

NFS485H1 S – Nutritional Microbiology

OVERVIEW AND LEARNING OUTCOMES

This course provides an integrated approach to how prokaryotes modulate nutrient availability and how they interact with the host to impact human health from a molecular perspective.

The course will provide fundamentals of food microbiology, information on the gut endogenous microbiota and its impact on host metabolism and examples of nutritional strategies to modulate its composition.

At the end of this course students will be able to:

1. Explain which microorganisms can be found in food and are important for its manufacture or spoilage
2. Discuss the role played by the endogenous gut microbiota in body health
3. Understand how gut microbiota dysbiosis relates to intestinal and gastro-intestinal diseases or influences metabolism
4. Suggest nutritional strategies to modulate gut microbiota composition so to impact body health
5. Understand regulatory issues related to food microorganisms

CLASSES AND INFORMATION

Lectures: Tuesday, 1-4 pm in MS 2173

Instructor: **Dr Elena Comelli**, Dept. of Nutritional Sciences
150 College Street, FitzGerald Building room 308A
- phone: 416 978-6284
- email: elena.comelli@utoronto.ca
- office hour: immediately after each lecture or by appointment

Guest lecturers **Dr David Jenkins, University Professor**, Depts of Nutritional Sciences and Medicine, UofT
Dr Dana Philpott, Dept of Immunology, UofT
Dr Krista Power, Research Scientist, Agriculture and Agri-Food Canada

Teaching Assistant: **Christopher Villa**, Dept. of Nutritional Sciences
150 College Street, FitzGerald Building room 70
email: christopher.villa@mail.utoronto.ca

MATERIALS

There are no required or recommended textbooks. Material will be provided during the term.

EVALUATION

The course will contain the following evaluations:

1. Mid-term exam (35%)
2. Written assignment (25%)
3. Final examination (40%)

Mid-term exam (35%) February 25, 2014

This test will include all topics covered during weeks 1 to 6. Questions for this test may consist of definitions, true-false, short answer and essay type.

Written assignment (25%) March 25, 2014

Students will have to write an essay on a topic of choice that is related to Nutritional Microbiology, previous approval of the instructor. Approval should be obtained on or before February 4, 2014; please send an email to Dr Comelli, cc Christopher Villa.

Essay formatting: 10 pages max (5 min), excluding the cover page, tables, figures and references; typewritten, 12-points Times New Roman or Arial, double-spaced; numbered pages and 1" margins. The cover page must include the title, name, student number and date. The text must be organized with the following headings: Abstract (max 200 words), Background, Conclusions and References; additional headings are allowed. Two copies of the assignments are due on March 25, 2014 in class. To conserve paper, please print double-sided (learn how at: printdoublesided.sa.utoronto.ca).

Final exam (40%)

A final examination will take place during the allotted time in examination week. It will cover the entire course content, but emphasis will be placed on topics covered during weeks 8-12. The format will be similar to the mid-term exam.

COURSE OUTLINE**Week 1, Jan 7**

Introduction to Nutritional Microbiology. Biochemistry of fermentation. Bacteria in the food industry.

Week 2, Jan 14

Bacteria exogenous to the host utilized for food manufacturing (processing and preservation) or implicated in food spoilage. Regulatory issues.

Week 3, Jan 21

Bacteria endogenous to the host that modulate nutrient availability and metabolism. Oral and gut microbiota.

Week 4, Jan 28 Dr D. Jenkins

Gut microbiota as a metabolic organ: nutrients generation.
Dietary fiber and non-digestible oligosaccharides. Short-chain fatty acids.

Weeks 5, Feb 4

Gut microbiota: mechanisms of intestinal colonization and establishment. Molecular techniques in intestinal microbiology.

Week 6, Feb 11 Dr D. Philpott

Intestinal epithelium responses to non-pathogenic bacteria. Role of the gut microbiota in the mucosal barrier.

Week 7, Feb 25 Mid-term exam

Week 8, March 4

The emerging role of gut bacteria in intestinal and extra-intestinal diseases and the metabolic syndrome.

Week 9, March 11 Dr K. Power

Diet and gut microbiota interplay: production of toxic products and cancer.

Week 10, March 18

Gastro-intestinal infections.

Week 11, March 25 Written assignment due.

Dietary modulation of gut microbiota composition. Probiotics. Prebiotics. Synbiotics. Regulatory issues, claims.

Week 12, April 1

Dietary modulation of gut microbiota composition. Prebiotics and synbiotics. Regulatory issues, claims.