PORTFOLIO

COURSE:
UNIT OPERATIONS II
(PTH 403217)

TEACHING TEAM:

Dr. Ir. Umi Rosidah, MS
Dr. Eka Lidiasari, S.TP., M.Si.
Hermanto, S.TP., M.Si.

AGRICULTURAL PRODUCT TECHNOLOGY
STUDY PROGRAM, FACULTY OF AGRICULTURE
UNIVERSITAS SRIWIJAYA

A. COURSE IDENTITY

Module designation	*Unit Operations II*	
Semester (s) in which the module is taught	3th semester/2nd year	
Person responsible for the module	1. Dr. Ir. Umi Rosidah, MS 2. Dr. Eka Lidiasari, S.TP., M.Si. 3. Hermanto, S.TP., M.Si.	
Language	Indonesian	
Relation to curriculum	Compulsory Course	
Type of teaching, contact hours	-Lectures (explanation, discussion) -Structured assignment (i.e.: explanation of problem solving followed by solving new problem by studens\ts in groups)) -The class size 20-75 students per class -Contact hours for lecture are 51.33 hours per semester -Total hours practical is 19.83 hours per semester	
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 51.33 hours per semester 2. Structured assignment (i.e.: explanation of problem solving followed by solving new problem by studens\ts in groups): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester	
Credit points	3 credits (equivalent with 4.91 ECTS)	
Requirements according to the examination regulations	A student must have attended the lecture at least 85% of total lectures and submitted all the assignments prior to join the final exam	
Module objectives/intended learning outcomes CLO=Course Learning Outcomes	After completing this course, a student is expected to:	
	CLO1	Understand the basics of theory in the food processing process.
	CLO2	Be able to explain the physical properties of foodstuffs that are used as the basis for calculations.
	CLO3	Be able to calculate and analyze problems in the food processing process.

Content	1. Introduction and scope area in unit operatiopns II 2. Moisture content of material (wet base and dry base) 3. Vapor air properties (Psychrometric Chart) 4. Calculation of energy requirements, volume of drying air, speed of drying time, volume of water lost in the drying process using psychrometric charts 5. Rheological properties of foodstuffs (viscosity, consistency and type of fluid flow) 6. Calculation of viscosity, consistency and fluid flow 7. Evaporation (heat and mass transfer process) 8. Calculations in the evaporation process (mass and energy balance) 9. Refrigeration (refrigeration temperature, non-freezing water, Equivalent Weight of solute, specific gravity, specific heat and heat conductivity of frozen food, cooling time, refrigeration and refrigerant) 10. Calculations related to cooling 11. Separation Process (Sedimentation, Centrifugal Separation, Liquid Separation and Filtration) 12. Calculation in Separation process.
Examination forms	Assignment, Mid-terms and Final Examination
Media employed	LCD, whiteboard, websites
Reading List	1. Earle, R.L. 1983. Unit Operations in Food Processing. Published by NZIFST (Inc.) 2. Albert, I and V.B. Gustavo. 2003. Unit Operations in Food Engineering. CRC Press, New York. 3. Henderson, S.M., and Perry, R.L. 1976. Agricultural Process Engineering. The AVI Publishing Company, Wesport, Connecticut

B. STUDY LEARNING PLAN

Course Name : Unit Operations II

Code/Credits : PTH233

Course Status : Mandatory

Short Description

Develop an understanding of principles in the processing of agricultural products and provide some examples of the use of these principles in several food industries. Analysis of all physical forms of processing agricultural products into smaller, simpler basic operations called unit operations. The discussion focuses on grain drying, rheology, evaporation, cooling and separation processes.

Objectives

After attending this course, students are expected to have an understanding of the basic operating concepts of drying, grain, rheology, evaporation, cooling and separation processes in agricultural product processing and to be able to develop these basic operating concepts in agricultural product processing.

Mapping of Course Learning Outcomes (CLO)-Program Learning Outcomes (PLO)

CLO	Description	PLO*			
		AV	KA	SC	GC
CLO1	Understand the basics of theory in the food processing process.	**2**	**4.4** **4.5**	**4**	**1**
CLO2	Be able to explain the physical properties of foodstuffs that are used as the basis for calculations.	**2**	**4.5** **4.6**	**4**	**1**
CLO3	Be able to calculate and analyze problems in the food processing process.	**2**	**4.4** **4.5** **4.6**	**4**	**1**

AV = Attitude and Value; **KA** = Knowledge Ability; **SC** = Specific Capability; **GC** = General Capability

*Details are in the Study Program Curriculum file

Course Outlines:

Face-to-Face:

No.	Course materials	Duration (face-to-face) (minutes)	CLO		
			1	2	3
1	Explain the subject matter of the Unit Operations II course. Explain the function of water in food.	110	v		v
2	Drying air properties. Use of psychrometric charts in grain drying.	110	v	v	
3	Calculation of the amount of water lost, energy requirements in the drying process	110		v	v
4	Calculation of drying air volume, rate in drying process	110		v	v
5	EVALUATION 1 meeting 1 to 4	110	v	v	v
6	Definition of Rheology and viscosity.	110	v	v	
7	Type of fluid flow (Reynolds number)	110	v	v	
8	Evaporation and the principle of evaporation.	110	v	v	
9	Calculation of mass balance, energy balance and heat requirements in the evaporation process	110		v	v
10	EVALUATION 2 meeting 6 to 9	110	v	v	v
11	Definition of cooling (cooling temperature, water that is not frozen, BE dissolved substances, specific gravity, specific heat and heat conductivity of frozen food, cooling time)	110	v	v	
12	Definition of refrigeration (refrigeration and refrigerant)	110	v	v	
13	Problem solving in cooling	110			v
14	Explain the separation process (Sedimentation, Centrifugal Separation, Liquid Separation and Filtration)	110	v	v	
15	Calculation of sedimentation problem	110			v
16	EVALUATION 3 meeting 11 to 15	110	v	v	v

Outcomes and Assessment

No.	Week	Sub-CLO	Assessment	Percentage of score weight to final score (%)
1	I	1. Understand and be able to explain the function of water in food 2. Calculating the moisture content of materials (wet basis and dry basis)	Ask and answer question (face-to-face). At least 5% of students in the class are able to answer the question correctly. Calculate water content.	
2	II	1. Understand and be able to explain the nature of drying air. 2. Studying psychrometric charts 3. Understand and be able to explain the drying process by heating and cooling using a psychrometric chart.	Ask and answer question (face-to-face). At least 5% of students in the class are able to answer the question correctly.	
3	III	1. Able to calculate the weight of water lost during the drying process 2. Able to calculate the energy requirements needed in the drying process	Work on group to solve the drying problems (calculate the weight of water lost and energy requirements in the drying process)	
4	IV	1. Able to calculate the required volume of drying air in relation to the RH of the air 2. Able to calculate air velocity during the drying process	Work on group to solve thedrying problems (calculate the required air volume and drying air speed)	
5	V	EVALUATION I (I - IV)	Essay exams	20
6	VI	1. Understand and be able to explain rheology and viscosity 2. Be able to explain the meaning of dynamic and kinematic viscosity. Understand and be able to explain reologi dan viscosity	Ask and answer question (face-to-face). At least 5% of students in the class are able to answer the question correctly	
7	VII	Be able to distinguish the type of flow that occurs in a fluid by calculating the Reynolds number	Ask and answer questions (face-to-face). Assignment	
8	VIII	1. Understand and be able to explain evaporation and the principles of evaporation 2. Understand and be able to explain mass balance and energy balance 1.	Ask and answer questions (face-to-face). Assignment	

9	IX	1. Able to calculate the mass balance and energy balance that occurs in the evaporation process 2. Able to calculate the heat/steam requirements needed in the evaporation process	Ask and answer questions (face-to-face). Assignment	
10	X	EVALUATION II (VI-IX)		20
11	XI	Definition of cooling (cooling temperature, water that is not frozen, dissolved substances equivalent weight, specific gravity, specific heat and heat conductivity of frozen food, cooling time)	Ask and answer question (face-to-face). At least 5% of students in the class are able to answer the question correctly	
12	XII	Definition of refrigeration (refrigeration and refrigerant)	Ask and answer question (face-to-face). At least 5% of students in the class are able to answer the question correctly	
13	XIII	Calculations about cooling	1. Work on group cooling problems (cooling temperature, non-freezing water, solute equivalent Weight, specific gravity, specific heat and heat conductivity of frozen food, cooling time) 2. Assignment	
14	XIV	Explain the separation process (Sedimentation, Centrifugal Separation, Liquid Separation and Filtration)	Ask and answer question (face-to-face). At least 5% of students in the class are able to answer the question correctly	
15	XV	Calculation about separation	1. Working on group separation process questions 2. Assignment	
16	XVI	EVALUATION III (XI – XV)		20

Assignment

No.	Week	Assignment Instructions	Submission Methods	Weight (%)
1	II	Determine the properties of the drying air (wet bulb temperature, dry bulb temperature, RH, specific volume, enthalphy)	Send by whatsapp	
2	IV	Calculate the required air volume, enthalpy and time required for the drying process	Send by whatsapp	
3	VII	Calculate the resulting Reynolds number and determine the type of fluid flow	Send to google drive	
4	IX	Calculate the amount of water that evaporates and the final weight of the material that is evaporated Calculate how much heat is available in the appliance, how much heat is needed by the material and the amount of steam needed every hour in the evaporation process	Send to google drive	
5	XIII	A 3-cm thick slab of lean meat is placed inside a freezer in which the temperature is –25°C. The coefficient of heat transfer by convection from the surface of the meat is 15 J/(s·m2·°C). Determine the time needed to freeze the meat slab if 70% of its weight is water.	Send to email	
6	XV	A dispersion of oil in water is to be separated using a centrifuge. Assume that the oil is dispersed in the form of spherical globules 5.1 x 10-5 m diameter; its density is 894 kgm-3• If the centrifuge rotates at 1500 rev/mm and the effective radius at which the separation occurs is 3.8cm, calculate the velocity of the oil through the water. Take the density of water to be 1000kgm-3 and its viscosity to be 0.7 x 1O-3Nsm-2• (The separation in this problem is the same as that in Example 10.2, in which the rate of settling under gravity was calculated.)	Send to email	
	Weight score of evaluation (%)			20

Laboratory Practicum:

No.	Topics	Duration	CLO			Activities in Laboratory
			1	2	3	
1	Drying	170	v	v		Pre-test, explanation from assistant, practice according to the practical manual, writing the results in worksheet, approval by assistant.
2	Drying (observation day 1) (weighing)	170		v	v	
3	Drying (observation day 2) (weighing)	170		v	v	
4	Drying (observation day 3) (weighing)	170		v	v	
5	Viscosity Rate Measurement	170		v	v	
6	Effect of Temperature and Concentration on Fluid Viscosity	170		v	v	
7	Texture Measurement in Semi Fluids	170		v	v	
		Distribution of weight in the lab practicum score: Pre-Test (20%), practicum report (20%), participation (10%), final practicum exam (50%). All student should have 100% of presence in the laboratory, and for those who are unable to attend lab practicum, she/he must take a follow-up practicum at another time. Percentage of score weight of laboratory practicum to final score is 20%.				

Contribution of Course Assessment to PLO

Course Assessment	AV	KA	SC	GC	Type
Assignments	2	4.4, 4.5, 4.6	4	1	Formative
Questions in Quiz	2	4.4, 4.5, 4.6	4	1	Summative
Questions in Mid-Term	2	4.4, 4.5, 4.6	4	1	Summative
Questions in Final Exam	2	4.4, 4.5, 4.6	4	1	Summative
Lab Practicum	2	4.4, 4.5, 4.6	4	1	Formative

Assignment Assessment Rubric

			Score			
No.	Criteria	Weight (%)	≥ 86	71-85.99	56-70.99	40-55.99
			Excellent	Good	Enough	Bad
1	Writing units correctly	20	Consistency in writing units from beginning to end.	The units written in the calculation of the problem are only 50%.	Units are only written at the end of the answer.	There is no unit in each stage of problem solving
2	Stages of problem solving	30	The stages of completion are in accordance with the specified work order.	The steps written are 70% correct	The steps written are 50% correct	There is no explanation/steps. Only the final answer is written.
3	Accuracy in calculations	30	Problem solving is carried out with accurate calculations.	Problem solving is carried out with accurate calculations (70%)	Problem solving is carried out with accurate calculations (50%)	What is written is only the final answer
4	Submission time	20	Assignment is submitted before the deadline	Assignment is submitted one day after the deadline	Assignment is submitted two days after the deadline	Assignment is submitted after two days from deadline

Benchmark for Scoring

No.	Range of Score	Grade	Description
1	86.00 - 100.00	A	Excellent
2	71.00 – 85.99	B	Good
3	56.00 – 70.99	C	Fair
4	40.00 – 55.99	D	Bad
5	<40.00	E	Worst

Benchmark for Evaluation of the achievement of CLO

No.	Performance of Evaluation	Criteria
1	Very satisfactory	If ≥ 80% of students in a class achieve Good and Excellent
2	Satisfactory	If 70-79.9% of students in a class achieve Good and Excellent
3	Fairly satisfactory	If 60-69.9% of students in a class achieve Good and Excellent
4	Unsatisfactory	If <60% of students in a class achieve Good and Excellent

Remedial Exam: Students are allowed to join Remedial Exam if the score is under 60 out of 100.

Course materials in Power Point Slides

KADAR AIR

- Kadar air merupakan salah satu sifat fisik dari bahan yang menunjukan banyaknya air yang terkandung di dalam bahan. Kadar air dinyatakan dengan **persentase berat air terhadap bahan basah** atau dalam **gram air untuk setiap 100 gram bahan** yang disebut dengan kadar air basis basah (bb).
- Berat bahan kering atau padatan adalah berat bahan setelah mengalami pemanasan beberapa waktu tertentu sehingga beratnya tetap (konstan).

PERHITUNGAN KADAR AIR

Kadar air suatu bahan biasanya dinyatakan dalam persentase bobot terhadap bahan basah, misalnya dalam gram air untuk setiap 100 gram bahan, dan disebut kadar air berat basah atau basis basah (bb).

Kadar air basis basah dapat ditetapkan dengan persamaan berikut:

$$Ka = \frac{Ba}{Ba + Bk} \times 100\ \%$$

Di mana : Ka = kadar air basis basah (%)
Ba = bobot air dalam bahan (g)
Bk = bobot bahan kering mutlak (g)

PERHITUNGAN KADAR AIR

Disamping kadar air bobot basah, kadar air bahan juga dapat dinyatakan dalam **kadar air basis kering** yaitu air yang diuapkan dibagi bobot bahan setelah pengeringan. Jumlah air yang diuapkan adalah bobot bahan sebelum pengeringan dikurangi bobot bahan setelah pengeringan, sebagaimana persamaan berikut:

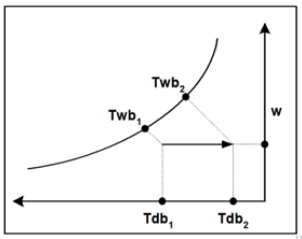
$$Ka = \frac{Ba}{Bk} \times 100\ \%$$

Di mana : Ka = kadar air basis kering (%)
Ba = bobot air dalam bahan (gr)
Bk = bobot bahan kering mutlak (g)

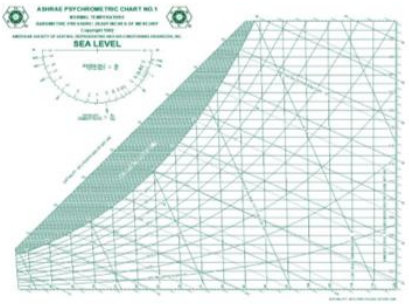
1. Proses pemanasan (*Heating*)

- Proses pemanasan adalah proses penambahan kalor sensibel ke udara sehingga temperatur udara tersebut naik. Proses ini hanya disebabkan oleh perubahan temperatur bola kering udara tanpa perubahan rasio kelembaban. Garis proses pada karta psikometrik adalah garis horizontal ke arah kanan.

Tdb: suhu bola kering
Twb: suhu bola basah
W: humidity rasio (lb uap air/lb udara kering)



LATIHAN PENGGUNAAN DIAGRAN PSIKROMETRI



LATIHAN

Hasil pengukuran kondisi suatu ruangan dengan slink psychrometer memberikan data sebagai berikut.
Tentukan parameter udara lainnya dengan mengunakan psikrometrik chart.

Suhu bola kering	Suhu bola basah	RH	Titik embun	Enthalpi	Vol Spesifik	Rasio kelembaban
75°F	70°F					
78°F	65°F					

RHEOLOGY

Pendahuluan

Rheology berasal dari bahasa Yunani *"Rheo"* (mengalir) dan *"Logos"* (ilmu)

Maka *Rheologi* adalah kajian tentang bentuk dan sifat aliran

Istilah Rheologi pertamakali digunakan oleh Bingham dan Crawford untuk menggambarkan aliran cairan dan deformasi dari padatan

Imuwan Inggris Sir Isaac Newton (1642-1727) adalah salah seorang peneliti pendahulu yg mempelajari aliran fluida

VISKOSITAS

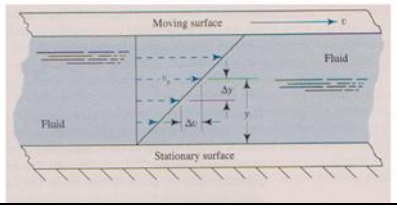
Viskositas fluida merupakan ukuran ketahanan sebuah fluida terhadap deformasi atau perubahan bentuk.

Kekentalan (viskositas;η) adalah suatu ungkapan dari resistensi zat cair untuk mengalir. Semakin tinggi viskositas aliran akan semakin besar resistensinya. Viskositas berpengaruh terhadap laju penyerapan obat dari saluran pencernaan

ALIRAN VISKOS

VISKOSITAS DINAMIK

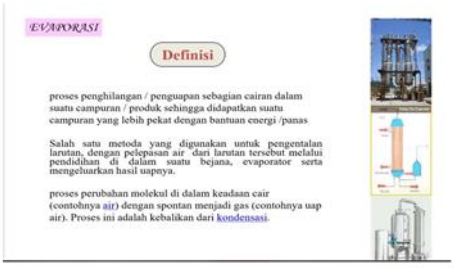
- Fluida pada pelat yang diam kecepatannya nol sedangkan pada pelat yang bergerak kecepatannya sama dengan kecepatan pelat
- Tegangan geser yang bekerja pada pelat atas sebanding dengan gradien kecepatan
- Kontanta kesebandingannya disebut sebagai viskositas dinamik



BILANGAN REYNOLD N_R

- Tergantung pada rapat massa, viskositas, diameter dan kecepatan
- Merupakan bilangan tak berdimensi
- Menentukan jenis aliran
- Bila N_R < 2000 → aliran laminer
- Bila N_R> 4000 → aliran turbulen
- bila 2000 < N_R< 4000 → aliran transisi/daerah kritis (*critical zone*)

$$N_R = \frac{\rho V D}{\mu}\left[\frac{\frac{kg}{m^3}\frac{m}{s}m}{\frac{kg}{m.s}}\right]$$



Neraca Bahan Total: F = V + L .....(1)
dimana: F = Umpan/Feed
V = uap/Vapour
L = Saturated Solution/Liquid

Neraca Bahan Penyusun:
Neraca terlarut: xF.F = xL.L .....(2)
Neraca pelarut: (1-xF).F = V + (1-xL).L ...(3)

Contoh soal:

Suatu larutan NaCl 10% massa, akan diuapkan menjadi larutan 30% massa NaCl. Umpan masuk evaporator berkapasitas 500 liter per jam dengan massa jenis 1,06 gram/cm^3. Berapa kg/jam larutan pekat yang dihasilkan.

Contoh soal

Suatu alat penguapan tunggal dibutuhkan untuk mengentalkan suatu larutan dari berkadar bahan padat 10% menjadi berkadar bahan padat 30% pada kecepatan 500 lb umpan per jam. Apabila tekanan di dalam alat penguapan 10 lb/in^2 abs., dan apabila uap disediakan ada 30 lb/in^2 gauge, hitunglah jumlah uap yang dibutuhkan per jam dan luas permukaan pindah panas apabila koefisien pindah panas keseluruhan 300 Btu/kaki^2 jam^2 °F. Anggap suhu umpan 65°F dan titik didih larutan di bawah tekanan 10 lb/in^2 abs adalah 195° F, panas jenis larutan 1 Btu/lb °F dan panas laten penguapan larutan adalah sama dengan untuk air pada kondisi yang sama.

Dari tabel uap suhu pengembunan uap pada 30 lb/in^2 gauge adalah 274°F absolute 930 Btu/lb.

Pendinginan

Pengelompokan bahan dan produk pangan berdasarkan suhu pendinginan

Suhu	Jenis Bahan dan Produk Pangan
-1 sampai 1 oC	Ikan segar, daging, sosis, daging giling, dan daging asap
0 sampai 5 oC	Daging kaleng pasteurisasi, susu, krim, yoghurt, salad siap saji, pasta, pizza, produk roti-rotian, adonan siap masak
0 sampai 8 oC	Mentega, margarin, keju

1. Teknik Pendinginan

A. Pendinginan Hembusan Udara Dingin

- Proses pendinginan cepat sehingga cocok untuk produk pangan yg sangat mudah rusak
- Laju optimum 2-3 m/detik dibutuhkan untuk mendinginkan bahan pangan yg tebal.
- Laju pergerakan udara dingin yg tepat dibutuhkan untuk meminimumkan waktu pendinginan.
- Faktor lain yg harus diperhatikan kelembaban udara yang relatif tinggi jika produk pangan yg didinginkan tidak dikemas

- Contoh alat pendinginan yg menggunakan teknik ini adalah cabinet cooler dan alat pendingin dengan sirkulasi udara tetap (fixed air cooler), chilling tunnel
- Alat tersebut umumnya dilengkapi dengan rak beroda, nampan/rak, gantungan untuk meletakkan produk.
- Bisa sistem bacth (cabinet cooler) atau kontinyu (chilling tunnel)
- Laju pergerakan udara bisa diatur sesuai kebutuhan

B. Ruang Pendingin

- Ruang pendingin digunakan untuk menjaga suhu bahan atau produk tetap rendah, tetapi tidak cocok jika digunakan untuk pendinginan cepat
- Udara dingin biasanya dihembuskan dari bagian atas ruang pendingin dan bergerak menuju bagian bawah

c. Pendinginan Kriogenik

- Teknik pendinginan ini menghasilkan proses pendinginan yg sangat cepat.
- Pengendalian laju pendinginan sangat diperlukan untuk mecegah pembekuan
- Sesuai untuk mendinginkan produk yg hangat
- Contoh : pencelupan pada nitrogen (N_2) atau CO_2 cair

d. Pendinginan dengan Air (Hydrocooling)

- Pendinginan dengan air digunakan terutama untuk menghilangkan panas setelah pemanenan untuk buah-buahan atau sayuran.
- Pendinginan air dilakukan dengan cara perendaman, penyemprotan, atau pencelupan pada air dingin.
- Proses pendinginan dapat bersifat kontinyu dengan waktu berkisar 20 – 40 menit.
- Keuntungan : mecegah pembekuan, tidak terjadi penyusutan berat, dan dapat memulihkan produk yg layu

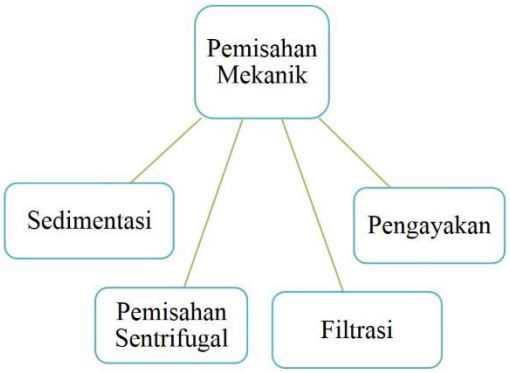
e. Pendinginan vakum

- Digunakan untuk sayuran berdaun yang mempunyai permukaan luas dan jumlah air bebas yang tinggi, seperti selada.
- Tidak sesuai untuk produk atau bahan pangan yang bervolume besar (bulk), tebal, dan mempunyai lapisan lilin.

- Teknik pendinginan vakum didasarkan pada efek pendinginan akibat penguapan air pada tekanan rendah.
- Contoh : selada dapat didinginkan sampai suhu 2-3 oC ketika kondisi vakum tercapai.
- Beberapa produk tanaman pangan harus disemprot dengan air sebelum didinginkan untuk meminimumkan penyusuta berat.
- Pada teknik pendinginan ini penyusutan berat sebesar 1% terjadi pada setiap penurunan suhu 5oC

MECHANICAL SEPARATIONS (PEMISAHAN MEKANIS)

"Pemisahan mekanis merupakan suatu cara pemisahan antara dua komponen atau lebih yang dilakukan dengan cara mekanik"



1. Sedimentasi: dua campuran (cair dan padat) dipisahkan dengan ekuilibrium dalam aksi gravitasi. Sehingga bahan yang lebih berat akan jatuh. Contohnya pengendapan lumpur.
2. Pemisahan Sentrifugal: Membantu percepatan untuk meningkatkan laju sedimentasi .
3. Filtrasi: pemisahan padatan dari cairan, dengan mengalirkan cairan melalui pori-pori yang cukup kecil untuk menghentikan partikel padat tapi cukup besar untuk memungkinkan cairan dapat lolos.
4. Pengayakan: sebagai penghalang dimana unsur-unsur yang lebih besar tidak bisa lewat, sering digunakan untuk klasifikasi partikel padat.

Percentage of CLO Achievement per Class

CLASS: INDRALAYA A

No	Evaluation	Weight (%)	Score	CLO1	CLO2	CLO3	Level of Achievement
1	Assignment	20	84.25	93.94	93.94	93.94	Very Satisfactory
2	Evaluation I	20	83.24	93.94	93.94	93.94	Very Satisfactory
3	Evaluation II	20	65.24	6.06	6.06	6.06	Fairly Satisfactory
4	Evaluation III	20	60.70	9.09	9.09	9.09	Fairly Satisfactory
5	Lab Practicum	20	87.26	77.06	77.06	77.06	Very Satisfactory

CLASS: INDRALAYA B

No	Evaluation	Weight (%)	Score	CLO1	CLO2	CLO3	Level of Achievement
1	Assignment	20	87.00	100.00	100.00	100.00	Very Satisfactory
2	Evaluation I	20	85.65	100.00	100.00	100.00	Very Satisfactory
3	Evaluation II	20	88.60	100.00	100.00	100.00	Very Satisfactory
4	Evaluation III	20	88.08	97.50	97.50	97.50	Very Satisfactory
5	Lab Practicum	20	91.04	92.86	92.86	92.86	Very Satisfactory

CLASS: PALEMBANG

No	Evaluation	Weight (%)	Score	CLO1	CLO2	CLO3	Level of Achievement
1	Assignment	20	90.22	100.00	100.00	100.00	Very Satisfactory
2	Evaluation I	20	88.50	95.00	95.00	95.00	Very Satisfactory
3	Evaluation II	20	69.25	15.00	15.00	15.00	Fairly Satisfactory
4	Evaluation III	20	67.25	10.00	10.00	10.00	Fairly Satisfactory
5	Lab Practicum	20	95.38	100.00	100.00	100.00	Very Satisfactory