

<p style="text-align: center;"><b>THE UNIVERSITY OF BRITISH COLUMBIA</b> <b>FNH 313</b> <b>Microorganisms in Food Systems</b></p>
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**Term:** 2 (January – April, 2012)  
**Instructor:** Dr Kevin Allen  
FNH Room 218  
Phone: 604.822.4427  
E-mail: Please email through Vista

**Lectures:** Tuesdays, 2:00 – 5:00 pm  
**Location:** MacMillan room 158 and various breakout rooms in MacMillan 360.

**FNH 313 Teaching Assistants:**

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**Microorganisms in Food Systems:** This course focuses on the following: the importance of microorganisms in relation to the safety, spoilage and preservation of foods; extrinsic and intrinsic factors affecting growth, survival and inactivation of microorganisms in fermented food systems; cleaning and sanitation of food processing plants. Prerequisite: BIOL 112 [3-0-0].

**Rationale:**

In order to produce high quality foods, it is important to understand the role of microorganisms in food production, preservation, spoilage and foodborne disease. This course will build upon basic information developed in BIOL 112 and will focus on the interaction of microorganisms with selected food systems. We will examine how extrinsic environmental factors and intrinsic parameters within foods can be applied to food systems to produce high quality food products. Specifically, we will consider how these factors influence survival, growth and inactivation of microorganisms as it relates to highlighted food systems. The course will also provide you with an appreciation and knowledge base regarding the build-up and removal of soils on food processing equipment and food contact surfaces, as well as various factors requiring consideration to effectively clean and sanitize food contact surfaces.

**Learning outcomes:**

Upon completion of the course you should be able to:

- Evaluate the importance of specific classes of microorganisms pertaining to their role in food safety, food preservation and food spoilage.

- Assess the importance of extrinsic environmental factors that can be used to influence growth, survival and inactivation of microorganisms of importance in selected food systems.
- Describe the role that various types of microorganisms have as they pertain to production, sensory properties and safety of selected food systems.
- Analyze the potential impact of a combination of extrinsic and intrinsic factors on microorganisms of significance in selected food systems.
- Explain the function of components of cleaning and sanitizing systems used in the food industry.
- Determine the type of cleaning and sanitizing systems appropriate for specific types of soils, food contact surface and equipment configurations
- Evaluate the impact of personal sanitation practices in the context of safe food handling
- Practice verbal and written communication skills
- Participate effectively in a problem-based learning environment
- Further develop skills in team work environments

**Textbook:**

There is no text for this course. However, readings from from “Principles of Food Sanitation” (5<sup>th</sup> ed.) by N.G. Marriott and R.B. Gravani, 2006. Springer, New York will be provided to all students during the course. When appropriate, other readings may be also be provided. To cover copyright fees for these materials, students are required to pay \$35.00 to the FNH secretary (Barb Wakal) located in room 230 of the FNH building; if fees are not paid, your final grade will be withheld.

Students are also encouraged to use published literature, including peer-reviewed journal articles and food microbiology textbooks. Regarding the latter, a number of relevant texts may be found online or in the Woodward library. Suggestions include, but are not limited to:

- Hutkins, R. W. 2006. Microbiology and Technology of Fermented Foods. Blackwell, Ames, IA. (in the reserve collection at Woodward Library)
- International Commission on Microbiological Specifications for Foods. ICMSF. 2005. Microbial Ecology of Food Commodities. Kluwer Academic/Plenum Publishers, New York (available on line through the UBC Library: enter “icmsf” as the keyword search term)
- Jay, J. M., Loessner, M. J. and Golden, D. A. 2005. Modern Food Microbiology. 7<sup>th</sup> ed. Springer, New York. (available on-line through the UBC Library: type “jay, james” as the author search)
- Jay, J. M. 2000. Modern Food Microbiology, 6<sup>th</sup> ed. Aspen Publishers Inc., Gaithersburg, MD. (available on-line at the following web address: <http://www.knovel.com/knovel2/Toc.jsp?BookID=1162>)
- Ray, B and Bhunia, A. 2008. Fundamental Food Microbiology. CRC Press, Boca Raton. FL.

**Problem-based learning concept:**

FNH 313 is taught using a problem-based learning (PBL) format. Based on this, formal lecturing will constitute a minor component of weekly lectures, ranging from 15 to 60 min. For the PBL component, you will work in teams with 6 to 7 members to address case studies spanning several weeks. To ensure students learn relevant course material, specific information will be provided during each PBL session that guides the learning process. For this to be effective, you will have to communicate effectively with fellow group members and ensure that individual research tasks are addressed and disseminated to the group on a weekly basis. For each case study, Prof. Allen will make team assignments.

Each group will be assigned a teaching assistant who has received training in the concepts and practices of PBL and in facilitating the learning process during PBL sessions. The role of the teaching assistant is to facilitate discussion within the group and provide guidance if required; it is not the teaching assistant's role to provide answers or solutions to case study-related questions. Each team member should be an active participant in the PBL sessions and in discussions on the FNH 313 Vista website. At the end of each PBL session, individual group members will be assigned learning objectives that will need to be researched and communicated to respective group members. To facilitate this, each group will be provided a unique forum through Vista to post results, questions, arrange meetings, *etc.* Teaching assistants and Prof. Allen will monitor weekly Vista discussions for all groups; failure to participate may lead to a failure in the PBL component of the course.

PBL-based learning requires active participation during team discussions as well as between classes through library research, consultation of appropriate sections of the reference materials, and discussions with your peers in person or *via* the FNH 313 Vista website. These efforts are required to adequately prepare you for the next PBL session. You will find the more active you engage in the PBL process, the more rewarding it is.

At the end of each PBL session, the tutor will provide an assessment of the team dynamics by providing group and individual feedback. Team members will also have the opportunity to provide feedback to the teaching assistant and to other members. You will have an opportunity to complete a PBL evaluation form at the end of each problem case where you will be able to evaluate the case, the tutor and the team.

Participation in the PBL portion of the course will be evaluated on a pass/fail basis. **Failure to attend classes regularly, and to participate and contribute to the team discussions in and out of the class will lead to a fail for the PBL portion of the course.** This in turn will lead to a failing mark for the course regardless of the grades received for assignments, quizzes, and the midterm and final examination.

**Methods of evaluation:**

Midterm examination	25%
Reports from case studies	20%
Quizzes	15%
Final examination	40%

### **Midterm examination**

The midterm examination, scheduled for 1.5 hours, will begin at 2:00 pm on Tuesday, March 6, 2012. You may bring one sheet (8.5 x 11") of paper with pertinent information to assist you during the examination. Further information about the midterm will be available closer to the examination date.

### **Case study reports**

You will be required to submit a report for each case *via* the assignment section of the FNH 313 Vista site. The report is due 1 hour before the class following completion of respective case studies. In total, there will be two reports (1000 to 1200 words) and one abstract (ca. 300 words). Specific requirements for each assignment will be provided at appropriate times during the semester.

**Quizzes:** Three quizzes will be administered during the course of the term. Each quiz will be composed of 25 multiple-choice questions and will be completed on-line through the FNH 313 Vista site. Dates for the quizzes are: January 31, February 28, and April 3.

### **Final examination (Date and time TBA)**

You will write the final examination in April during the final examination period as scheduled by the Registrar's office. Further information about the final exam will be available closer to the examination date. You may bring two sheets (8.5 x 11") of paper with pertinent information to assist you during the examination. Requests for change of exam date because of travel schedules will not be entertained.

### **A Note on Plagiarism:**

Plagiarism is a serious offence that can result in expulsion. Please ensure that you understand what qualifies as plagiarism before you hand in your paper; this is YOUR responsibility. Never use another author's ideas or phrasing without indicating a source, and use quotation marks when quoting. (Website for UBC Plagiarism Resource Centre: <http://www.library.ubc.ca/home/plagiarism/>.) You will be required to electronically submit your reports through "Turn It In" at [www.turnitin.com](http://www.turnitin.com) to check for plagiarism prior to submitting the reports to the FNH 313 Vista Website. The "Turn It In" class ID for FNH 313 and password will be provided at a later date. You can find more information about TurnItIn at the following UBC website: <http://www.vpacademic.ubc.ca/integrity/turnitin/students.htm>

Prior to submission of your reports to the TurnItIn site, please ensure that you have removed identifying information (your name and student number) from the text of your report. Please refer to the vpacademic website above for more detailed instructions.

### **Problem Based Learning Case Outlines**

**Week 1 (Jan 10):** An overview of the course, including assignments, examinations, quizzes and learning objectives for FNH 313 will be provided. To familiarize you with PBL, background concepts and engagement in PBL practices will be introduced; this will aid in week 2 when the first PBL case study commences. An introduction to food

production, quality and foodborne disease will be discussed to provide the context for why we need to understand microorganisms in food systems. Lastly, the role, significance and control of biofilms in food production environments will be discussed.

**Weeks 2 to 5 (Jan 17, 24, 31 and Feb 7):**

**PBL Case Study #1.** Milk products will be used as the example food system. A problem pertaining to milk quality, product development and safety will be addressed in this case. You will work as a group of consultants to a dairy processor who is experiencing a challenge with development of a probiotic dairy product.

**Week 6 (Feb 14):**

**PBL Case Study #1 Review and PBL Case Study #2.** Cleaning and sanitation of food contact surfaces in the food processing industry will be the focus of this section. Design features in processing plants and equipment that facilitate cleaning and sanitation will be considered in this section of the course.

The first session of PBL Case Study #2 begins.

**Weeks 7, 9, 10 (Feb 28, Mar 13, 20)**

**PBL Case Study # 2 (cont.)**

Factors affecting survival, growth and inactivation of microorganisms in foods will be explored. Concepts showing the relating to how fermentations are used to produce safe food products will be focused on. For this PBL, you will work as a group of quality assurance personnel addressing an issue pertaining to quality and safety of a fermented food product.

**Week 8 (Mar 6):**

**Midterm exam.**

**Week 11 (Mar 27):**

**PBL Case Study #2 Review.**

**Week 12 (Apr 3):**

**Hand sanitation and food safety**

Issues of importance in personal sanitary practices and hand sanitation will form the topic of this section of the course.