Course Outline

Institut Pertanian Bogor - ACICIS' Agriculture Semester Program

Unit name	Unit Operations in Food Industry (ITP230)
Department/ Faculty	Food Science and Technology Faculty of Agriculture Technology
Course credit (SKS)	3 (3-0)
Offered in	Even semester (February-July)
Pre-requisite	Introduction to Food Technology
Course Coordinator	Adil Basuki Ahza
Language	Indonesian ☑ English Both

Course description

The course concerns with unit operations that are integral to food processing covering equipment and machinery system used in food industries from harvesting to final processing. The course also covers a broad range of unit operation, such as packaging and distribution; utility and supporting system (electricity, water and waste water treatment, boiler, plant layout, raw materials transportation); mechanical separa-tion (cleaning, sorting, and grading); size reduction (solid and liquid food); mixing; separation and concentration of food components; heat processing; freezing; extrusion and post processing operations (packaging, storage, and distribution).

Learning outcomes

Upon successful completion of this course, students will have learned transport processes and unit operations commonly applied in food processing, some important preliminary operations such as mechanical cleaning, sanitation and separation (sorting and grading), size reduction (solid and liquid foods), mixing, separation and concentration of food components, the requirement for water utilization and waste manage-ment in food and food processing, operations that take place at ambient temperature and involve a minimum heating of foods, operations that heat foods and those that remove heat from foods, post processing operations (packaging, storage and distribu-tion), and current topics related to unit operation in food industries. Through individual and group assignments, student's success skills including information acquisition and organization skills are also developed..

Indicative assessment

- Midterm written examination 35%
- Final written examination 35%
- Group assignment : review paper 15%
- Quizzess 10%
- Course participation and attandance 5%

Contact Hours

3 hours lectures per week

Readings

- Fellows,P.J. 2000. Food Processing Technology: Principles and Practice. Second Edition. CRC Press, Boca Raton.
- Earle,R.L. Unit Operations in Food Processing. 1983. Pergamon Press.
- [Agro-Food Waste Minimisation and Reduction Network], 2000. Handbook For The Prevention and Minimisation of Waste and Valorisation of By-Products in Euro-pean Agro-Food Industries. Published by Awarnet Consortium, EU.
- Brennan,J.G. Food Processing Handbook. 2000. Elsevier Publ. Co., Ltd. N.Y.

Course topics (subject to change)

Week	Topics	Sub-topics
1	Introduction to Unit Operations and Processes	• Unit operations and unit processes determination, examples. • Categorization of unit operations and unit processes. • Three phase electricity system for industrial purpose.
2	Water Treatment and Waste Water Management	• Water treatment • Equipment for steam generation (boiler) and chiller • Waste water management
3	Plant Layout and Mate-Rial Transfer	• Plant lay out system and category • Equipment and methods used for materials transfer • Fluid transfer methods and equipment • Pumps category and classification
4	Mechanical Separation	• Cleaning and Peeling • Sorting equipments and method • Grading equipment and method
5	Size Reduction	• Grinding and cutting equipments and methods • Screening, tyler scale, mean particles diameter distribution • Extraction and pressing
6	Mixing and Homogeni-Zation	• Equipment for mixing liquid, powder and paste • Mixing index • Equipment and method for homogenization
7	Kneading, Calendering/ Sheeting and Forming	• Kneading • Calendering/sheeting/forming
8	Eat Processing: Blanching, Pasteurization, Steriliza-tion Process, Cooling and Freezing	• Blanching equipment • Pasteurization equipments • Retort, other equipments for sterilization • Cooling and freezing
9	Drying and Evaporation	• Equipment and method for drying • Equipment and method for evaporations
10	Baking, Frying and Roasting	• Method and equipment for baking • Frying equipment • Roasting equipment
11	Extrusion and Membrane Filtration	• Single screw • Double screw • Reverse osmosis • Ultrafiltration • Microfiltration
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Week	Topics	Sub-topics
	Canning and Bottle Filling, Packaging and Labelling	• Can characteristics and properties, canning process, retort • Bottling • Oher filling (sachets, pots and tubes) • Secondary and tertiary package
13	Churning Process and Crystalization	• Churning process • Butter churning • Chrystalization determination Chrystalization mechanism and methods
14	New Emerging Operations and Processes	• Supercritical fluid extraction • Ohmic Heating • High Hydrostatic Pressure • Microwave Heating