics; Membrane channels and pumps ; Signal-Transduction pathways ; Glycolysis-fermentation and the pentose phosphate pathway; The citric acid cycle; Electron transport and oxydative phosphorylation; Gluconeogenesis and glycogen synthesis ; Degradation and biosynthesis of lipids and cholesterol ; The cycle of urea; Degradation and biosynthesis of amino acids and purine nucleotides. Laboratory exercises will focus on activity of some metabolic pathways (e.g.; glucoside transmembrane transport, cellular respiration and glucose degradation through the phosphogluconate pathway).

Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

Prerequisite: BIR1220 Biochemistry I : Structural biochemistry, enzymology and molecular biology

Examination: The exam will cover information from the lectures and laboratory exercises. The laboratory reports are also evaluated.

Support : copies of the PowerPoint slides are available from the teachers; the most useful textbook for the lecturers is Lehninger : Principles of Biochemistry by DL Nelson et MM Cox.

Lecturers : teachers and assistants specialised in biochemistry and molecular biology.

Other credits in programs

BIR13BA/A	Troisième année de bachelier en sciences de l'ingénieur, orientation bioingénieur (option : agronomie)	(3.5 credits)	Mandatory
BIR13BA/C	Troisième année de bachelier en sciences de l'ingénieur, orientation bioingénieur (option : chimie)	(3.5 credits)	Mandatory
BIR13BA/E	Troisième année de bachelier en sciences de l'ingénieur, orientation bioingénieur (option : environnement)	(3.5 credits)	Mandatory