

Subject Description Form

Subject Code	FSN5033
Subject Title	Clinical Biochemistry and Molecular Nutrition
Credit Value	3
Level	5
Pre-requisite	Nil
Objectives	<p>This subject is intended to introduce interactions among genetics, epigenetics, gut microbiota, diet and health. After taking the courses, the students would understand how genetic variations and varied gut microbiome compositions contribute to different metabolic responses to different diets and lifestyles. In addition, the subject is intended to introduce the research techniques and methodologies employed in nutritional epigenetics and gut microbiota studies.</p>
Intended Learning Outcomes	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> Understand basic concepts on genetics, epigenetics, gut microbiota, metabolisms and nutrition Understand research techniques and methodologies employed in the nutritional epigenetics and gut microbiota studies Understand biological mechanisms behind interactions among genetic variations, gut microbiota, diet and health Develop analytical, critical thinking, and written communication skills.
Subject Synopsis/ Indicative Syllabus	<p>The subject will contain 3 modules. The first module will include basic concepts of biochemistry, metabolism, population genetics, epigenetics, gut microbiota and nutrition. The second module will include basic concepts of nutrigenetics, nutrigenomics and interactions between epigenetics, diet and health. The third modules will include interactions between gut microbiota, diet and health. Brief contents of each module are listed below.</p> <p>The first module:</p> <ul style="list-style-type: none"> 1st lecture: basic metabolism, biochemistry, nutritional requirements and related research techniques, like metabolomics 2nd lecture: basic in genetics, gene polymorphism, epigenetics, and related research techniques, like genome wide association study 3rd lecture: basic in composition and metabolisms of gut microbiome,

	<p>interactions between gut microbiota and hosts, gut-brain axis, and related research technique, like metagenomics</p> <p>The second module:</p> <ul style="list-style-type: none"> • 4th lecture: nuclear receptors as nutrient sensors • 5th lecture: changes in DNA methylation profiles upon different diets • 6th lecture: genetic polymorphisms and metabolic variations upon different diets • 7th lecture: genetic polymorphisms, diet and metabolic diseases, part 1 • 8th lecture: genetic polymorphisms, diet and metabolic diseases, part 2 <p>The third module:</p> <ul style="list-style-type: none"> • 9th lecture: gut microbiome and nutrient metabolisms throughout the lifespan • 10th lecture: dietary modulations of gut microbiome by prebiotics and cultural food products • 11th lecture: gut microbiome, diet, and metabolic diseases, like obesity, fatty liver disease and inflammatory bowel disease • 12th lecture: altering gut microbiome for cognitive benefits
Teaching/Learning Methodology	<p>The basic contents of this subject will be presented with the aid of lecture notes, video, Blackboard platform and other teaching tools. In tutorials, students will participate in small-group discussions and learn to apply adequate knowledge in daily practice. The students will form small groups and each group will be required to review the literature on a specific topic and do a presentation. Students are also expected to study reference materials distributed in class, from the library or other sources (e.g. newspaper and magazine clippings, and information available on the Internet). A variety of assessment tools will be used, including quizzes and group presentations to develop students' analytical skills, critical thinking and communication skills. The lecture materials will be examined in the examination.</p>

Assessment Methods in Alignment with Intended Learning Outcomes	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)			
			a	b	c	d
	1. Quiz	30	√	√	√	√
	2. Group presentation	20	√	√	√	√
	3. Final examination	50	√	√	√	√
	Total	100 %				
Student Study Effort Expected	Class contact:					
	▪ Lecture					24 hours
	▪ Tutorial					12 hours
	▪ Group presentation					3 hours
	Other student study effort:					
	▪ Self study					84 hours
	Total student study effort					123 hours
Reading List and References	<ol style="list-style-type: none"> 1. Nutritional Epigenomics, Ferguson, Bradley S, San Diego: Elsevier Science & Technology; 2019; 1 2. Nutrigenetics applying the science of personal nutrition, Kohlmeier, Martin ; Kohlmeier, Gabrielle Z. ; ScienceDirect (Online service) 3. Nutriomics: Well-being through Nutrition, Thangadurai, Devarajan ; Islam, Saher ; Nollet, Leo M. L ; Adetunji, Juliana ; Nollet, Leo M.L ; Islam, Saher ; Thangadurai , Devarajan ; Islam, Saher ; Thangadurai, Devarajan ; Nollet, Leo M.L. ; Adetunji, Juliana Bunmi, United States: CRC Press; 2022; 1 4. Nutrigenomics : how science works, Carlberg, Carsten ; Ulven, Stine Marie. ; Molnár, Ferdinand. Cham : Springer; 2020 5. Gene Polymorphism and Nutrition: Relationships with Chronic Disease, Crujeiras, Ana B ; de Luis Roman, Daniel-Antonio, Basel: MDPI - Multidisciplinary Digital Publishing Institute; 2023 6. Dietary Influence on Nutritional Epidemiology, Public Health and Our Lifestyle, Varela, Lourdes M, Basel: MDPI - Multidisciplinary Digital Publishing Institute; 2023 7. Gut Microbiota: Interactive Effects on Nutrition and Health, Ishiguro, Edward ; Haskey, Natasha ; Campbell, Kristina, San 					

	<p>Diego: Elsevier Science & Technology; 2023; Second edition</p> <p>8. Metabonomics and Gut Microbiota in Nutrition and Disease, Kochhar, Sunil ; Martin, François-Pierre ; Martin, François-Pierre ; Kochhar, Sunil, London: Springer London, Limited; 2014; 2015</p> <p>9. The Gut-Brain Axis: Dietary, Probiotic, and Prebiotic Interventions on the Microbiota, Hyland, Niall ; Stanton, Catherine, San Diego: Elsevier Science & Technology; 2023; Second edition</p> <p>10. The Gut Microbiome: Bench to Table, Wu, Vivian C. H ; Wu, Vivian C.H ; Wu, Vivian C.H. United States: CRC Press; 2022; 1</p>
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