Module Handbook/RPKPS

Technology of Fermented Fisheries Products

Composed by :

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Master of Fisheries Science

Faculty of Agriculture

Universitas Gadjah Mada

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Module Handbook:
Technology of Fermented Fisheries Products

Module designation	This course provides knowledge related to microbial physiology in the fermentation process, the factors that influence the fermentation process, the fermentation process traditionally uses natural microbes, and modernly uses inoculum starter, enzymatic processes in the production of protein hydrolysates and chito oligosaccharides, and the production of metabolites from microbes.
Semester(s) in which the module is taught	2
Person responsible for the module	Indun Dewi Puspita, S.P., M.Sc. Ph.D. Prof. Dr. Amir Husni, S.Pi., M.P. Mgs. Muhammad Prima Putra, S.Pi., M.Sc., Ph.D.
Language	Indonesian
Relation to curriculum	Elective Course
Teaching methods	Activities: a) Lecture (lecture and discussion) b) Examinations c) Take home assignments d) Quiz e) Student presentation

Workload (incl. contact hours, self-study hours)	1. Lecture 2 SKS x 50 minutes x 16 meetings = 1,600 minutes = 26.67 hours = 26.67 hours/30 hours = 0.89 ECTS 2. Structural Assignment 2 SKS x 60 minutes x 16 meetings = 1,920 minutes = 32.00 hours = 32.00 hours/30 hours = 1.07 ECTS 3. Self Study 2 SKS x 60 minutes x 16 meetings = 1,920 minutes = 32.00 hours = 32.00 hours/30 hours = 1.07 ECTS Total Workload = 3.02 ECTS
Credit points	2 Credit points
Required and recommended prerequisites for joining the module	-

Module objectives/intended learning outcomes	**Program Learning Outcomes:** -LO-P1 : Able to demonstrate theory and its application comprehensively in the fields of aquaculture, aquatic resource management, fish product technology. -LO-P2 : Able to examine problems and formulate appropriate solutions in the field of aquaculture/aquatic resource management/fish product technology -LO-KK1 : Able of assemble science and technology together via interdisciplinary and multidisciplinary research, sustainable innovation in the fisheries sector encompassing aquaculture, aquatic resource management, and fish product technology

Content	1. Introduction a. Definition of fermentation b. Fermentation History c. Fermented products 2. Microbial diversity in fermented fishery products a. Microorganisms in various fishery fermentation products b. Bacterial population dynamics in the fermentation process c. Effect of bacterial population dynamics on product characteristics 3. Microbial physiology in the fermentation process a. Metabolic processes in bacterial cells b. Aerobic respiration (glycolysis, creb cycle, electron transport) c. Anaerobic respiration d. Fermentation 4. Bacterial, mould and yeast fermentation a. Bacterial fermentation b. Mould fermentation c. Yeast fermentation d. Process characteristics and fermented products 5. Factors that affect fermentation a. Starter selection and analysis of microorganisms b. Effect of nutrition, temperature, pH, and inhibitors on the fermentation process 6. Type of fermentation a. Batch, fed-batch, continuous fermentation b. Solid state, submerge, liquid fermentation c. Fermentation process characteristics d. Strengths and weaknesses 7. Traditional fermentation of fishery products a. Fermentation process of fish sauce and shrimp paste

	b. Whole fish fermentation process c. Chemical changes in fermented products d. Chemical characteristics of fermented products 8. Modern fermentation of fishery products a. Fish protein hydrolysate production process b. Fermented fish oil c. Algae fermentation (production of bioethanol and biogas) 9. Production of bioactive compounds through fermentation of fishery products (non-food) a. Biological processes in chitin / chitosan oligomer production b. Biological processes in the production of bioactive compounds from fisheries waste 10. Health and safety impacts of fishery fermentation products a. Beneficial microorganisms in fermented products b. Increase the nutritional value of fermented products c. Bacteriocin and bioactive marine peptide d. Safety of fishery fermentation products: biogenic amine, putrefaction
Examination forms	Midterm exam: Examination Final exam: Examination by Simaster, g form, and Elok
Study and examination requirements	Students can join the course by registering the study plan (KRS) to enroll the chosen subjects in each academic semester. The students must meet minimum attendance requirements 70% for joining the final examination.

Reading list	1. Steinkraus, K.H. 1993. Fish Fermentation Technology. United Nations University Press. 2. Madigan, M.T. & J. M. Martinko. Brock Biology of Microorganism 11th Ed. 2006. Pearson Prentice Hall. International Journal, such as: 1. Crisan, E.V. & A. Sands. 1975. Microflora of Four Fermented Fish Sauces. Applied Microbiology. 29(1): 106-108 2. Se Hee Lee, Ji Young Jung, Che Ok Jeon. 2015. Bacterial community dynamics and metabolite changes in myeolchi-aekjeot, a Korean traditional fermented fish sauce, during fermentation. International Journal of Food Microbiology. 203: 15-22 3. Xuefeng Zeng, Wenshui Xia, Qixing Jiang, Fang Yang. 2013. Chemical and microbial properties of Chinese traditional low-salt fermented whole fish product Suan yu. Food Control International Journal of Food Microbiology. 30: 590-595 4. Gaden, E.L. 2000. Fermentation Process Kinetics. Biotechnology and Bioengineering. 67(6): 629-635. 5. Chisti, Y. 1999. Fermentation (industrial): Basic consideration. In: Encyclopedia of Food Microbiology, Robinson, R., Batt C., and Patel P., editors. Academic Press, London. pp. 663-674. 6. Thomas, L., C. Larroche, A. Pandey. 2013. Current developments in solid-state fermentation. Biochemical Engineering Journal. 81: 146-161.