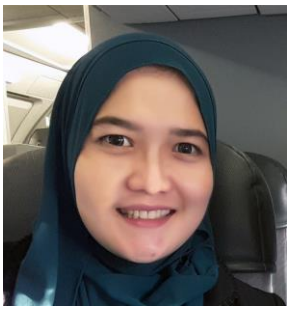
SYLLABUS

Date/ Revision : January 27, 2017/0
Faculty : Life Sciences
Approval : Dean of The Faculty of Life Sciences

SUBJECT : FOOD MICROBIOLOGY

1. Identification of Subject:

Name of Subject : Food Microbiology
Code of Subject : FMIC-2400
SKS / ECTS : 2 / 3
Semester : 4
Study Program : Food Technology
Lecturer : Lely Rahmawaty, STP, MP



2. Competency

After having the course, students are expected to:

a) know important food microbiology basic areas: beneficial, spoilage and pathogenic microbiology 1
b) to understand the problems of spoilage-causing microorganisms, that would help to develop effective control methods for different types of food, especially using the hurdle concept 2-4
c) identification foodborne and pathogen behaviour in the complex environment 2
d) know applied microbiology in food industries 3
e) to the basic principles of controling microorganisms in food 3
f) logging methods scientifically adequately 4
g) to understand relationships in microbiological processes to detect foodborne disease and automatically suggested solutions to work on the basis of microbiological mechanisms 1-5

1 knowledge; 2 understanding; 3 application; 4 analysis; 5 Synthesis and Assessment

3. Description of Subject:

The golden age of food microbiology has begun. All three areas of food microbiology: beneficial, spoilage and pathogenic microbiology, are expanding and progressing at an increadible pace. Spoilage-causing microorganisms are a major concern. To feed a growing population in the world, microbial food spoilage must be reduced, and improved intervention technologies must be developed. To achieve the goal, it is necessary to understand the problems, that would help to

DAAD Federal Ministry of Education and Research
Coordinator TECHNISCHE UNIVERSITÄT ILMENAU
PO Box 150, BSD CPA 15330
Tel. +62 21 50588000
+62 852 12318000
info@iuli.ac.id; www.iuli.ac.id
IULI – Eco Campus, The Breeze
Jl. BSD Grand Boulevard
BSD City 15345
Island of Java

develop effective control methods for different types of food, especially using the hurdle concept. Foodborne pathogens have broadened their assosiation with varieties of foods that were unexpected, that's why we need to address food safety and quality issues. We have also learn anormous developments in intervention technologies, such as application of bacteriophages and novel antimicrobials to pathogens and spoilage microbes, and novel processing technologies, such as a high hydrostatic pressure, pulse electric fields, low temperature plasma, infrared, X-rays, ultrasound and many more. Microbial ecology (microbial community) in food chains are receiving greater attention to understand pathogen behaviour in the complex environment. Application of natural microorganisms as biocontrol and probiotics are receiving renewed interest in controlling pathogens in meat and poultry production or controling disease in humans. This subject also give new information about microbial biofilm formation, quorum sensing, gut microbiota, and their role in chronic diseases, incuding diabetes; obesity, application of food nanotechnology in food preservation; bacteriophages as intervention and detection tools; and emerging pathogens.

4. Learning Approach

Approach : Combination of Expository - inquiry and colaborative
Method : Discussion, question answer, sample problem, group work
Student Task : Home work, quiz
Media : LCD projector, film.

5. Evaluation

a) Absence maximum : 25%
b) Participation in discussion : 5 points
c) Homework, Classwork : 5 points
d) Presentation, Simulation : 10 points
e) Daily Quiz : 20 points
f) Final Examination : 60 points

Total : 100 points

6. Contents/ Topics of Lecturing:

Week	Topics	Content	Remark
1	**Introduction to Microbes in Foods**	History and development of food microbiology Characteristic of predominant microorganisms in food Sources of microorganism in foods Normal microbiological quality of foods and its significants	
2	**Microbial Growth Response in the Food Environment**	Microbial growth characteristics Factor influence microbial growth in food Microbial attachments and biofilm formation	Quiz
3	**Metabolism, Sporulation - Germination, and Stress Response**	Microbial metabolism of food components Microbial sporulation and germination Microbial stress response in the food environment	Homework
4	**Beneficial Uses of Microorganisms in**	Biochemistry of some beneficial traits Genetics of some beneficial traits	

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	Foods	Starter cultures and bacteriophages	
5	**Food Fermentation**	Microorganisms used in food fermentation Microbiology of fermented food production	
6	**Probiotics**	Intestinal bacterial and probiotics	Quiz
7	**New Technology**	Food biopreservatives of microbial origin, bacteriocin and nanotechnology Food ingredients and enzymes of microbial origin	Homework
8	**Microbial Food Spoilage**	Important factors in microbial food spoilage Spoilage of specific food groups New food spoilage bacteria in refrigerated foods Food spoilage by microbial enzymes Indicator of microbial food spoilage	
9	**Microbial Foodborne Disease**	Important facts in foodborne disease Opportunistic bacterial pathogens, molds and mycotoxins, viruses, parasites and fish and shelfish toxins New and emerging foodborne pathogens	
10	**Foodborne Infection, Intoxication – Toxico Infection**	Foodborne intoxication Foodborne toxico – infection Foodborne bacterial infection	
11	**Control of Microorganism in Foods**	Control by low pH and organic acids Control by modified atmosphere (reducing O- or R-potential) Control by antimicrobial preservatives and bacteriophages	
12	**Control of by Processing**	Control of access of micoorganism: cleaning, sanitation, and desinfection Control by physical removal Control by by heat (thermal processing) Control by low temperature Control by reducing water activity and drying	
13	**Control by New Technology**	Control by irradiation Control by a novel processing technology Control by a combination of methods (Hurdle Concept)	Quiz
14	**Microbial Detection and Food Safety**	Conventional, immunological, molecular and biosensor-based detection	Homework
15	**Final Examination**		

7. Book Reference:

a) **Text Book**: Ray, B and A. Bhunia. Fundamental Food Microbiology. CRC Press. Edition: 5th. 2014.
b) Erkmen, O and T. F. Bozoglu. Food Microbiology: Principles in Practice. Wiley. Vol. 2th. 2016.
c) Jay, James M, M. J. Loessner, and D. A. Golden. Modern Food Microbiology. Springer. Edition: 7th. 2005.

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