Departemen
Ilmu dan Teknologi Pangan
FakultasTeknologiPertanian - InstitutPertanian Bogor

Kampus IPB Darmaga, PO Box 220 Bogor 16002
E-mail: foodtech@indo.net.id; dfst@ipb.ac.id
Website: http://itp.fateta.ipb.ac.id
Forum:www.forum.itp-ipb.org
Telp/Faks: (0251) 8626725

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MATERI KULIAH ITP330 – PRINSIP TEKNIK PANGAN

Week-ke		Topics	Jam ke-	Sub-topics	Lecturer	
					IND	ENG
1	2/9	Introduction: General	1	• Introducion of ITP330 (The importance of food engineering in food processing applications), Sylabus of Lecture and Signing "Lecture agreement" (Kontrak Perkuliahan)	EHP	PHA
		Review of Math	2	• Review: algebraic (linier and non-linear equation, linearization of non-linear equation), graphic and coordinate (linear and non-linear graphic, logarithmic/semi-logarithmic graphic), calculus (differential and integral)		
		Unit & Dimension	3	• Unit and dimensions, unit conversion and conversion factors		
2	9/9	Mass Balance	1	• The principle of mass balance	ESY	EHP
			2	• Steps to solve a problem related to mass balance principle in a given food processing		
		Thermodynamics & Energy Balance	3	• Review: enthalpy, equation of state and perfect gas law, phase diagram of water, thermodynamics, and laws of thermodynamics		
3	16/9		1	• Review: enthalpy, equation of state and perfect gas law, phase diagram of water, thermodynamics, and laws of thermodynamics (Cont'd)	ESY	EHP
			2	• Generation of steam (thermodynamics of phase change and steam tables)		
			3	• The principle of energy balance in closed system and open system • Case study to solve problems related to energy balance in food processing		
4	16/9	Fluid Flow and Transportation in Food Processing	1	• Intro to Liquid transport system	ESY	EHP
			2	• Properties of fluid (stress, density, viscosity)		
			3	• Flow characteristics of Newtonian and non-Newtonian fluids and how to measure (viscosity, flow behavior index, consistency index, and yield stress)		
5	23/9		1	• Transportation of fluids (piping for processing plants, laminar and turbulent flow, Reynolds number, energy equation for steady flow of fluids by Bernoulli equation)	ESY	EHP
			2			
			3	• Friction factors in pumping Newtonian and non-Newtonian fluids		
6	30/9	The Principle of Heat Transfer in Food Processing	1	• Heat exchanger systems for heating and cooling food products; mathematical calculation in heat exchanger	ESY	EHP
			2	• Thermal properties of food (specific heat, thermal conductivity and thermal diffusivity)		
			3	• Modes of heat transfer (conduction, convection and radiation)		
7	7/10		1	• The principle of steady-state heat transfer and its application in food processing (conductive and convective heat transfer, role of insulation in reducing heat loss)	ESY	EHP
			2			
			3	• The principle of unsteady-state heat transfer and its application in food processing (internal and external heat resistance)		

UJIAN TENGAH SEMESTER
(Oleh ESY dan EHP)

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					IND	ENG
8	21/10	Principle of Thermal Processing in Food	1 2 3	• Microbial survivors curves (D value, Z value), thermal death time (F value) • Spoil-age probability (logarithmic cycle) • The principle of pasteurization and commercialization • Thermal process calculation: General and mathematical methods for thermal process calculation (application to pasteurization, commercial sterilization and aseptic processing and packaging)	NWU	PHA
9	28/10		1 2 3		NWU	PHA
10	4/11	Refrigeration and Freezing System	1 2 3	• The principle of refrigeration and freezing • Selection of a refrigerant • Components of a refrigerant system (evaporator, compressor, condenser, and expansion valve) • Pressure-Enthalpy charts • Mathematical expressions useful in analysis of vapor-compression refrigeration (cooling load, compressor, condenser, evaporator, coefficient of performance, and refrigerant flow rate) • Freezing systems • Frozen food properties (density, thermal conductivity, enthalpy, apparent specific heat, and apparent thermal diffusivity) • Freezing time (freezing curve, Plank's equation, prediction of freezing time, freezing rate)	NWU	PHA
11	11/11		1 2 3		NWU	PHA
12	18/11	Psychrometries and Dehydration	1 2 3	• Properties of dry air (composition, specific volume, specific heat, enthalpy, and dry bulb temperature) • Properties of water vapour (specific volume, specific heat, enthalpy) • Properties of air-vapour mixtures (dew-point temperature, humidity rate, relative humidity, wet bulb temperature) • Psychrometric chart (construction of the chart, use of psychrometric chart to evaluate complex air-conditioning processes)	NWU	PHA
13			1 2 3	• Basic drying processes (water activity, moisture diffusion, drying rate curves, heat and mass transfer) • Dehydration systems • Dehydration system design (mass and energy balance, drying time prediction)	NWU	PHA
14		Evaporation	1 2 3	• Boiling point evaluation • Types of evaporators • Energy and mass balance in a single-effect evaporator • Energy and mass balance in a multiple-effect evaporator	NMW	PHA
UAS Oleh NWU dan PHA						