

SYLLABUS:

Date / Revision 23 May 2015 / 02 May 2017 / PP
Faculty Life Sciences (LS)
Study Program Food Technology (FTE)

SUBJECT: Food Engineering

1 Basic Information

1.01	Subject Name	Food Engineering
1.02	Semester	4
1.03	Level	1
1.04	SKS	3
1.05	Mandatory / Curriculum	D-02
1.06	Subject Code	FOEN
1.07	Subject Code	FOEN
1.08	Year	2017 (7)
1.09	Quality Control	Final Test, OFSE, see evaluation
1.10	Limitations	Min 12 and Max 32 students in one class
1.11	Combined with	None
1.12	Pre-requisite	Physics and Laboratory, Engineering Math, Chemistry and Lab, Organic Chemistry and Lab, Food Chemistry, Microbiology
1.13	Responsible	Dr. Tutun Nugraha
1.14	Revision	15-05-2017/pp

2 Description of Subject

This course is intended as introduction for Food Technology students with technical engineering principles used in the design and applications of food processing. The course will cover basic knowledge of engineering principles and the importance of those knowledge for food industry. The course will cover both basic concept and simple calculation in engineering terms. It will also cover fluid flow, energy and control, heat transfer, food freezing, evaporation and packaging concept. The course will highlight the complexity of engineering principles and how it is used in the food processing technology and the food industry.

3 Objectives

- This course is one of the peak of the various subjects being studied by the students within the previous semesters. Thus this will connect various fundamental knowledge, theories and skills that they have acquired to the food technology requirement to be applied within the scope of the project. Specifically, the topics discussed focus on various technology in the food industries.

4 Competency

- Through this subject students will understand various concepts relevant to food engineering currently used in the food industries, which includes
- Engineering principles in food industry.
 - Fluid flow properties and calculate pump power.
 - Mass and energy balance
 - Steam generation principles and different types of steam.
 - Process control in food industry.
 - Heat exchanger design.
 - Different types of freezing system in food industry
 - Food packaging concept

5 Learning Approach / Methodology

- Lectures/ Class contact (time-tabled) supplemented with interactive questions and answers to build the projects;
- Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing;
- Student Study Effort: homework/assignment; preparation for test/quizzes/ examination.
- Writing assignments/presentations

6 Evaluation

5.1	Absence maximum	25%
5.2	Participation in Discussion	5 Points
5.3	Homework / Classwork	10 Points
5.4	Presentation /Simulation	5 Points
5.5	Daily Quiz	20 Points
5.6	Final Examination	60 Points
	Total	100 Points

7 Text Book and Reference

1	Main Text Book: <ul style="list-style-type: none"> • Introduction to Food Engineering - R. Paul Singh and Dennis R. Heldman - McGraw-Hill • Food and Package Engineering, Scott A Morris, Wiley Blackwell, 1st ed, 2011
2	Supplement Textbooks: <ul style="list-style-type: none"> • Practical Design, Construction, and Operation of Food Facilities - Clark J. P. - Elsevier • Unit Operations of Chemical Engineering - McCabe et. al. - McGraw-Hill

8 Content / Topics of Lecture

Week	Content/ Topics of Lecturing	Text Book Chapter	Remark
1	Introduction to Food Engineering Principles <ul style="list-style-type: none"> • Engineering Units • Phase Diagram of Water • Material Balance • Law of Thermodynamics 	Morris, Blackwell, Chapter 1	1 x 3 x 50 minutes
2	Fluid Flow in Food Processing <ul style="list-style-type: none"> • Pipes • Pump Types • Property of Liquid • Reynold's number 	Morris, Blackwell, Chapter 2	1 x 3 x 50 minutes
3	Fluid Flow in Food Processing <ul style="list-style-type: none"> • Friction • Pump Power • Flow Measurement • Solid Flow 	Morris, Blackwell, Chapter 2	1 x 3 x 50 minutes
4	Quiz 1 <ul style="list-style-type: none"> • Fluid Flow in Food Processing 		1 x 3 x 50 minutes
5	Energy and Control <ul style="list-style-type: none"> • Steam Generation Principles • Different types of steam • Thermodynamic of Phase Change • Fuel Utilization 	Morris, Blackwell, Chapter 3	1 x 3 x 50 minutes
6	Energy and Control <ul style="list-style-type: none"> • Mass and Energy Balance • Process Control in Food Processing • Control Strategy 	Morris, Blackwell, Chapter 3	1 x 3 x 50 minutes
7	Quiz 2 Energy and Control		1 x 3 x 50 minutes
8	MIDTERM SEMESTER BREAK		

9	Heat Transfer <ul style="list-style-type: none"> • Heat Exchanger • Specific Heat • Thermal Conductivity • Steady-state Heat Transfer 	Morris, Blackwell, Chapter 4	1 x 3 x 50 minutes
10	Heat Transfer <ul style="list-style-type: none"> • Thermal Resistance • Multilayered system • NTU method • Heat Exchanger System • Unsteady-state Heat Transfer 	Morris, Blackwell, Chapter 4	1 x 3 x 50 Minutes
11	Quiz 3 <ul style="list-style-type: none"> • Heat Transfer 		1 x 3 x 50 Minutes
12	Food Freezing <ul style="list-style-type: none"> • Freezing System • Frozen Food Properties • Freezing Time • Frozen Food Storage 	Morris, Blackwell, Chapter 7	1 x 3 x 50 minutes
13	Evaporation <ul style="list-style-type: none"> • Boiling Point • Evaporator • Single-effect Evaporator • Multi-effect Evaporator 	Morris, Blackwell, Chapter 8	1 x 3 x 50 minutes
14	Packaging Concept <ul style="list-style-type: none"> • Product Containment • Innovation in Food Packaging • Product Shelf-life 	Morris, Blackwell, Chapter 14	1 x 3 x 50 minutes
15	Quiz 4 <ul style="list-style-type: none"> • Semester summary 		1 x 3 x 50 minutes
16	Final Examination		