

# BIOS 2021 METABOLISM

**Credit Points** 10

**Legacy Code** 300848

**Coordinator** Ming Wu ([https://directory.westernsydney.edu.au/search/name/Ming Wu/](https://directory.westernsydney.edu.au/search/name/Ming%20Wu/))

**Description** Organisms degrade food molecules to generate energy and converts excess food molecules into internal fuel stores. This subject will cover topics including: bioenergetics; the structures of key molecules; glycolysis, gluconeogenesis, glycogen synthesis and breakdown; fatty acid oxidation and synthesis; amino acid catabolism; urea synthesis; citric acid cycle; electron transport and oxidative phosphorylation. Emphasis will be on the regulation and integration of these pathways, including their responses to hormonal regulation. The effects of altered dietary and hormonal status on metabolic pathways and their consequences for the organism will be discussed.

**School** Science

**Discipline** Biochemistry and Cell Biology

**Student Contribution Band** HECS Band 2 10cp

Check your fees via the Fees ([https://www.westernsydney.edu.au/currentstudents/current\\_students/fees/](https://www.westernsydney.edu.au/currentstudents/current_students/fees/)) page.

**Level** Undergraduate Level 2 subject

**Equivalent Subjects** BIOS 2002 - Biochemistry 2 CHEM 2005 - Human Metabolism Disease

**Restrictions**

Successful completion of 60 credit points

## Learning Outcomes

On successful completion of this subject, students should be able to:

1. Describe the molecular mechanisms by which dietary macromolecules (carbohydrates, lipids, proteins) are metabolised to generate energy or, alternatively, to store energy.
2. Demonstrate an understanding of the mitochondrial electron transport system and the mechanism by which this system is coupled to ATP synthesis in oxidative phosphorylation.
3. Describe the different roles of the major tissues in energy metabolism. Know the general structural types and functional classifications of regulatory molecules such as hormones, growth factors, cytokines, neurotransmitters.
4. Explain how disruption of a metabolic pathway affects changes in other metabolic pathways in order to maintain homeostasis.
5. Demonstrate competency in; biochemical techniques, use of standard biochemical equipment, graphical skills, biochemical calculations and utilization of professional databases in the research, diagnostic, treatment and policy sectors.
6. Organise, present and interpret experimental observations in clear, concise written and spoken English. Identify, retrieve, read and analyse scientific literature relevant to the study of metabolism.
7. Demonstrate competency of time management through identifying milestones and reporting progress against milestones in accordance with human resource management and industry expectations.

## Subject Content

1. Carbohydrate metabolism, including pathways of glycolysis, gluconeogenesis, glycogen metabolism; their metabolic and hormonal regulation.
2. Lipid metabolism, including the fate of dietary lipid, fatty acid oxidation and synthesis, the regulation of fat metabolism, and the relationship between fat metabolism and carbohydrate metabolism in animals and plants.
3. Amino acid metabolism, including degradation and the fate of carbon skeletons (glucogenic and ketogenic amino acids) and amino groups (urea cycle).
4. The citric acid cycle, its role in energy metabolism and its regulation.
5. Electron transport and oxidative phosphorylation, including the structure and function of ATP synthase.
6. Integration of pathways of carbohydrate, fat and amino acid metabolism; the different roles of individual tissues in metabolism; regulation in response to dietary and disease states; maintenance of biochemical homeostasis.
7. Hormone regulation of metabolic processes in health and disease.
8. Design, conduct and interpret biochemical assays including detection of metabolites and hormones in biological samples.
9. Identify the nature of specificity, sensitivity and reproducibility when selecting and using biochemical assays to discriminate between healthy or disease states.
10. Engage and interpret professional literature, including database access and interpretation.
11. Time management, organisation and communication through team work activities as it relates to leadership responsibilities

## Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

Type	Length	Percent	Threshold	Individual/ Group Task	Mandatory
Practical	1,500 words maximum	20	N	Individual	N
Quiz	10 x 10 minutes	20	N	Individual	N
Report	1,000 words	10	N	Individual	N
Intra-session Exam	2 hours	10	N	Individual	N
Final Exam	2 hours	40	N	Individual	N