

SUBJECT OUTLINE



Subject Name:

Nutritional Biochemistry

Subject Code:

NMDF211

SECTION 1 – GENERAL INFORMATION

Award/s:	Total course credit points:	Level:
Bachelor of Health Science (Naturopathy)	128	2 nd Year
Bachelor of Health Science (Nutritional and Dietetic Medicine)	96	2 nd Year
Duration: 1 Semester		
Subject Coordinator: Vandana Gulati (Melbourne campus)		
Subject is: Core	Subject Credit Points: 2	

Student Workload:

No. timetabled hours per week:	No. personal study hours per week:	Total hours per week:
3	2	5

Delivery Mode:

Face to face	3 hour lecture	
Intensive Delivery	Details:	Summer School - contact hours are delivered over 5 weeks with 2 x 4 hour days delivered per week. Assessment: Exam 1 is completed in week 3 of the intensive, Problem Sheet is due end of week 5. Final written exam is conducted in week 6 of summer school.
Full Time		
Part Time		

Pre-requisites: BIOH122, NMDF121

Co-requisites: Nil

SECTION 2 – ACADEMIC DETAILS

Subject Rationale

This subject draws on students' understanding of biochemistry and explores the biochemical activity in the human body of nutrients and food constituents. Students gain an appreciation of the clinical relevance of nutritional biochemistry and the influence of dietary modification and nutritional intervention on physiology. Essential biochemical pathways are explored along with the nutritional influences that moderate those pathways. Students develop an appreciation of, and differentiate between biological oxidation and the metabolic release of energy and learn about their significance in disease processes. Students learn about the influence of nutritional biochemistry in liver detoxification, neurotransmitter synthesis, antioxidant pathways and immune function. This subject deepens students' understanding of nutrition and diet therapy and augments later nutritional medicine and clinical practicum subjects.

Learning Outcomes

1. Explain the biochemical absorption, storage and metabolic function of macro and micronutrients.
2. Describe the role of nutrients in the optimal functioning of key biochemical pathways in the body.
3. Integrate biochemical mechanisms with disease pathology and clinical treatment options.
4. Provide a coherent argument for the use of nutrient supplementation and food therapy for maintaining and promoting health and wellbeing through optimal biochemical pathway functions.

Assessment Tasks				
Type	Learning Outcomes Assessed	Week Content Delivered	Week Due	Weighting
Exam 1 (Multiple choice, short answer and application questions – 1 hour)	1,2	1-4	6	25%
Problem Sheet (Five (5) short answer application questions)	1,2,3	5-9	10	35%
Final Exam (Multiple choice, short answer and case study questions—1.5 hours)	1,2,3,4	1-13	Final Exam Period	40%

Prescribed readings:

1. Gropper, S. S., & Smith, J. L. (2016). *Advanced nutrition and human metabolism* (7th ed.). Belmont, CA: Wadsworth Cengage Learning.

Recommended readings:

1. Lord, R. S., & Bralley, J. A. (Eds.). (2008). *Laboratory evaluations for integrative and functional medicine* (2nd ed.). Duluth, GA: Metamatrix Institute.
2. Pagana, K. D., & Pagana, T. J. (2014). *Mosby's manual of diagnostic and laboratory tests* (5th ed.). St Louis, MO: Elsevier.
3. Stipanuk, M. H., & Caudill, M. A. (2013). *Biochemical, physiological, and molecular aspects of human nutrition* (3rd ed.). St Louis, MO: Saunders Elsevier.

Subject Content	
Week	Lecture
1.	Introduction to subject and assessment Stimulation and hormonal regulation of the digestive system Macronutrient Pharmacokinetics: <ul style="list-style-type: none"> • Biochemical mechanisms of digestion, absorption and metabolism • Transport and storage physiology • Agonists and antagonists
2.	Water Soluble Vitamin Pharmacokinetics: <ul style="list-style-type: none"> • Biochemical mechanisms of digestion, absorption and metabolism • Transport and storage physiology • Agonists and antagonists Nutrient control of gene expression
3.	Fat Soluble Vitamin and Macromineral Pharmacokinetics: <ul style="list-style-type: none"> • Biochemical mechanisms of digestion, absorption and metabolism • Transport and storage physiology • Agonists and antagonists Clinical issues of macromineral metabolism

4.	Micromineral Pharmacokinetics: <ul style="list-style-type: none"> Biochemical mechanisms of digestion, absorption and metabolism Transport and storage physiology Agonists and antagonists Clinical issues of micromineral metabolism
5.	<ul style="list-style-type: none"> Nutrients that resist digestion Effects of gut microbiota on digestion, nutrient status and systemic physiology Intolerance and malabsorption syndromes
6.	Exam 1 Liver detoxification: <ul style="list-style-type: none"> Liver Phase One Pathways Liver Phase Two Pathways Methylation and Homocysteine Alcohol Detoxification
7.	Hormonal regulation and types of energy metabolism: <ul style="list-style-type: none"> Relationship between liver and other organs Energy systems biochemistry: <ul style="list-style-type: none"> Glycolysis Krebs cycle and electron transport chain Anaerobic metabolism Glycogenesis and gluconeogenesis
NON-TEACHING WEEK (note that any make up classes may be scheduled in this week) Semester 1 - This aligns with the week after Easter so it may fall between weeks 6 to 8. Semester 2 - The break week falls between Weeks 7 and 8.	
8.	Energy systems biochemistry continued: <ul style="list-style-type: none"> Lipoproteins and fatty acid metabolism Cholesterol biosynthesis and regulation of metabolism Lipogenesis and lipolysis Clinical Issues of energy metabolism
9.	Managing oxidation <ul style="list-style-type: none"> Free radical generation Antioxidants Regeneration/ redox pathways
10.	Amino acid biochemistry: <ul style="list-style-type: none"> Regulation, metabolism and amino transferases Waste nitrogen and the urea cycle Neurotransmitter synthesis and functions
11.	Blood cell biochemistry <ul style="list-style-type: none"> Haemopoiesis, erythropoiesis, leukopoiesis Immunity: <ul style="list-style-type: none"> Gut associated lymphoid tissue Innate immunity Acquired immunity Clinical issues in haematology and immune dysfunction
12.	Inflammation:

	<ul style="list-style-type: none"> • Essential fatty acids • The role of prostaglandins, leukotrienes and cytokines • Nutritional influences on inflammation pathology
13.	Homeostatic maintenance <ul style="list-style-type: none"> • Body fluid, electrolytes and the role of the kidneys • Acid-base balance and associated disorders • Regulation of pH
14.	Non-Teaching Week/Practical Exam Week 1: note that make-up classes may be scheduled in this week.
15.	Non-Teaching Week/Practical Exam Week 2: note that make-up classes may be scheduled in this week.
16.	Final Exam Week 1 Please refer to the Exam Timetable for your local campus for the exact day and time of exam.
17.	Final Exam Week 2 Please refer to the Exam Timetable for your local campus for the exact day and time of exam.