PORTFOLIO

COURSE:
MATERIAL SCIENCE
(PTH 402217)

TEACHING TEAM:

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Dr. Merynda Indriyani Syafutri, S.TP., M.Si.
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AGRICULTURAL PRODUCT TECHNOLOGY STUDY PROGRAM, FACULTY OF AGRICULTURE UNIVERSITAS SRIWIJAYA

A. COURSE IDENTITY

Module designation	Material Science
Semester (s) in which the module is taught	3th semester/2nd year
Person responsible for the module	1. Dr. Ir. Gatot Priyanto, M.S. 2. Dr. Ir. Parwiyanti, M.Si 3. Dr. Budi Santoso, S.TP.,M. Si. 4. Dr. Merynda Indriayani Syafutri, S.TP., M.Si. 5. Friska Syaiful, S.TP., M.Si
Language	Indonesian
Relation to curriculum	Compulsory Course
Type of teaching, contact hours	-Face-to-face lecture (offline) and E-Learning (online) -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. 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 (diurutkan dari sederhana ke komplek)	After completing this course, a student is expected to:
	CLO1 Understand definition and function of knowledge of agricultural products.
	CLO2 Understand physical and chemical characteristics of agricultural products (fruits, vegetables, cereals, legumes, tubers, egg, fishery products, meat, milk, plantation products, vegetable oils, and spices) as raw materials in food industry.
	CLO3 understand physical and chemical changes of agricultural products postharvest.
	CLO4 understand the mechanism of damage to agricultural products and identify how to control it

Content	1. Introduction: Definition and function of knowledge of agricultural products
	2. Physical and chemical characteristics of fruits and vegetables and alternative processed products.
	3. Changes in the physical and chemical properties of fruits and vegetables during ripening.
	4. Physical and chemical characteristics of cereals and legumes and their alternative products.
	5. Physical and chemical characteristics of tubers and alternative processed products.
	6. Physical, chemical and microorganism properties and their relationship to the quality of milk and dairy products
	7. Egg structure, composition, physicochemistry as a determinant of egg quality and post-harvest and egg preservation and their processed products
	8. Characteristics of fishery products and factors determining fish quality.
	9. Changes in post-harvest fish and handling of fresh fish
	10. Structure, composition and determinants of meat quality as well as physiological and physical changes in meat after slaughter and post-morten processes
	11. Definition and classification of plantation products, physical and chemical characteristics of plantation products and some of the main products of plantation products
	12. Classification of oil-producing vegetable foods and the physical and chemical characteristics of vegetable oils
	13. Physical and chemical characteristics of spices and their use in the food industry
Examination forms	Multiple choice exam and essay writing exam
Media employed	LCD, whiteboard, E-learning Unsri,video
Reading List	1. 1.2. Sinha, N.K., Y.H. Hui, and M.S. J. Ahmed. 2011. Handbook of vegetables and vegetable processing. Blackwell Publishing Ltd. Ames, Iowa 50014, USA.
	2. 1.3. Owen, G. 2000. Cereals Processing Technology. CRC Press LLC. Boca Raton FL 33431.
	3. Haryati. 2015. Rempah-rempah dan Bahan Penyegar. Teknologi Agroindustri. Universitas Pendidikan Indonesia.
	4. Rinto dan Wulandari. 2020. Modul Ajar: Dasar-dasar Teknologi Hasil Perikanan. Fakultas Pertanian. Universitas Sriwijaya.
	5. Walstra P. 1999. Dairy Technology: Principle of Milk Propertiies and Processes.
	6. Jurnal-jurnal Nasional dan Internasional.

A. STUDY LEARNING PLAN

<table>
<tr><td rowspan="2"></td><td colspan="2">UNIVERSITAS SRIWIJAYA (UNSRI)
FACULTY OF AGRICULTURE
DEPARTMENT OF AGRICULTURAL TECHNOLOGY
STUDY PROGRAM OF AGRICULTURAL PRODUCT TECHNOLOGY</td></tr>
<tr><td colspan="2">SEMESTER LEARNING PLAN</td></tr>
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A. COURSE IDENTITY

Subject	: Material Science	Code: PTH1402217	Semester : 3	Credits : 3(2-1)
Relation to curriculum	**Compulsory**			
Course Description	Knowledge of agricultural products properties, both as industrial raw materials and materials used in the process. The properties that will be studied are biological and physiological, chemical and mechanism of damage of agricultural products.			
PLO/ILO	1. Able to working together and have social sensitivity and concern for society and the environment (AV-6) 2. Able to demonstrate a responsible attitude towards work in their field of expertise independently (AV-9). 3. Able to describe the characteristics of raw materials, ingredients and food additives and their effect on the characteristics agricultural production (KA-4.1). 4. Able to describe the principles and techniques of handling and processing agricultural products, as well as the influence of process parameters on quality, safety and shelf life of agricultural product (KA-4.7). 5. Able to applied and incorporate the principles of agricultural products science in practice and real conditions in the produce industry agriculture (KA-5.1). 6. Able to think critically, identify the root of the problem and solve it comprehensively,, and make the right decisions based on analysis of information and data (KA-6.2)			

	7. Able to analyze problems with agricultural products technology approach in solving production problems and agricultural products so that they are efficient, safe, and with guaranteed quality (SC-4). 8. Able to examine the implications of developing or implementing science and technology that pay attention to and applies humanities values according to their expertise based on scientific principles, procedures and ethics in order to produce solutions, ideas, designs or art criticism (GC-3).
Lecturers	Dr. Ir. Gatot Priyanto, M.S. Dr. Ir. Parwiyanti, M.P. Dr. Budi Santoso, S.TP, M.Si. Dr. Merynda Indriyani Syafutri, S.TP., M.Si. Friska Syaiful, S.TP., M.Si

Week	CLO	SUB-CLO	Subject	Learning Methode and Time	Assessment	Weight (%)
1	1	Understand objective and scope of knowledge of agricultural products.	Introduction: Definition and function of knowledge of agricultural products	Lecture, discussion (2 x50 minutes) (face to face)	Ask and answer question(face-to-face). At least 5% of students in the class are able to answer the question correctly	
2	2, 3 and 4	Understand characteristics of fruit and vegetable products as raw materials in food industry. Describe the characteristics of fruit and vegetable products postharvest physiology	Physical and chemical characteristics of fruits and vegetables and alternative processed products	Lecture, discussion (2 x50 minutes) (face to face)	Ask and answer question(face-to-face). At least 5% of students in the class are able to answer the question correctly	
3	2, 3 and 4	Understand physical and chemical changes of fruits and vegetables during ripening. Understand the mechanism of damage to fruits and vegetables and identify how to control it	Changes in the physical and chemical properties of fruits and vegetables during ripening, and mechanism of damage to fruits and vegetables and identify how to control it	Lecture, discussion (2 x50 minutes) (face to face)	Ask and answer question(face-to-face). At least 5% of students in the class are able to answer the question correctly	
4	2, 3 and 4	Understand characteristics of cereals and legumes as raw materials in food industry. Understand physical and chemical changes of cereals and legumes Understand the mechanism of damage to cereals and legumes and identify how to control it	Physical and chemical characteristics of cereals and legumes and their alternative products.	Lecture, discussion (2 x50 minutes) (face to face)	Ask and answer question(face-to-face). At least 5% of students in the class are able to answer the question correctly	
5	2, 3 and 4	Understand characteristics of tubers as raw materials in food industry Describe the characteristics of tubers postharvest physiology	Physical and chemical characteristics of tubers and alternative processed products.	Lecture, discussion (2 x50 minutes) (face to face)	Ask and answer question(face-to-face). At least 5% of students in the class are able to answer the question correctly	
6	1, 2, 3 and 4	**EVALUATION I (Lecture 1-5)**				25

		Understand characteristics of milk and dairy products as raw materials in food industry. Understand physical and chemical changes of milk and dairy products. Understand the mechanism of damage to milk and dairy products and identify how to control it	Physical, chemical and microorganism properties and their relationship to the quality of milk and dairy products	Lecture, discussion (2 x50 minutes) (face to face)	Ask and answer question(face-to-face). At least 5% of students in the class are able to answer the question correctly	
7	2, 3 and 4					
8	2, 3 and 4	Understand structure, composition, determinants, and characteristics of egg as raw materials in food industry. Understand physical and chemical changes of egg. Understand the mechanism of damage to egg and identify how to control it.	Egg structure, composition, physicochemistry as a determinant of egg quality and post-harvest and egg preservation and their processed products	Lecture, discussion (2 x50 minutes) (face to face)	Ask and answer question(face-to-face). At least 5% of students in the class are able to answer the question correctly	
9	2, 3 and 4	Understand characteristics of fishery products as raw materials in food industry Understand physical and chemical changes of fishery products	Characteristics of fishery products and factors determining fish quality.	Lecture, discussion (2 x50 minutes) (face to face)	Ask and answer question(face-to-face). At least 5% of students in the class are able to answer the question correctly	
10	2, 3 and 4	Understand the mechanism of damage to fishery products and identify how to control it	Changes in post-harvest fish and handling of fresh fish	Lecture, discussion (2 x50 minutes) (face to face)	Ask and answer question(face-to-face). At least 5% of students in the class are able to answer the question correctly	
11	2, 3 and 4	**EVALUATION II (Lecture 7-10)**				25
12	2, 3 and 4	Understand characteristics of meat as raw materials in food industry. Understand physical and chemical changes of meat.	Structure, composition and determinants of meat quality as well as physiological and physical changes in	Lecture, discussion (2 x50 minutes) (face to face)	Ask and answer question(face-to-face). At least 5% of students in the class are able to answer the question correctly	

7

		Understand the mechanism of damage to meat and identify how to control it.	meat after slaughter and post-morten processes			
13	2, 3 and 4	Understand characteristics of plantation products as raw materials in food industry. Understand physical and chemical changes of plantation products. Understand the mechanism of damage to plantation products and identify how to control it.	Definition and classification of plantation products, physical and chemical characteristics of plantation products and some of the main products of plantation products	Lecture, discussion (2 x50 minutes) (face to face)	Ask and answer question(face-to-face). At least 5% of students in the class are able to answer the question correctly	
14	2, 3 and 4	Understand characteristics of vegetable oils as raw materials in food industry. Understand physical and chemical changes of vegetable oils. Understand the mechanism of damage to vegetable oils and identify how to control it	Classification of oil-producing vegetable foods and the physical and chemical characteristics of vegetable oils	Lecture, discussion (2 x50 minutes) (face to face)	Ask and answer question(face-to-face). At least 5% of students in the class are able to answer the question correctly	
15	2, 3 and 4	Understand characteristics of spices as raw materials in food industry. Understand physical and chemical changes of spices. Understand the mechanism of damage to spices and identify how to control it	Physical and chemical characteristics of spices and their use in the food industry	Lecture, discussion (2 x50 minutes) (face to face)	Ask and answer question(face-to-face). At least 5% of students in the class are able to answer the question correctly	
16	2, 3 and 4	**EVALUATION III (Lecture 12-15)**				25
		Total Percentage for the Lecture				**75**
		Percentage for Lab Practical				**25**
		Grand Total				**100**

Course Outlines:

Face-to-Face:

No.	Course materials	Duration (face-to-face) (minutes)	CLO 1	2	3	4
1	Introduction: Definition and function of knowledge of agricultural products	110	√			
2	Physical and chemical characteristics of fruits and vegetables and alternative processed products.	110		√	√	√
3	Changes in the physical and chemical properties of fruits and vegetables during ripening, and mechanism of damage to fruits and vegetables and identify how to control it	110		√	√	√
4	Physical and chemical characteristics of cereals and legumes and their alternative products.	110		√	√	√
5	Physical and chemical characteristics of tubers and alternative processed products.	110		√	√	√
6	Evaluation - 1		√	√	√	√
7	Physical, chemical and microorganism properties and their relationship to the quality of milk and dairy products	110		√	√	√
8	Egg structure, composition, physicochemistry as a determinant of egg quality and post-harvest and egg preservation and their processed products	110		√	√	√
9	Characteristics of fishery products and factors determining fish quality.	110		√	√	√
10	Changes in post-harvest fish and handling of fresh fish	110		√	√	√
11	Evaluation - 2			√	√	√
12	Structure, composition and determinants of meat quality as well as physiological and physical changes in meat after slaughter and post-morten processes	110		√	√	√
13	Definition and classification of plantation products, physical and chemical characteristics of plantation products and some of the main products of plantation products	110		√	√	√
14	Classification of oil-producing vegetable foods and the physical and chemical characteristics of vegetable oils	110		√	√	√
15	Physical and chemical characteristics of spices and their use in the food industry	110		√	√	√
16	Evaluation - 3	110		√	√	√

Laboratory Practicum

No.	Topics	Duration	CLO 1	CLO 2	CLO 3	CLO 4	Activities in Laboratory
1	Practical general explanation	170	√				Pre-test, explanation from assistant, practice according to the practical manual, writing the results in worksheet, approval by assistant.
2	Fruit and vegetable peeling method	170		√	√		
3	Edible portion of fruit and vegetable	170		√	√		
4	Physical properties of cereals and beans	170		√	√		
5	Determination of fish quality	170		√	√	√	
6	Physical properties of intermediate products	170		√	√		
7	physical properties of tubers	170		√	√		
8	Milk quality test	170		√	√	√	
9	Report	170		√	√	√	
10	Examination	170		√	√	√	

Contribution of Course Assessment to PLO

Course Assessment	AV	KA	SC	GC	Type
Evaluation 1	**6, 9**	**4.1, 4.7 5.1, 6.2**	**4**	**3**	Summative
Evaluation 2		**4.1, 4.7 5.1, 6.2**	**4**	**3**	Summative
Evaluation 3		**4.1, 4.7 5.1, 6.2**	**4**	**3**	Summative
Lab Practicum	**6, 9**	**4.1, 4.7 5.1, 6.2**	**4**	**3**	Formative

10

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 $\geq$ 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.
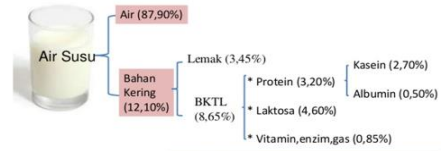
Course materials in Power Point Slides

Week 4	

Slide 1

Karakteristik Bahan Nabati
A. Serealia

Slide 2

Sifat Fisik dan Biologi Serealia

- Struktur biji serealia
  - Pericarp/Kulit biji (1-2%)
  - Endosperm/butir biji (89-94%)
  - Embryo/lembaga (2-3%)

Slide 3

Rice Processing

Struktur biji padi — CEREALS

b. Beras Pecah Kulit

Slide 4

JAGUNG

- Struktur biji jagung (*corn kernel*) yang telah matang terdiri atas empat bagian utama, yaitu perikarp (pericarp atau *bran coat*), lembaga (*germ*), endosperma (endosperm) dan tip kap (tip cap atau pedicel).
- Perikarp merupakan lapisan pembungkus biji jagung (kulit ari) yang berubah cepat selama proses pembentukan biji. Bobot perikarp sekitar 5% dari bobot biji jagung utuh kering (*whole corn kernel*). Perikarp ini dilapisi oleh lapisan kulit biji atau testa dan lapisan aleuron yang mengandung 10% protein.
- Lembaga (*germ*) merupakan bagian yang cukup besar. Pada biji jagung tipe gigi kuda, bobot lembaga sekitar 11,5% dari bobot biji jagung utuh kering. Lembaga ini sendiri sebenarnya tersusun atas dua bagian yaitu skutelum (scutellum) dan poros embrio (embryo axis).
- Endosperm merupakan bagian terbesar dari biji jagung, yaitu sekitar 85%. Hampir seluruhnya terdiri atas karbohidrat dari bagian yang lunak (*floury endosperm*) dan bagian yang keras (*horny endosperm*).
- Tip cap adalah bagian yang menghubungkan biji jagung dengan janggel atau tongkol jagung. Bobotnya sekitar 0,8% dari bobot biji jagung utuh kering.

Slide 5

GANDUM

- Biji gandum terdiri dari endosperm (83%), bran/kulit (14,5%), dan germ/lembaga (2,5%).
- Pada umumnya, kernel berbentuk oval dengan panjang 6–8 mm dan diameter 2–3 mm.
- Bagian kulit dari biji gandum sebenarnya tidak mudah dipisahkan karena merupakan satu kesatuan dari biji gandum, tetapi bagian kulit ini biasanya dapat dipisahkan melalui proses penggilingan.
- Gandum kaya akan kandungan vitamin, mineral, dan serat. Selain itu gandum juga memiliki beragam senyawa fitokimia yang mempunyai dampak positif untuk kesehatan.
- Gandum biasanya digunakan untuk memproduksi tepung terigu, pakan ternak, ataupun difermentasi untuk menghasilkan alkohol.

Slide 6

Karakteristik Bahan Nabati
B. Kacang-kacangan

Slide 7

Jenis Kedelai

- Kedelai kuning
  tempe, tahu, kecap, kembang tahu dan susu kedelai.
- Kedelai hitam
  kecap
- Kedelai coklat
  Bisa digunakan untuk pembuatan produk yang serupa dengan dengan kedelai kuning.
- Kedelai hijau
  pembuatan makanan kecil dalam bentuk direbus atau digoreng.

Slide 8

- Koro pedang : bentuk buahnya besar, panjang, dan pipih seperti pedang. Warnanya putih kekuning-kuningan dan aromanya agak langu. Batangnya pendek besar dan daunnya hijau, lebar dan tebal. Bunganya berwarna putih kebiru – biruan. Bijinya banyak mengandung HCN.
- Koro benguk : bagian kulit polongnya berbulu, tebal dan agak kasar jika diraba. Panjang polong rata-rata 10 cm dan isinya sekitar 4-6 biji. Warna polong coklat gelap dengan lapisan bulu yang tebal dan kaku. Warna bijinya abu-abu, hitam, coklat atau berbercak-bercak.
- Koro kecipir : Dikenal sebagai kacang botol atau kacang belimbing (di Sumatera) dan kacang embing(di Palembang), kelongkang dan kumbotor. Biji dan daun kecipir mengandung saponin, tannin dan flavonoid. Biji mengandung protein, magnesium, kalium, fosfor, vit. C dan antioksidan. Biji agak bulat, berwarna coklat, kuning, putih.

PENGETAHUAN BAHAN
S U S U

KOMPOSISI AIR SUSU

Air Susu

- Air (87,90%)
- Bahan Kering (12,10%) — BKTL (8,65%)
  - Lemak (3,45%)
  - Protein (3,20%)
    - Kasein (2,70%)
    - Albumin (0,50%)
  - Laktosa (4,60%)
  - Vitamin, enzim, gas (0,85%)

Sumber : Sudono (1989)

Mudah berubah → genetik dan lingkungan

Milk Proteins

Total protein content in milk – 2.9 – 3.5%

Two major types of milk protein

➢ Caseins (80%)

➢ Whey proteins: (20%)

Composition of Milk Protein

Whey Protein 20%

Casein 80%

Whey (milk serum) is the liquid remaining after milk coagulation and curds removal. It contains water, lactose and soluble non-casein proteins.

http://ansci.illinois.edu/static/ansc438/Milkcompsynth/milkcomp_protein.html

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PENGGUMPALAN SUSU

○ **Denaturasi Protein :**
- Perubahan utama pada struktur 3 dimensi

○ **Flokulasi :**
- Perubahan sekunder, gumpalan protein yang mengendap berada dalam keadaan terpisah-pisah

○ **Gelasi/Koagulasi:**
- Gumpalan-gumpalan protein sudah membentuk massa homogen seperti gel.

Choose your milk source: Amino acid composition

Amino acid concentration (% of protein content)

Amino Acid	Cow	Buffalo	Sheep	Goat	Camel	Human
Aspartic acid	7.8	n/a	n/a	7.4	6.9	8.3
Threonine*	4.5	5.7	4.2 - 4.4	5.7	4.1	4.6
Serine	4.8	n/a	n/a	5.2	4.3	5.1
Glutamic acid	23.2	n/a	n/a	19.3	18.1	17.8
Proline	9.6	n/a	n/a	14.6	12.0	8.6
Cysteine	0.6	0.6	0.8 - 0.9	0.6	1.9	1.7
Glycine	1.8	n/a	n/a	2.1	2.1	2.6
Alanine	3.0	n/a	n/a	3.6	2.1	4.0
Valine*	4.8	6.8	6.2 - 6.4	5.7	4.1	6.0
Methionine*	1.8	0.9	2.7	3.5	2.0	1.8
Isoleucine*	4.2	5.7	4.6	7.1	4.9	5.8
Leucine*	8.7	9.8	9.7 - 9.9	8.2	6.1	10.1
Tyrosine	4.5	3.8	3.7 - 3.8	4.8	3.1	4.7
Phenylalanine*	4.8	4.7	4.2 - 4.3	6.0	4.0	4.4
Histidine*	3.0	n/a	n/a	5.0	2.1	2.3
Lysine*	8.1	7.5	7.7 - 7.8	8.2	4.0	6.2
Arginine	3.3	n/a	n/a	2.9	2.0	4.0
Tryptophan*	1.5	n/a	n/a	n/a	n/a	1.8
Limiting Amino Acid	Cysteine Methionine	Cysteine Methionine	-	-	Lysine	-

* Essential amino acids (9 in total)

Milk proteins have a balanced amino acid; high quality protein

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SIFAT FISIK SUSU

Warna
Susu dapat berwarna putih kebiruan hingga keemasan. Warna putih kebiruan merupakan refleksi cahaya oleh globula lemak dan partikel koloidal dari kasein dan pospat. Warna kuning adalah karena lemak dan karoten yang dapat larut.

Rasa dan bau air susu
Air susu terasa sedikit manis, yang disebabkan oleh laktosa, sedangkan rasa asin berasal dari klorida, sitrat dan garam-garam mineral lainnya.

SIFAT KIMIA SUSU

Keasaman dan pH
Susu segar mempunyai sifat ampoter (dapat bersifat asam dan basa). pH antara 6.5-6.7.
Sebagian besar asam dalam susu adalah asam laktat.
Keasaman susu juga dapat terjadi karena kandungan pospat kompleks, asam sitrat, dan asam-asam amino.
Bila pH < 6.5 : terjadi kerusakan oleh bakteri.
Bila pH > 6.7 : penyakit mastitis

KUALITAS SUSU

Faktor penentu kualitas susu:

1. Keadaan kandang.
   Kandang sapi harus mempunyai ventilasi yang baik agar sirkulasi udara lancar, tidak berdekatan dengan kandang ternak lainnya.
2. Kesehatan sapi.
   Sapi harus terbebas dari penyakit terutama yang dapat ditularkan kepada manussia spt. TBC dan antrax.
3. Kondisi ruang penyimpanan.
4. Cara pemberian pakan sapi.
5. Persiapan sebelum pemerahan.
   Persiapan alat-alat yang akan digunakan, kebersihan sapi dan pekerja yang akan mengambil susu sapi.

PENGETAHUAN BAHAN HASIL PERIKANAN

♦ Dgradasi TMAO menjadi TMA, DMA dan FA:
Setelah ikan mati, TMAO akan terurai oleh enzim reduktase menjadi TMA, dan kemudian terurai lagi menjadi unsur-unsur yang lebih sederhana yaitu DMA, MMA dan FA.

TMAO ⟶ TMA + DMA + FA
TMAO reduktase (TMA bagian terbesar)
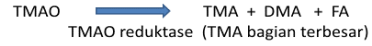
TMA juga terbentuk dari hasil degradasi TMAO oleh mikrobia *Pseudomonas, Lactobacillus dan Achromobacter*

♦ Protein ikan mudah dicerna (daya cerna 95%).

♦ Protein daging ikan tersusun atas **sarkoplasma** yang terdapat dalam plasma otot dan **miofibriler** yang menyusun serabut otot (miofibril).
Protein miofibril menyusun 66-77% dari protein daging ikan. Protein ini berperan penting dalam penggumpalan dan pembentukan gel pada pengolahan daging ikan.

Kandungan Gizi Produk Perikanan non Ikan

No	Komposisi Kimia	Udang Vaname (%)	Udang Windu (%)	Kerang Darah (%)	Kepiting Rajungan (%)
1	Air	72,64	73,39	74,37	75,12
2	Protein	19,36	18,35	19,48	19,96
3	Lemak	0,82	0,86	2,50	1,78
4	Karbohidrat	6,10	5,73	NA	NA
5	Abu/mineral	1,07	1,66	Cu: 3,17 ppm Ca: 698,49 ppm Fe: 93,63	2,52
				Zn: 13,91 ppm	
	Sumber	Verdian et al, 2019	Verdian et al, 2019	Nurjanah et al, 2005	Suwandi et al, 2019

♦ Ikan segar dapat dibedakan dengan ikan yang sudah rusak dapat dilihat dari tanda-tanda berikut:

Parameter	Ikan Segar	Ikan yang Mutunya Buruk
Warna Kulit	Terang, cerah dan tidak suram	Tida cerah dan suram
Sisik	Masih melekat dengan kuat	Sisik mudah dilepas
Mata	Jernih, tidak suram, melotot	Suram, tenggelam ke dalam tempat mata
Daging	Segar, elastis, apabila ditekan dengan jari bekasnya lekas kembali ke posisi semula	Tidak segar, lemas dan tidak mudah kembali ke posisi semula apabila ditekan dengan jari
Bau	Tidak memberikan tanda-tanda busuk atau berbau asing	Busuk dan asam
Lendir	Tidak terdapat lendir pada permukaannya. Kalaupun ada jumlahnya tidak banyak	Banyak terdapat lendir di permukaan badannya
Kondisi dalam Air	Ikan tenggelam	Ikan mengapung

• Rumput laut di kelompokkan ke dalam Divisio Thallophyta.

• Berdasarkan kandungan pigmennya, rumput laut dikelompokkan menjadi 4 (empat) kelas:
1) Rhodophyceae (Ganggang merah)
2) Phaeophyceae (Ganggang cokelat)
3) Cholorophyceae (Ganggang hijau)
4) Cyanophyceae (Ganggang biru-hijau)

Febriansyah (2014)
Eucheuma cottonii dan *Gracilaria sp* tumbuh subur di sebagian besar wilayah Indonesia.

• **Agar-agar** merupakan asam sulfanik yang merupakan ester dari galakto linier dan diperoleh dengan mengekstraksi ganggang jenis Agarophytae. Agar - agar ini sifatnya larut dalam air panas dan tidak larut dalam air dingin.
• Kegunaan agar – agar adalah sebagai bahan pemantap, dan pembuat emulsi, bahan pengental, bahan pengisi, dan bahan pembuat gel.
• **Keraginan** merupakan senyawa polisakarida yang tersusun dari unit D-galaktosa dan L-galaktosa 3,6 anhidrogalaktosa yang dihubungkan oleh ikatan 1,4 α-glikosilik. Ciri khas dari keraginan adalah setiap unit galaktosanya mengikat gugusan sulfat, jumlah sulfatnya lebih kurang 35,1%.
• Kegunaan keraginan hampir sama dengan agar - agar, antara lain sebagai pengatur keseimbangan, pengental, pembentuk gel, dan pengemulsi.
• **Algin (alginate)** didapatkan dari rumput laut jenis algae coklat. Algin ini merupakan polimer dari asam uronat yang tersusun dalam bentuk rantai linier panjang. Bentuk algin di pasaran banyak dijumpai dalam bentuk tepung natrium, kalium atau amonium alginat yang larut dalam air.
• Kegunaan algin dalam industri ialah sebagai bahan pengental, pengatur keseimbangan, pengemulsi, dan pembentuk lapisan tipis yang tahan terhadap minyak.

PROGRAM STUDI : TEKNOLOGI HASIL PERTANIAN

TAHUN AKADEMIK : 2021/2022 (SEMESTER GANJIL)

NAMA MATA KULIAH : PENGETAHUAN BAHAN HASIL PERTANIAN (3 SKS)

RUANG : RK C1207

DOSEN : DR. BUDI SANTOSO, S.TP., M.SI. / FRISKA SYAIFUL, S.TP., M.SI. / DR. IR. PARWIYANTI, M.P.

JADWAL : SENIN (09:20 - 11:00 WIB)

| NO. | NIM | NAMA | PRAC | EV-1 | EV-2 | Ev-3 | ASSESSMENT | | | | NTR | NUTS | NUAS | Final Score | GRADE | Overall Achievement of CLO |
							PRAC	EV-1	EV-2	Ev-3						
1	05031082122001	ERINNA AYU PRASYSTA	88	85	85	86	achieved	not achieved	not achieved	achieved	88	85	86	86,15	A	OK
2	05031082122002	RIZKY NOVA PRASETYA	86	85	85	87	achieved	not achieved	not achieved	achieved	87	85	87	86,3	A	OK
3	05031182025002	REVI RIANI	93	88	91	89	achieved	achieved	achieved	achieved	93	89	89	90	A	OK
4	05031182025003	PUTRI WULAN DARI	91	84	88	94	achieved	not achieved	achieved	achieved	91	86	94	90,45	A	OK
5	05031182025004	VIONITA SEPTRIANI	92	88	90	86	achieved	achieved	achieved	achieved	92	89	86	88,55	A	OK
6	05031182025005	ERIKA NANDA SYOFIANTI	92	84	88	87	achieved	not achieved	achieved	achieved	92	86	87	87,9	A	OK
7	05031182025006	NOFIANTO	93	96	95	89	achieved	achieved	achieved	achieved	93	95	89	92,1	A	OK
8	05031182025007	HENI MARICO	93	76	85	88	achieved	not achieved	not achieved	achieved	93	80	88	86,45	A	OK
9	05031182025008	CELCILIA ASRI PUTRI	93	88	91	88	achieved	achieved	achieved	achieved	93	89	88	89,6	A	OK
10	05031182025009	FADILLA FEBRIANI	90	68	79	82	achieved	not achieved	not achieved	not achieved	90	74	82	81,2	B	X
11	05031182025010	FRISKA AZZAHRA	89	88	89	86	achieved	achieved	achieved	achieved	89	88	86	87,45	A	OK
12	05031182025011	ANJELITA PRAMUDIA	89	92	91	91	achieved	achieved	achieved	achieved	89	91	91	90,5	A	OK

NO.	NIM	NAMA	PRAC	EV-1	EV-2	Ev-3	PRAC	EV-1	EV-2	Ev-3	NTR	NUTS	NUAS	Final Score	GRADE	Overall Achievement of CLO
13	05031182025012	IIS ARISKA	87	60	74	81	achieved	not achieved	not achieved	not achieved	87	67	81	77,6	B	X
14	05031182025013	ELIZA DWI PUTRI	92	84	88	87	achieved	not achieved	achieved	achieved	92	86	87	87,9	A	OK
15	05031182025014	ANA AMINAH	93	80	87	86	achieved	not achieved	achieved	achieved	93	83	86	86,7	A	OK
16	05031182025015	HANA OKTARIYANI	89	72	81	86	achieved	not achieved	not achieved	achieved	89	76	86	83,25	B	X
17	05031182025016	DELI SARTIKA	88	80	84	85	achieved	not achieved	not achieved	not achieved	88	87	85	86,45	A	OK
18	05031182025017	FERI NURMALA SARI	91	76	84	82	achieved	not achieved	not achieved	not achieved	91	80	82	83,55	B	X
19	05031182025018	CICI AMBARWATI	90	60	75	85	achieved	not achieved	not achieved	not achieved	90	68	85	80,3	B	X
20	05031282025019	SANTANIA ALDITA KABAN	91	88	90	81	achieved	achieved	achieved	not achieved	91	89	81	86,3	A	OK
21	05031282025020	DELIA MAHARANI	88	72	80	81	achieved	not achieved	not achieved	not achieved	88	76	81	81	B	X
22	05031282025021	MUHAMMAD RIZQI LIOGA PUTRA	89	76	83	76	achieved	not achieved	not achieved	not achieved	89	79	76	80,3	B	X
23	05031282025022	KRISNA RAMADHAN	90	92	91	91	achieved	achieved	achieved	achieved	90	92	91	91,1	A	OK
24	05031282025023	SHAKIRA ALFISYAHRINI	91	88	90	88	achieved	achieved	achieved	achieved	91	89	88	89,1	A	OK
25	05031282025024	M. FADLY WAHYUDHI	89	84	87	73	achieved	not achieved	achieved	not achieved	89	85	73	81,2	B	X
26	05031282025025	PANI ISMIRA	90	92	91	89	achieved	achieved	achieved	achieved	90	92	89	90,3	A	OK
27	05031282025026	NYAYU FITHRIAH AL KAMILAH	93	88	91	97	achieved	achieved	achieved	achieved	93	89	97	93,2	A	OK
28	05031282025027	WILLY PERDANA	91	80	86	83	achieved	not achieved	not achieved	not achieved	91	87	83	86,4	A	OK
29	05031282025028	WIDYA ADENINGRUM	93	80	87	90	achieved	not achieved	achieved	achieved	93	83	90	88,3	A	OK
30	05031282025029	GRESSI PAKPAHAN	91	80	86	79	achieved	not achieved	not achieved	not achieved	91	83	79	83,4	B	X
31	05031282025030	ELA ROSWASTI A.S. GINTING	89	84	87	92	achieved	not achieved	achieved	achieved	89	85	92	88,8	A	OK

NO.	NIM	NAMA	PRAC	EV-1	EV-2	Ev-3	PRAC	EV-1	EV-2	Ev-3	NTR	NUTS	NUAS	Final Score	GRADE	Overall Achievement of CLO
32	05031282025031	DIAN KURNIATI	90	68	79	88	achieved	not achieved	not achieved	achieved	90	74	88	83,6	B	X
33	05031282025032	JIHAN PUTRI NABILA	92	72	82	89	achieved	not achieved	not achieved	achieved	92	79	89	86,25	A	OK
34	05031282025033	ARYA FEBRIAN	87	80	84	73	achieved	not achieved	not achieved	not achieved	87	82	73	79,65	B	X
35	05031282025034	NADYA RAHMA	90	68	79	82	achieved	not achieved	not achieved	not achieved	90	74	82	81,2	B	X
36	05031282025035	IRA SALSABILA UTAMI SEMBIRING	92	44	68	84	achieved	not achieved	not achieved	not achieved	92	56	84	76,2	B	X
37	05031282025036	SRI WAHYUNI	92	88	90	88	achieved	achieved	achieved	achieved	92	89	88	89,35	A	OK
38	05031282025037	GEBY ZONA KHANSA	91	44	68	81	achieved	not achieved	not achieved	not achieved	91	56	81	74,75	B	X
39	05031282025038	MUHAMMAD IQBAL AIDIL FITRI YR	91	80	86	89	achieved	not achieved	not achieved	achieved	91	83	89	87,4	A	OK
40	05031282025039	TRIE AGMA YANSIH	92	88	90	80	achieved	achieved	achieved	not achieved	92	89	80	86,15	A	OK
41	05031282025040	MIFTAHUL JANNAH	88	80	84	79	achieved	not achieved	not achieved	not achieved	88	82	79	82,3	B	X
42	05031282025041	MONA NOVELIA	89	76	83	79	achieved	not achieved	not achieved	not achieved	89	79	79	81,5	B	X
43	05031282025043	MEILISA HAGAINA BR SITEPU	90	92	91	90	achieved	achieved	achieved	achieved	90	92	90	90,7	A	OK
44	05031282025044	GITA IFANKA	91	88	90	83	achieved	achieved	achieved	not achieved	91	89	83	87,1	A	OK
45	05031282025045	REYNALDI CHRISTIAN PANE	88	80	84	82	achieved	not achieved	not achieved	not achieved	88	82	82	83,5	B	X
46	05031282025046	CINDANA CUCITRA SINAGA	91	92	92	79	achieved	achieved	achieved	not achieved	91	92	79	86,55	A	OK
47	05031282025047	DEFI NISTRISYAH	92	68	80	80	achieved	not achieved	not achieved	not achieved	92	74	80	80,9	B	X
48	05031282025049	SAMUEL M. SITINJAK	89	72	81	86	achieved	not achieved	not achieved	achieved	89	76	86	83,25	B	X
49	05031282025050	ILHAM M. QODRI	87	92	90	77	achieved	achieved	achieved	not achieved	87	91	77	84,4	B	X

NO.	NIM	NAMA	PRAC	EV-1	EV-2	Ev-3	PRAC	EV-1	EV-2	Ev-3	NTR	NUTS	NUAS	Final Score	GRADE	Overall Achievement of CLO
50	05031282025051	SITI ZULYETTA SOFYA FINARTI A ABIDIN	92	72	82	88	achieved	not achieved	not achieved	achieved	92	80	88	86,2	A	OK
51	05031282025052	RIZKY MARULITUA RUMAHORBO	91	80	86	87	achieved	not achieved	not achieved	achieved	91	83	87	86,6	A	OK
52	05031282025053	HISYAM DANY AL DAFFA	87	84	86	86	achieved	not achieved	not achieved	achieved	87	87	86	86,6	A	OK
53	05031282025054	THARRA NISA RAFIQAH	90	92	91	88	achieved	achieved	achieved	achieved	90	92	88	89,9	A	OK
54	05031282025055	VANESA INDAH WINARNO	87	92	90	78	achieved	achieved	achieved	not achieved	87	91	84	87,2	A	OK
55	05031282025056	KASSANDRA DWIKI ANNISA	90	84	87	84	achieved	not achieved	achieved	not achieved	90	86	84	86,2	A	OK
56	05031282025057	FIGO ARDIANSYAH	88	80	84	86	achieved	not achieved	not achieved	achieved	88	88	86	87,2	A	OK
57	05031282025058	SAMUEL SILALAHI	93	88	91	89	achieved	achieved	achieved	achieved	93	89	89	90	A	OK
58	05031282025059	ALGA MAWARA	88	96	92	75	achieved	achieved	achieved	not achieved	88	94	80	86,9	A	OK
59	05031282025061	LAUREN F MANALU	92	96	94	86	achieved	achieved	achieved	achieved	92	95	86	90,65	A	OK
60	05031382025062	MAULANA ARIF NUGRAHA	88	80	84	88	achieved	not achieved	not achieved	achieved	88	85	88	86,95	A	OK
61	05031382025066	GALIH WICAKSANA	88	100	94	80	achieved	achieved	achieved	not achieved	88	97	80	87,95	A	OK
62	05031382025071	BUDI TRIANSYAH	89	68	79	82	achieved	not achieved	not achieved	not achieved	89	73	82	80,6	B	X
63	05031382025073	ADYA APRILLANDI CAHYA	91	68	80	78	achieved	not achieved	not achieved	not achieved	91	74	78	79,85	B	X
64	05031382025075	SONIA	90	84	87	79	achieved	not achieved	achieved	not achieved	90	86	79	84,2	B	X
65	05031382025079	DESMI HARTIKA	87	60	76	72	achieved	not achieved	not achieved	not achieved	87	75	72	76,8	B	X
66	05031382025087	DEVI DESVIANA	88	80	84	74	achieved	not achieved	not achieved	not achieved	88	82	74	80,3	B	X
67	05031382025088	TIAN NABILA MAHARANI	91	76	84	80	achieved	not achieved	not achieved	not achieved	91	80	80	82,75	B	X

NO.	NIM	NAMA	PRAC	EV-1	EV-2	Ev-3	PRAC	EV-1	EV-2	Ev-3	NTR	NUTS	NUAS	Final Score	GRADE	Overall Achievement of CLO
68	05031382025092	CINCIN	90	60	75	75	achieved	not achieved	not achieved	not achieved	90	68	75	76,3	B	X
69	05031382025094	AGDELILLAH	88	64	76	70	achieved	not achieved	not achieved	not achieved	88	70	70	74,5	B	X
70	05031382025095	PEBRI WAHYUDI	85	56	76	69	not achieved	not achieved	not achieved	not achieved	85	69	70	73,4	B	X
71	05031382025097	REILLY HAFIIDHA WANA PUTRI	85	56	71	60	not achieved	not achieved	not achieved	not achieved	85	70	68	72,95	B	X
		Average Per Class	89,92	79,24	84,66	83,21	69 Student Achieved	23 Student Achieved	23 Student Achieved	33 Student Achieved				84,80		
		Achievement	achieved	not achieved	not achieved	not achieved	97%	32%	32%	47%				not achieved		
							AVERAGE 52%						There were 30 student out of 71 students got grade B			

	PROGRAM STUDI :	**TEKNOLOGI HASIL PERTANIAN**
	TAHUN AKADEMIK :	**2021/2022 (GANJIL)**
	NAMA MATA KULIAH :	**PENGETAHUAN BAHAN HASIL PERTANIAN (3 SKS)**
	RUANG :	**RUANG 09**
	DOSEN :	**Dr. Ir. Gatot Priyanto, M.S./Dr. Budi Santoso, S.TP., M.Si./Dr. Merynda Indriayani Syafutri, S.TP., M.Si.**
	JADWAL :	**KAMIS (07:30 - 09:10 WIB)**

| NO. | NIM | NAMA | PRAC | EV-1 | EV-2 | Ev-3 | Achievement | | | | NTR | NUTS | NUAS | Final Score | GRADE | Overall Achievement of CLO |
							PRAC	EV-1	EV-2	Ev-3						
1	05031182025001	NYIMAS SINTA SATIA	89,00	88,83	89,50	89,50	achieved	achieved	achieved	achieved	88,92	89,50	89,50	89,35	A	OK
2	05031282025042	ALIFIA ANGGRAINI	92,00	86,40	89,50	89,45	achieved	achieved	achieved	achieved	89,20	89,50	89,45	89,41	A	OK
3	05031382025063	MUHAMMAD ALIF MUFLIH	90,00	87,80	88,63	84,58	achieved	achieved	achieved	not achieved	88,90	88,63	84,58	87,10	A	OK
4	05031382025064	VALLENTIA PIDI ARTA MULIA	89,00	84,50	87,30	84,80	achieved	not achieved	achieved	not achieved	86,75	87,30	84,80	86,17	A	OK
5	05031382025065	FERDINANTRI AKBAR	86,50	86,70	88,60	83,80	achieved	achieved	achieved	not achieved	86,60	88,60	83,80	86,26	A	OK
6	05031382025067	MUHAMMAD DAVID ALFARISI	92,00	86,40	87,36	83,80	achieved	achieved	achieved	not achieved	89,20	87,36	83,80	86,80	A	OK
7	05031382025069	HANIFAH AULIA ANALYRA	88,00	87,20	85,56	86,50	achieved	achieved	achieved	achieved	87,60	85,56	86,50	86,46	A	OK
8	05031382025070	RICKY RIKARDO	90,00	89,00	88,63	88,80	achieved	achieved	achieved	achieved	89,50	88,63	88,80	88,93	A	OK
9	05031382025072	YOHANNES MANIK	82,00	93,00	86,80	84,80	not achieved	achieved	achieved	not achieved	87,50	86,80	84,80	86,18	A	OK
10	05031382025074	YUNI SARA MARISYAH	88,00	87,00	85,56	85,30	achieved	achieved	achieved	not achieved	87,50	85,56	85,30	86,05	A	OK
11	05031382025076	ANNISA NUR SAFIRA WIJAYA	91,00	86,60	89,50	89,08	achieved	achieved	achieved	achieved	88,80	89,50	89,08	89,16	A	OK
12	05031382025077	VICKY RIFANSYA	84,00	96,00	85,56	85,30	not achieved	achieved	achieved	not achieved	90,00	85,56	85,30	86,02	A	OK
13	05031382025078	HIDAYATULLAH	86,00	87,00	83,20	79,50	achieved	achieved	not achieved	not achieved	86,50	83,20	79,50	82,55	B	X
14	05031382025080	AISYAH NURLIANI	90,00	86,40	88,70	78,55	achieved	achieved	achieved	not achieved	88,20	88,70	78,55	84,52	B	X

NO.	NIM	NAMA	PRAC	EV-1	EV-2	Ev-3	PRAC	EV-1	EV-2	Ev-3	NTR	NUTS	NUAS	Final Score	GRADE	Overall Achievement of CLO
15	05031382025081	FARHAN MUHARAM	89,00	86,00	87,80	85,30	achieved	achieved	achieved	not achieved	87,50	87,80	85,30	86,73	A	OK
16	05031382025083	RADNA SEKAR KUSUMA NINGRUM	88,00	87,60	88,70	83,60	achieved	achieved	achieved	not achieved	87,80	88,70	83,60	86,45	A	OK
17	05031382025085	MUHAMMAD FARHAN	89,00	86,00	85,22	86,80	achieved	achieved	not achieved	achieved	87,50	85,22	86,80	86,42	A	OK
18	05031382025089	ANNISA KHALA NABILLAH	89,00	86,00	87,50	88,50	achieved	achieved	achieved	achieved	87,50	87,50	88,50	87,90	A	OK
19	05031382025091	INTAN NOVALIA	89,00	87,40	88,50	83,79	achieved	achieved	achieved	not achieved	88,20	88,50	83,79	86,42	A	OK
20	05031382025098	FIKRI NAUFALDY DANANJAYA	87,00	88,60	86,10	84,80	achieved	achieved	achieved	not achieved	87,80	86,10	84,80	86,01	A	OK
		Average per class	88,43	87,72	87,41	85,33	18 student achieved	19 student achieved	18 student achieved	7 student achieved				86,74		
		Assessment	achieved	achieved	achieved	not achieved	90%	95%	90%	35%				achieved		
							AVERAGE 78%				There were 18 student out of 20 students got grade B						

Percentage of CLO Achievement per

CLASS: INDRALAYA

No.	Evaluation	Weight (%)	Score	CLO1	CLO2	CLO3	CLO4	Level of achievement
1	Evaluation I	25	79	32%	32%	32%		Unsatisfactory
2	Evaluation II	25	85	32%	32%	32%	32%	Unsatisfactory
3	Evaluation III	25	83		47%	47%	47%	Unsatisfactory
4	Lab Practicum	25	90		97%	97%	97%	Very Satisfactory

CLASS: PALEMBANG

No.	Evaluation	Weight (%)	Score	CLO1	CLO2	CLO3	CLO4	Level of achievement
1	Evaluation I	25	88	95%	95%	95%		Very Satisfactory
2	Evaluation II	25	87		90%	90%	90%	Very Satisfactory
3	Evaluation III	25	85		35%	35%	35%	Unsatisfactory
4	Lab Practicum	25	88		90%	90%	90%	Very Satisfactory