

Note: This SLT calculation is designed for home grown programme only.

Course Content Outline and Subtopics		CLO*	Learning and Teaching Activities**										Total SLT
			Face-to-Face (F2F)								NF2F Independent Learning (Asynchronous)		
			Physical				Online/ Technology-mediated (Synchronous)						
			L	T	P	O	L	T	P	O			
1	Topic 1 : Introduction - Overview of marine pollution - GESAMP definition of marine pollution	CLO1		2								2	
2	Topic 2 : Agrochemicals and agriculture pollution and their impact on fisheries resources	CLO1		4								4	
3	Topic 3 : Domestic waste and sewage and their impact on fisheries resources	CLO1		2								2	
4	Topic 4 : Organic pollutants and their impacts on fisheries resources	CLO1		4								4	
5	Topic 5 : Radioactive contamination and their impacts on fisheries resources	CLO1		2								2	
6	Topic 6 : Heavy metals and trace elements, and their impacts on fisheries resources	CLO1		4								4	
7	Topic 7 : Plastic, sedimentation and biological pollution and their impacts of fisheries resources	CLO3		4								4	
8	Topic 8 : The concept of sustainability and current management practice for monitoring marine pollution on fisheries resources	CLO3		2								2	
9	Practical 1 : Agriculture pollution	CLO2			3							3	
10	Practical 2 :Domestic wastes	CLO2			3							3	
11	Practical 3 :Organic pollutants	CLO2			3							3	
12	Practical 4 :Radioactive	CLO2			3							3	
13	Practical 5 :Heavy metals	CLO2			3							3	
14	Practical 6 :Plastic pollution	CLO2			3							3	
15													
16													
17													
18													
19													
20													
SUB-TOTAL SLT:												84	
Continous Assessment		%	Face-to-Face (F2F)								NF2F Independent Learning for Assessment (Asynchronous)		
			Physical				Online/ Technology-mediated (Synchronous)						
			L	T	P	O	L	T	P	O			
1	Case Study Report	40											12
2	Lab Project Report	40											12
3	Project Report	10											6
4	Presentation	10			1							5	
5													
SUB-TOTAL SLT:												36	
Final Assessment		%	Face-to-Face (F2F)								NF2F Independent Learning for Assessment (Asynchronous)		
			Physical				Online/ Technology-mediated (Synchronous)						
			L	T	P	O	L	T	P	O			
1													
2													
3													
4													
5													
SUB-TOTAL SLT:													

SLT for Assessment:		36
GRAND TOTAL SLT:		120
A	% SLT for F2F Physical Component: [Total F2F Physical / (Total F2F Physical + Total F2F Online + Total Independent Learning) x 100]	35.83
B	% SLT for Online & Independent Learning Component: [(Total F2F Online + Total Independent Learning) / (Total F2F Physical + Total F2F Online + Total Independent Learning) x 100]	64.17
C	% SLT for All Practical Component: [% F2F Physical Practical + % F2F Online Practical]	15.00
C1	% SLT for F2F Physical Practical Component: [Total F2F Physical Practical / (Total F2F Physical + Total F2F Online + Total Independent Learning) x 100]	15.00
C2	% SLT for F2F Online Practical Component: [Total F2F Online Practical / (Total F2F Physical + Total F2F Online + Total Independent Learning) x 100]	

Please tick (V) if this course is Industrial Training/ Clinical Placement/ Practicum using 50% of Effective Learning Time (ELT)

Note:



* Indicate the CLO based on the CLO's numbering in Item 8

** For ODL programme: Courses with mandatory practical requirements imposed by the programme standards or any related standards can be exempted from complying to the minimum 80% ODL delivery rule in the SLT.

*** L = Lecture, T = Tutorial, P= Practical, O= Others

11	Identify special requirement or resources to deliver the course (e.g., software, nursery, computer lab, simulation room etc)	
12	References (include required and further readings, and should be the most current)	<ol style="list-style-type: none"> 1. Beiras, R. (2018). Marine pollution: Sources, fate and effects of pollutants in coastal ecosystems. Waltham, MA: Elsevier. 2. Christodoulou-Varotsi, I. (2018). Marine pollution control: Legal and managerial frameworks. New York, NY: Informa Law from Routledge. 3. Fouzia, H. B. (2019). Monitoring of marine pollution. London: IntechOpen. 4. Majeti Narasimha Vara Prasad (2020). Agrochemicals detection, treatment and Remediation-Pesticides and Chemical fertilizers. www.elsevier.com. 5. Marcovecchio, J. E., & Arias, A. H. (2018). Marine pollution and climate change. Boca Raton: CRC Press Taylor & Francis Group. 6. Sagata JM, Zadeh SM & Turral H. (2017) . Water pollution from Agriculture : a global review. Executive summary. The Food and Agriculture Organization of the United Nation Rome, 2017 & The International Water Management Institute 7. Weis, J.S. (2017) Marine Pollution : What everyone needs to know. Oxford University Press
13	Other additional information (if applicable)	



Note: Number of PLO indicated is purely for illustration purposes only and the number is subjected to the curriculum design.

Date of Approval		Notes of Improvements (if any)	Checked By	Approved By
Programme	MSc Tropical Fisheries 6/10/2022		 DR. EMIENOUR MUZALIKA BINTI MUSTAFA Pensyarah Universiti Fakulti Perikanan dan Sains Makanan Universiti Malaysia Terengganu 21030 Kuala Nerus, Terengganu	 DR. SHARIFAH RAHMAH BINTI SYED MUHAMMAD Pengerusi Bidang Perikanan dan Akuakultur Fakulti Perikanan dan Sains Makanan Universiti Malaysia Terengganu 21030 Kuala Nerus, Terengganu Darul Iman
Faculty	7/3/2021			
JPPPU	14/7/2021			
Senate	25/7/2021			
Version	2			
Effective Session	Semester I 2022-2023			
			Date : 6/10/2022	Date : 6/10/2022

Course Information

1	Course Name:	Fishery Molecular Ecology (Ekologi Molekul Perikanan)													
	Course Code:	FIS5133													
	Course Classification:	Elective (core)	Remarks:												
2	Synopsis:	This course aims to expose students to advance concepts and skills in sustainable management of fishery resources through molecular approaches. In this course, basic principles of ecological genetics and population genetics as well as the application of molecular markers in the ecological and evolutionary aspects of fish will be emphasized. Molecular techniques which are commonly used in fish population studies such as species identification, phylogeny, phylogeography, and conservation unit determination will also be discussed. Current issues related to threatened aquatic biodiversity and associated conservation strategies will also be discussed. Students will also be trained to conduct case study in fisheries molecular ecology encompassing the process of sampling, voucher specimens preparation, data analysis and scientific report writing.													
3	Name(s) of Academic Staff:	1	Assoc. Prof. Dr. Wong Li Lian												
		2													
		3													
4	Semester and Year offered:	Year Offered	1	Semester	1	Remarks:									
5	Credit Value:	3	3(3+0)												
6	Pre-requisite/ co-requisite (if any):														
7	At the end of the course, student should be able to:														
Course Learning Outcomes (CLO)	CLO1	Determine the application and importance of molecular ecology in conserving fisheries research. (PLO3, C5)													
	CLO2	Explain the current issues related to threatened aquatic biodiversity. (PLO4, A4)													
	CLO3	Perform a case study to determine status of fisheries molecular ecology. (PLO7, A5)													
8	Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment Methods														
Course Learning Outcomes	Programme Learning Outcomes (PLO)											Teaching Methods	Assessment Methods		
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11				
	CLO1		v											Lecture, E-learning	Test, Final exam
	CLO2			v										Discussion, E-learning	Assignment, Presentation 1
CLO3						v					Discussion, E-learning	Case study, Presentation 2			
Mapping with MQF Cluster of Learning Outcomes			C2												
				C3C											
						C4A									
Indicate the primary causal link between the CLO and PLO by ticking "v" in the appropriate box.															
<p>PLO1-Knowledge & Understanding=C1, PLO2-Practical Skills=C3A, PLO3-Cognitive Skills=C2, PLO4-Communication Skills=C3C, PLO5-Interpersonal Skills=C3B, PLO6-Ethics & Professionalism=C5, PLO7-Personal Skills=C4A, PLO8-Entrepreneurial Skills=C4B, PLO9-Leadership, Autonomy & Responsibility=C3F, PLO10-Digital Skills=C3D, PLO11-Numeracy Skills=C3E</p>															
9	Transferable Skills (if applicable)														
(Skills learned in the course of study which can be useful and utilized in other settings)															
1 Communication Skills															
2 Personal Skills															
3 Cognitive skills															
Open-ended response (if any)															
4															
10	Distribution of Student Learning Time (SLT) Note: This SLT calculation is designed for home grown programme only.														

12	References (include required and further readings, and should be the most current)	<ol style="list-style-type: none"> 1. Bourlat, S. J. (2016). Marine genomics: Methods and protocols. New York: Humana Press/Springer Science+Business Media LLC. 2. Kartavtsev, Y. P. (2016). Molecular evolution and population genetics for marine biologists. Boca Raton, FL: CRC Press. 3. Natividad, Cheryl. (2020). Genetics, molecular biology, cell biology, ecology and evolution. Oakville, ON: Delve Publishing. 4. Rieppel, O. (2016). Phylogenetic systematics: Haeckel to Hennig. Boca Raton: CRC Press. 5. Rowe, G., & Sweet, M. (2017). An introduction to molecular ecology (Third Revised edition.). Oxford, United Kingdom: Oxford University Press.
13	Other additional information (if applicable)	
<p>Note: Number of PLO indicated is purely for illustration purposes only and the number is subjected to the curriculum design.</p>		

Date of Approval		Notes of Improvements (if any)	Checked By	Approved By	
Programme	1/3/2021		 DR. SHARIFAH NOOR EMILIA BINTI SYED JAMIL FAD'AAK Pensyarah Universiti Fakulti Perikanan dan Sains Makanan Universiti Malaysia Terengganu 21030 Kuala Nerus, Terengganu	 DR. WAN MOHD RUKHAN BIN WAN HUSSIN Pengerusi Bidang Perikanan dan Akuakultur Sarjana Sains Perikanan Tropika Sarjana Sains (Akuakultur) Fakulti Perikanan dan Sains Makanan Universiti Malaysia Terengganu 21030 Kuala Nerus, Terengganu	
Faculty	7/3/2021				
JPPPU	14/7/2021				
Senate	25/7/2021				
Version	1				
Effective Session	Sem I 2021-2022				
		Date :	1/3/2021	Date :	7/3/2021

Course Information

1	Course Name:	Fisheries Limnology and Oceanography (Limnologi dan Oseanografi Perikanan)												
	Course Code:	FIS5143												
	Course Classification:	Elective (core)	Remarks:											
2	Synopsis:	The aim of this course is to express an understanding on fisheries in freshwater and marine ecosystems. Topics covered include the roles of fish response to environmental variation, adaptation of fish by natural selection, and subsequent ecological diversification in generating fish species diversity and allowing population and community persistence. Students also will be exposed to the methods and techniques to evaluate environmental changes as well as changes in fish and other aquatic animal's population. At the end of the course, students will be able to explain similarities and differences in the ways that fish maintain fitness and interact with other biota in both ecosystems.												
3	Name(s) of Academic Staff:	1	Assoc. Prof. Dr. Seah Ying Giat											
		2	Assoc. Prof. Dr. Nor Azman Kasan											
		3												
4	Semester and Year offered:	Year Offered	1	Semester	1	Remarks:								
5	Credit Value:	3	3(3+0)											
6	Pre-requisite/ co-requisite (if any):													
7	At the end of the course, student should be able to:													
Course Learning Outcomes (CLO)	CLO1	Interpret the structure and function of aquatic habitats for sustainable fish resources. (PLO3, C5)												
	CLO2	Organise the information relate to limnological and oceanographic fisheries through literatures. (PLO7, A4)												
	CLO3	Verify the biotic and abiotic factors affect fish communities in freshwater and marine ecosystem through leadership performance. (PLO9, A5)												
8	Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment Methods													
		Programme Learning Outcomes (PLO)										Teaching Methods	Assessment Methods	
	Course Learning Outcomes	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11		
	CLO1			√									Lecture	Final Exam
	CLO2							√					Tutorial	Reports
	CLO3									√			Discussion	Assignments, Presentation
	Mapping with MQF Cluster of Learning Outcomes			C2										
								C4A						
										C3F				
	Indicate the primary causal link between the CLO and PLO by ticking "√" in the appropriate box.													
	<p>PLO1-Knowledge & Understanding=C1, PLO2-Practical Skills=C3A, PLO3-Cognitive Skills=C2, PLO4-Communication Skills=C3C, PLO5-Interpersonal Skills=C3B, PLO6-Ethics & Professionalism=C5, PLO7-Personal Skills=C4A, PLO8-Entrepreneurial Skills=C4B, PLO9-Leadership, Autonomy & Responsibility=C3F, PLO10-Digital Skills=C3D, PLO11-Numeracy Skills=C3E</p>													
9	Transferable Skills (if applicable)													
	(Skills learned in the course of study which can be useful and utilized in other settings)		1	Cognitive skills										
			2	Personal Skills										
			3	Leadership, Autonomy and Responsibility										
			4	Open-ended response (if any)										
10	Distribution of Student Learning Time (SLT)													
	Note: This SLT calculation is designed for home grown programme only.													

SUB-TOTAL SLT:		10
SLT for Assessment:		74
GRAND TOTAL SLT:		120
A	$\frac{[Total\ F2F\ Physical]}{[Total\ F2F\ Physical + Total\ F2F\ Online + Total\ Independent\ Learning]} \times 100$	23.33
B	$\frac{[(Total\ F2F\ Online + Total\ Independent\ Learning)]}{[Total\ F2F\ Physical + Total\ F2F\ Online + Total\ Independent\ Learning]} \times 100$	76.67
C	$\frac{[%\ F2F\ Physical\ Practical + \%\ F2F\ Online\ Practical]}{[%\ F2F\ Physical\ Practical + \%\ F2F\ Online\ Practical]} \times 100$	
C1	$\frac{[Total\ F2F\ Physical\ Practical]}{[Total\ F2F\ Physical + Total\ F2F\ Online + Total\ Independent\ Learning]} \times 100$	
C2	$\frac{[Total\ F2F\ Online\ Practical]}{[Total\ F2F\ Physical + Total\ F2F\ Online + Total\ Independent\ Learning]} \times 100$	

Please tick (v) if this course is **Industrial Training/ Clinical Placement/ Practicum** using 50% of Effective Learning Time (ELT)

Note:



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11	Identify special requirement or resources to deliver the course (e.g., software, nursery, computer lab, simulation room etc)	
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12	References (include required and further readings, and should be the most current)	<ol style="list-style-type: none"> 1. Borges, B. A. A. (2018). Ecology and management of aquatic environments, Canada: Delve Publishing. 2. Bullock, S. (2018). A modern approach to oceanography, New York, NY: Syrawood Publishing House. 3. Cui, Q. (2017). Limnology and Oceanography, New York: Delve Publishing LLC. 4. Gao, K., & Hader, D. (2019). Aquatic ecosystems in a changing climate. Boca Raton, FL: CRC Press, Taylor and Francis Group. 5. Hamza, W., & Paul, T. T. (2019). Management and ecology of lake & reservoir fisheries, Delaware, United States: Excelsis Press. 6. Luki Subehi, Zanul Hazrin Hashim, Wan Maznah Wan Omar, Muzzaifah Abd Hamid, & Mashhor Mansor, (2016). Lake Ecosystem & Services: Temengor Reservoir, Malaysia and selected Indonesian Lakes, Penang: School of Biological Sciences, Universiti Sains Malaysia. 7. Williams, J. (2019). Aquatic biology and ecology, Forest Hills, NY: Callisto Reference.
13	Other additional information (if applicable)	
Note: Number of PLO indicated is purely for illustration purposes only and the number is subjected to the curriculum design.		

Date of Approval		Notes of Improvements (if any)	Checked By	Approved By	
Programme	1/3/2021		 DR. SHARIFAH NOOR EMILIA BINTI SYED JAMIL FAD'AAK Pengerah Universiti Fakulti Perikanan dan Sains Makanan Universiti Malaysia Terengganu 21030 Kuala Nerus, Terengganu	 DR. WAN MOHD RUZMAN BIN WAN HUSSAIN Pengerah Bidang Perikanan dan Abuakultur Sarjana Sains Perikanan Tropika Sarjana Sains (Akuatikultur) Fakulti Perikanan dan Sains Makanan Universiti Malaysia Terengganu 21030 Kuala Nerus, Terengganu	
Faculty	7/3/2021				
JPPPU	14/7/2021				
Senate	25/7/2021				
Version	1				
Effective Session	Sem I 2021-2022	Date :	1/3/2021	Date :	7/3/2021



FACULTY OF FISHERIES AND FOOD SCIENCE



Course Information

1	Course Name:	Sports and Game Fishing (Sukan dan Permainan Memancing)													
	Course Code:	FIS5153													
	Course Classification:	Elective (core)	Remarks:												
2	Synopsis:	The aim of this course is to introduce the students to the global sports and games fishing industries and its regulations. Topics covered include the famous freshwater and saltwaters fish species, the fishing methods used, famous sport fishing area in the world, ethics and principles, rules and regulations applied and industrial importants as well as its related industries. The students will also gain experiences in applying sports fishing activities by field work and workshop.													
3	Name(s) of Academic Staff:	1	Dr. Mohd. Fazrul Hisam Abd. Aziz												
		2													
		3													
4	Semester and Year offered:	Year Offered	1	Semester	2	Remarks:									
5	Credit Value:	3	3(3+0)												
6	Pre-requisite/ co-requisite (if any):														
7	At the end of the course, student should be able to:														
Course Learning Outcomes (CLO)	CLO1	Evaluate different sport fishing regulations with regards to species and regions. (PLO3, C5)													
	CLO2	Display understanding on the ethics and principles of sports fishing. (PLO6, A5)													
	CLO3	Organise a comparative study on the commercial point of view in sport fishing. (PLO9, A4)													
8	Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment Methods														
Course Learning Outcomes	Programme Learning Outcomes (PLO)											Teaching Methods	Assessment Methods		
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11				
	CLO1		v											Lecture, E-learning	Test, Final exam
	CLO2					v								Discussion, E-learning	Assignment, Presentation 1
CLO3								v				Discussion, E-learning	Case study, Presentation 1		
Mapping with MQF Cluster of Learning Outcomes			C2												
					C5										
								C3F							
Indicate the primary causal link between the CLO and PLO by ticking "v" in the appropriate box.															
<p>PLO1-Knowledge & Understanding=C1, PLO2-Practical Skills=C3A, PLO3-Cognitive Skills=C2, PLO4-Communication Skills=C3C, PLO5-Interpersonal Skills=C3B, PLO6-Ethics & Professionalism=C5, PLO7-Personal Skills=C4A, PLO8-Entrepreneurial Skills=C4B, PLO9-Leadership, Autonomy & Responsibility=C3F, PLO10-Digital Skills=C3D, PLO11-Numeracy Skills=C3E</p>															
9	Transferable Skills (if applicable)														
	(Skills learned in the course of study which can be useful and utilized in other settings)		1	Cognitive skills											
			2	Ethics and Professionalism											
			3	Leadership, Autonomy and Responsibility											
			Open-ended response (if any)												
			4												
10	Distribution of Student Learning Time (SLT) Note: This SLT calculation is designed for home grown programme only.														

Course Content Outline and Subtopics		CLO*	Learning and Teaching Activities**										Total SLT	
			Face-to-Face (F2F)											NF2F Independent Learning (Asynchronous)
			Physical					Online/ Technology-mediated (Synchronous)						
			L	T	P	O	L	T	P	O				
1	Introduction - Definition - Industrial point of view	CLO3	2			2							4	
2	Species preferable - Famous Freshwater species - Famous Saltwater species	CLO1	2				4						6	
3	Fishing Methodologies - Rod and Line fishing - Fly fishing	CLO1	2				4						6	
4	Rules and Regulations - USA and Canada - Australia - Asia	CLO1	2			4							6	
5	Industrial approaches by countries - Related industries	CLO1	2			2							4	
6	Ethics and principles of sports fishing - Catch and release methods - Open and close season	CLO2				6					3		9	
7	Organise a comparative study on the commercial point of view in sport fishing	CLO3				2					1		3	
8														
9														
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														
SUB-TOTAL SLT:												76		
Continous Assessment		%	Face-to-Face (F2F)					NF2F Independent Learning for Assessment (Asynchronous)						
			Physical					Online/ Technology-mediated (Synchronous)						
1	Test	15	1					4						
2	Assignment	15						12						
3	Case study	15						12						
4	Presentation 1	15	1					4						
5														
SUB-TOTAL SLT:												34		
Final Assessment		%	Face-to-Face (F2F)					NF2F Independent Learning for Assessment (Asynchronous)						
			Physical					Online/ Technology-mediated (Synchronous)						
1	Final exam	40	2					8						
2														
3														
4														
5														
SUB-TOTAL SLT:												10		
SLT for Assessment:												44		
GRAND TOTAL SLT:												120		
A	% SLT for F2F Physical Component: $[(Total\ F2F\ Physical)/(Total\ F2F\ Physical + Total\ F2F\ Online + Total\ Independent\ Learning) \times 100]$											25.00		
B	% SLT for Online & Independent Learning Component: $[(Total\ F2F\ Online + Total\ Independent\ Learning)/(Total\ F2F\ Physical + Total\ F2F\ Online + Total\ Independent\ Learning) \times 100]$											75.00		
C	% SLT for All Practical Component: $[(\%F2F\ Physical\ Practical + \%F2F\ Online\ Practical) / (\%F2F\ Physical\ Practical + \%F2F\ Online\ Practical + \%SLT\ for\ F2F\ Physical\ Practical\ Component) \times 100]$													
C1	% SLT for F2F Physical Practical Component: $[Total\ F2F\ Physical\ Practical / (Total\ F2F\ Physical + Total\ F2F\ Online + Total\ Independent\ Learning) \times 100]$													
C2	% SLT for F2F Online Practical Component: $[Total\ F2F\ Online\ Practical / (Total\ F2F\ Physical + Total\ F2F\ Online + Total\ Independent\ Learning) \times 100]$													

Please tick (✓) if this course is **Industrial Training/ Clinical Placement/ Practicum** using 50% of Effective Learning Time (ELT)

Note:


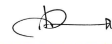
* Indicate the CLO based on the CLO's numbering in Item 8

** For ODL programme: Courses with mandatory practical requirements imposed by the programme standards or any related standards can be exempted from complying to the minimum 80% ODL delivery rule in the SLT.

*** L = Lecture, T = Tutorial, P= Practical, O= Others

11	Identify special requirement or resources to deliver the course (e.g., software, nursery, computer lab, simulation room etc)	
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12	References (include required and further readings, and should be the most current)	<ol style="list-style-type: none"> 1. Danielson, T. (2018). Fish & environment. Valley Cottage, NY: Scifus Academics LLC. 2. Jung, K. (2018). Fish ecology. Valley Cottage, NY: Scifus Academics LLC. 3. Pease, S. (2016). Kayak fishing: How to get started and set up your boat. CreateSpace Independent Publishing Platform. 4. Steer, A. (2016). Sea fishing knots: From the reel to the hook, USA: Andy Steer. 5. USA, (2017). Sea fishing from shore and boat, USA: Read Country Books,
13	Other additional information (if applicable)	
Note: Number of PLO indicated is purely for illustration purposes only and the number is subjected to the curriculum design.		

Date of Approval		Notes of Improvements (if any)	Checked By	Approved By	
Programme	1/3/2021		 DR. SHARIFAH NOOR EMILIA BINTI SYED JAMIL FAD'AAK Pensyarah Universiti Fakulti Perikanan dan Sains Makanan Universiti Malaysia Terengganu 21030 Kuala Nerus, Terengganu	 DR. WAN MOHD RAUHAN BINTI WAN HUSSAIN Pengerusi Bidang Perikanan dan Akuakultur Sarjana Sains Perikanan Tropika Sarjana Sains (Akuakultur) Fakulti Perikanan dan Sains Makanan Universiti Malaysia Terengganu 21030 Kuala Nerus, Terengganu	
Faculty	7/3/2021				
JPPPU	14/7/2021				
Senate	25/7/2021				
Version	1				
Effective Session	Sem I 2021-2022	Date :	1/3/2021	Date :	7/3/2021



FACULTY OF FISHERIES AND FOOD SCIENCE



Course Information

1	Course Name:	Coral Reef Fisheries (Perikanan Terumbu Karang)												
	Course Code:	FIS5163												
	Course Classification:	Elective (core)	Remarks:											
2	Synopsis:	This course will introduce students to the fishing practices in coral reef. The course also covers the importance of coral reef, the diversity of fishery resources, the destructive fishing gears, and the management of coral reef fisheries. Students will be exposed to the concept of marine protected area and Coral Triangle Initiative – coral reef, fisheries and food security applied in our region. At the end of the course, students are able to understand the threats and impacts on coral reef fisheries and the effective approach to manage coral reef fisheries												
3	Name(s) of Academic Staff:	1	Assoc. Prof. Dr. Seah Ying Giat											
		2												
		3												
4	Semester and Year offered:	Year Offered	1	Semester	2	Remarks:								
5	Credit Value:	3	3(3+0)											
6	Pre-requisite/ co-requisite (if any):													
7	At the end of the course, student should be able to:													
Course Learning Outcomes (CLO)	CLO1	Evaluate the variety of coral reef fishes and the protection of the resources. (PLO3, C5)												
	CLO2	Explain the threats and impacts on coral reef from natural and anthropogenic factors. (PLO5, A4)												
	CLO3	Propose an appropriate coral reef management strategy. (PLO6, A5)												
8	Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment Methods													
		Programme Learning Outcomes (PLO)												
	Course Learning Outcomes	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11	Teaching Methods	Assessment Methods
	CLO1			v									Lecture, E-learning	Test, Final exam
	CLO2					v							Discussion, E-learning	Assignment, Presentation
	CLO3						v						Discussion, E-learning	Project, Presentation
	Mapping with MQF Cluster of Learning Outcomes			C2										
						C3B								
							C5							
	Indicate the primary causal link between the CLO and PLO by ticking "v" in the appropriate box.													
	PLO1-Knowledge & Understanding=C1 , PLO2-Practical Skills=C3A , PLO3-Cognitive Skills=C2 , PLO4-Communication Skills=C3C , PLO5-Interpersonal Skills=C3B , PLO6-Ethics & Professionalism=C5 , PLO7-Personal Skills=C4A , PLO8-Entrepreneurial Skills=C4B , PLO9-Leadership, Autonomy & Responsibility=C3F , PLO10-Digital Skills=C3D , PLO11-Numeracy Skills=C3E													
9	Transferable Skills (if applicable)													
	(Skills learned in the course of study which can be useful and utilized in other settings)													
	1	Interpersonal skills												
	2	Ethics and Professionalism												
	3	Cognitive skills												
	Open-ended response (if any)													
	4													
10	Distribution of Student Learning Time (SLT) Note: This SLT calculation is designed for home grown programme only.													

Course Content Outline and Subtopics		CLO*	Learning and Teaching Activities**										Total SLT	
			Face-to-Face (F2F)								NF2F Independent Learning (Asynchronous)			
			Physical				Online/ Technology-mediated (Synchronous)							
			L	T	P	O	L	T	P	O				
1	Fishery resources • History, development and production status of fishery resources globally and locally. • The importance and contribution of coral reef fisheries sector.	CLO1	1					1					4	
2	Type of fishery resources • High commercial fishery resources. • Low commercial fishery resources. • Unconcern fishery resources.	CLO1	1					1					4	
3	Coral reef • Biodiversity. • Coverage. • Importance.	CLO1	2					1					6	
4	Fishing practices • Gill net, fish trap, bottom trawling, cyanide fishing, dynamite fishing, muroami fishing, and etc.	CLO2	2				1	1					7	
5	Threats and impacts to coral reef • Destructive fishing, ghost fishing, vessel anchor, human-caused, natural threats and etc.	CLO2	2				1	1					7	
6	Coral reef management • Adaptive management strategies. • Marine protected areas (MPAs). • Coral Triangle Initiative (CTI). • Regulations and laws. • Information and education.	CLO3	4				2	1					12	
7	Coral restoration • Coral farming. • Artificial reef.	CLO3	2				2	1					8	
8														
9														
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														
SUB-TOTAL SLT:												75		
Continous Assessment		%	Face-to-Face (F2F)								NF2F Independent Learning for Assessment (Asynchronous)			
			Physical				Online/ Technology-mediated (Synchronous)							
1	Test	20	1								4			
2	Assignment	10									10			
3	Presentation 1	10	1								4			
4	Project	10									10			
5	Presentation 2	10	1								4			
SUB-TOTAL SLT:												35		
Final Assessment		%	Face-to-Face (F2F)								NF2F Independent Learning for Assessment (Asynchronous)			
			Physical				Online/ Technology-mediated (Synchronous)							
1	Final exam	40	2								8			
2														
3														
4														
5														
SUB-TOTAL SLT:												10		
SLT for Assessment:												45		

	GRAND TOTAL SLT:	120
A	$\frac{[Total\ F2F\ Physical]}{[Total\ F2F\ Physical + Total\ F2F\ Online + Total\ Independent\ Learning]} \times 100$	20.83
B	$\frac{[Total\ F2F\ Online + Total\ Independent\ Learning]}{[Total\ F2F\ Physical + Total\ F2F\ Online + Total\ Independent\ Learning]} \times 100$	79.17
C	$\frac{[Total\ F2F\ Physical\ Practical + Total\ F2F\ Online\ Practical]}{[Total\ F2F\ Physical + Total\ F2F\ Online + Total\ Independent\ Learning]} \times 100$	
C1	$\frac{[Total\ F2F\ Physical\ Practical]}{[Total\ F2F\ Physical + Total\ F2F\ Online + Total\ Independent\ Learning]} \times 100$	
C2	$\frac{[Total\ F2F\ Online\ Practical]}{[Total\ F2F\ Physical + Total\ F2F\ Online + Total\ Independent\ Learning]} \times 100$	

Please tick (v) if this course is **Industrial Training/ Clinical Placement/ Practicum** using 50% of Effective Learning Time (ELT)

Note:



* Indicate the CLO based on the CLO's numbering in Item 8

** For ODL programme: Courses with mandatory practical requirements imposed by the programme standards or any related standards can be exempted from complying to the minimum 80% ODL delivery rule in the SLT.

*** L = Lecture, T = Tutorial, P= Practical, O= Others

11	Identify special requirement or resources to deliver the course (e.g., software, nursery, computer lab, simulation room etc)	
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12	References (include required and further readings, and should be the most current)	<p>1. Comacho, E. T., & Beltran, C. D. (2018). Corals in a changing world. Croatia: InTechOpen.</p> <p>2. Gerry Goeden, Norhayati Ahmad, & Jamili Nais. (2018). Life in the triangle: Tun Sakaran Marine Park and Sipadan Island Park. Bangi, Selangor: Penerbit Universiti Kebangsaan Malaysia.</p> <p>3. Litypov, K. (2016). Coral reef ecosystem in space and time: Based on the reefs of Vietnam. New York: Nova Science Pub Inc.</p> <p>4. Ortiz, S. L. (2016). Coral reefs: Ecosystems, environmental impact and current threats. New York: Nova Science Pub Inc.</p> <p>5. Poh, S. C., Muhammad Hafiz Borkhanuddin, Tan, C. H., & Siti Nurtahirah Jaafar. (2020). Citizen scientist coral reef rescue program: Coral reef restoration handbook. Kuala Nerus, Terengganu: Penerbit UMT.</p>
13	Other additional information (if applicable)	
<p>Note: Number of PLO indicated is purely for illustration purposes only and the number is subjected to the curriculum design.</p>		

Date of Approval		Notes of Improvements (if any)	Checked By	Approved By	
Programme	1/3/2021		 DR. SHARIFAH NOOR EMILIA BINTI SYED JAMIL FAD'AAK Pensyarah Universiti Fakulti Perikanan dan Sains Makanan Universiti Malaysia Terengganu 21030 Kuala Nerus, Terengganu	 DR. WAN MOHD RULHAN BIN WAN HUSSIN Pengerusi Bidang Perikanan dan Akuakultur Sarjana Sains Perikanan Tropika Sarjana Sains (Akuakultur) Fakulti Perikanan dan Sains Makanan Universiti Malaysia Terengganu 21030 Kuala Nerus, Terengganu	
Faculty	7/3/2021				
JPPPU	14/7/2021				
Senate	25/7/2021				
Version	1				
Effective Session	Sem I 2021-2022	Date :	1/3/2021	Date :	7/3/2021



FACULTY OF FISHERIES AND FOOD SCIENCE



Course Information

1	Course Name:	Fisheries Bioinformatics (Bioinformatik Perikanan)													
	Course Code:	FIS5173													
	Course Classification:	Elective (core)	Remarks:												
2	Synopsis:	This course discusses the needs and importance of bioinformatics in research and management of fisheries resources. Models and algorithms used in molecular phylogenetic analysis, prediction and functional annotation of genes and proteins will be introduced. Concepts and application of bioinformatics softwares used to analyse biological molecules data related to health, nutrition and reproduction of aquatic organisms will be emphasized. Bioinformatics tools in predictive ecology and their applications to fisheries such as the Bayesian networks and hidden Markov model will also be discussed. At the end of the course, students will be able to evaluate the capabilities and effectiveness of various bioinformatics tools in molecular phylogenetic and phylogeography analyses as well as be able to integrate models in predictive ecology for better management of fisheries resources.													
3	Name(s) of Academic Staff:	1	Assoc. Prof. Ts. Dr. Muhd Danish Daniel Abdullah												
		2													
		3													
4	Semester and Year offered:	Year Offered	1	Semester	2	Remarks:									
5	Credit Value:	3	3(3+0)												
6	Pre-requisite/ co-requisite (if any):														
7	At the end of the course, student should be able to:														
Course Learning Outcomes (CLO)	CLO1	Evaluate the capabilities and effectiveness of various bioinformatics tools in molecular analyses. (PLO3, C5)													
	CLO2	Identify models in predictive ecology for better management of fisheries resources. (PLO7, A4)													
	CLO3	Display a conceptual framework and strategy in fisheries research using bioinformatics tools and resources. (PLO10, A4)													
8	Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment Methods														
		Programme Learning Outcomes (PLO)													
	Course Learning Outcomes	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11		Teaching Methods	Assessment Methods
	CLO1			√										Lecture, E-learning	Test, Final exam
	CLO2							√						Lecture, Discussion	Assignment, Presentation
	CLO3										√			Lecture, E-learning, Discussion	Report, Presentation
	Mapping with MQF Cluster of Learning Outcomes			C2				C4A							
											C3D				
	Indicate the primary causal link between the CLO and PLO by ticking "√" in the appropriate box.														
	PLO1-Knowledge & Understanding=C1, PLO2-Practical Skills=C3A, PLO3-Cognitive Skills=C2, PLO4-Communication Skills=C3C, PLO5-Interpersonal Skills=C3B, PLO6-Ethics & Professionalism=C5, PLO7-Personal Skills=C4A, PLO8-Entrepreneurial Skills=C4B, PLO9-Leadership, Autonomy & Responsibility=C3F, PLO10-Digital Skills=C3D, PLO11-Numeracy Skills=C3E														
9	Transferable Skills (if applicable)														
	<i>(Skills learned in the course of study which can be useful and utilized in other settings)</i>														
	1	Personal Skills													
	2	Digital Skills													
	3	Cognitive skills													
	Open-ended response (if any)														
	4														
10	Distribution of Student Learning Time (SLT) Note: This SLT calculation is designed for home grown programme only.														

Course Content Outline and Subtopics		CLO*	Learning and Teaching Activities**										Total SLT	
			Face-to-Face (F2F)											NF2F Independent Learning (Asynchronous)
			Physical					Online/ Technology-mediated (Synchronous)						
			L	T	P	O	L	T	P	O				
1	Introduction - Overview of bioinformatics and its applications - Bioinformatics in life and environmental sciences	CLO1	2			2						4		
2	Role of Computer in Bioinformatics - Computer languages for bioinformatics - Tools and resources - Biological databases	CLO3	4			3						7		
3	Genomic Approach to Fisheries - Marking genomes - Mapping genomes - Analysis of genome expression and function	CLO1	4			3						7		
4	Genetics in the discovery and monitoring of marine biodiversity - Marine biodiversity and genetics – a global perspective - Marine biodiversity – structural and functional components - Genetic diversity and functional analyses - DNA Barcoding and fisheries	CLO1	4			4						7		
5	Bioinformatics approach to understand population structure and adaptations - Nutritional adaptations - Reproductive adaptations - Other environmental adaptations	CLO2	1			1						2		
6	Bioinformatics in predictive fisheries ecology - Bayesian network analysis - Spatial analysis - Phylogeny and phylogeography	CLO2	2			1						3		
7	Practical Guide to Genomic Analysis - Molecular Phylogeny using MEGA - Genomic Sequencing Strategies - De novo assembly and annotation of NGS data	CLO3	2			5						7		
8														
9														
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														
SUB-TOTAL SLT:												75		
Continous Assessment		%	Face-to-Face (F2F)					NF2F Independent Learning for Assessment (Asynchronous)						
			Physical		Online/ Technology-mediated (Synchronous)									
1	Test	15	1					4						
2	Assignment	10						10						
3	Presentation 1	10	1					3						
4	Report	15						12						
5	Presentation 2	10	1					3						
SUB-TOTAL SLT:								35						
Final Assessment		%	Face-to-Face (F2F)					NF2F Independent Learning for Assessment (Asynchronous)						
			Physical		Online/ Technology-mediated (Synchronous)									
1	Final exam	40	2					8						
2														

3						
4						
5						
SUB-TOTAL SLT:						10
SLT for Assessment:						45
GRAND TOTAL SLT:						120
A	% SLT for F2F Physical Component: $[\text{Total F2F Physical} / (\text{Total F2F Physical} + \text{Total F2F Online} + \text{Total Independent Learning}) \times 100]$					35.83
B	% SLT for Online & Independent Learning Component: $[(\text{Total F2F Online} + \text{Total Independent Learning}) / (\text{Total F2F Physical} + \text{Total F2F Online} + \text{Total Independent Learning}) \times 100]$					64.17
C	% SLT for All Practical Component: $[\% \text{ F2F Physical Practical} + \% \text{ F2F Online Practical}]$					
C1	% SLT for F2F Physical Practical Component: $[\text{Total F2F Physical Practical} / (\text{Total F2F Physical} + \text{Total F2F Online} + \text{Total Independent Learning}) \times 100]$					
C2	% SLT for F2F Online Practical Component: $[\text{Total F2F Online Practical} / (\text{Total F2F Physical} + \text{Total F2F Online} + \text{Total Independent Learning}) \times 100]$					

Please tick (v) if this course is **Industrial Training/ Clinical Placement/ Practicum** using 50% of Effective Learning Time (ELT)

Note:



* Indicate the CLO based on the CLO's numbering in Item 8

** For OD L programme: Courses with mandatory practical requirements imposed by the programme standards or any related standards can be exempted from complying to the minimum 80% OD L delivery rule in the SLT.

*** L = Lecture, T = Tutorial, P = Practical, O = Others

11	Identify special requirement or resources to deliver the course (e.g., software, nursery, computer lab, simulation room etc)	
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12	References (include required and further readings, and should be the most current)	<ol style="list-style-type: none"> 1. Abu-Jamous, B., Fa, R., & Nandi, A.K. 2015. Integrative Cluster Analysis in Bioinformatics. USA: Wiley-Blackwell. 2. Pevsner, J. 2015, Bioinformatics and Functional Genomics, 3rd Edition, USA: Wiley-Blackwell. 3. Bourlat, Sarah J, (Ed.), 2016. Marine Genomics: Methods and Protocols. Switzerland: Springer Nature. 4. Selzer, Paul M., Marhöfer, Richard J., Koch, Oliver, 2018, Applied Bioinformatics: An Introduction, Switzerland: Springer Nature. 5. Wadhwa, G., Shannughavel, P., Singh, A.K., Bellare, J.R. (Eds.), 2018. Current Trends in Bioinformatics: An Insight. Switzerland: Springer Nature.
13	Other additional information (if applicable)	
Note: Number of PLO indicated is purely for illustration purposes only and the number is subjected to the curriculum design.		

Date of Approval		Notes of Improvements (if any)	Checked By	Approved By	
Programme	1/3/2021		 DR. SHARIFAH NOOR EMILIA BINTI SYED JAMIL FAD'AAK Pengerusi Universiti Fakulti Perikanan dan Sains Makanan Universiti Malaysia Terengganu 21030 Kuala Nerus, Terengganu	 DR. WAN MOHD RAUMAN BIN WAN HUSSEIN Pengerusi Bidang Perikanan dan Akuakultur Sarjana Sains Perikanan Tropika Sarjana Sains (Akuakultur) Fakulti Perikanan dan Sains Makanan Universiti Malaysia Terengganu 21030 Kuala Nerus, Terengganu	
Faculty	7/3/2021				
JPPPU	14/7/2021				
Senate	25/7/2021				
Version	1				
Effective Session	Sem I 2021-2022	Date :	1/3/2021	Date :	7/3/2021



FACULTY OF FISHERIES AND FOOD SCIENCE



Course Information

1	Course Name:	Habitat Replenishment Areas (Kawasan Pemulihan Habitat)													
	Course Code:	FIS5183													
	Course Classification:	Elective (core)	Remarks:												
2	Synopsis:	This course is designed to introduce the students with various concepts of replenishment of degraded fisheries habitat in the coastal waters. The course begins with lectures on various commonly practiced destructive fishing gears in the coastal waters. The destructions following physical development will also be discussed. Then the discussion continues with mitigating measures to replenish and protecting the degraded habitats. This will include various methods of fishing habitat restoration including installation of artificial reefs, ships wrecks, and policies. Monitoring of recovery rates in the affective replenished areas will also be discussed.													
3	Name(s) of Academic Staff:	1	Dr. Wan Mohd. Rauhan Wan Hussin												
		2													
		3													
4	Semester and Year offered:	Year Offered	1	Semester	2	Remarks:									
5	Credit Value:	3	3(3+0)												
6	Pre-requisite/ co-requisite (if any):														
7	At the end of the course, student should be able to:														
Course Learning Outcomes (CLO)	CLO1	Describe various factors of habitat destruction and replenishment approaches. (PLO3, C5)													
	CLO2	Propose mitigation measures of destructed habitats according to professional code of practice. (PLO6, A5)													
	CLO3	Formulate a collective strategy on monitoring replenished habitats through peers discussion. (PLO9, A4)													
8	Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment Methods														
		Programme Learning Outcomes (PLO)											Teaching Methods	Assessment Methods	
	Course Learning Outcomes	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11			
	CLO1			√										Lecture, E-learning	Test, Final exam
	CLO2					√								Lecture, Discussion,	Assignment 1,2, Presentation 1
	CLO3								√					Lecture, Discussion	Assignment 1,2, Presentation 1
	Mapping with MQF Cluster of Learning Outcomes			C2			C5								
										C3F					
Indicate the primary causal link between the CLO and PLO by ticking "√" in the appropriate box.															
<small>PLO1-Knowledge & Understanding=C1, PLO2-Practical Skills=C3A, PLO3-Cognitive Skills=C2, PLO4-Communication Skills=C3C, PLO5-Interpersonal Skills=C3B, PLO6-Ethics & Professionalism=C5, PLO7-Personal Skills=C4A, PLO8-Entrepreneurial Skills=C4B, PLO9-Leadership, Autonomy & Responsibility=C3F, PLO10-Digital Skills=C3D, PLO11-Numeracy Skills=C3E</small>															
9	Transferable Skills (if applicable)														
	<i>(Skills learned in the course of study which can be useful and utilized in other settings)</i>														
	1	Ethics and Professionalism													
	2	Leadership, Autonomy and Responsibility													
	3	Cognitive skills													
	Open-ended response (if any)														
	4														
10	Distribution of Student Learning Time (SLT) Note: This SLT calculation is designed for home grown programme only.														

Course Content Outline and Subtopics		CLO*	Learning and Teaching Activities**										Total SLT
			Face-to-Face (F2F)							NF2F Independent Learning (Asynchronous)			
			Physical				Online/ Technology-mediated (Synchronous)						
			L	T	P	O	L	T	P		O		
1	Introduction • Definition • Current status of threaten marine habitat in the World and Malaysia Waters	CLO1	3			2	2					7	
2	Contributing factors to habitat Degradation • Human factors (fishing and marine exploration, river mouth alteration and reclamation activities) • Natural hazards (Tsunami, cyclones etc.)	CLO1	3			2	2					7	
3	Detrimental development • Fishing methods (detrimental gears) • Coastal development (Reclamation etc.)	CLO1	3			2	2					7	
4	Types of habitat degradation • Fishing ground degradation • Coastal habitat degradation (mangrove, seagrass, mudflats)	CLO1	3			2	2					7	
5	Mitigation, and habitat replenishment approaches • Physical approaches - Installation of artificial reefs and FAD's - Ship wreck - Beach replenishment, mangrove protection , revetment etc • Biological approaches - Coastal restoration e.g. mangrove replanting etc • Policy and legal approaches	CLO2	1			3	1					5	
6	Continues assessment and monitoring of replenished areas	CLO3	1			3	1					5	
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
SUB-TOTAL SLT:												76	
Continous Assessment		%	Face-to-Face (F2F)							NF2F Independent Learning for Assessment (Asynchronous)			
			Physical				Online/ Technology-mediated (Synchronous)						
1	Test	15	1							4			
2	Assignment 1	15								12			
3	Assignment 2	15								12			
4	Presentation 2	15	1							4			
5													
SUB-TOTAL SLT:												34	
Final Assessment		%	Face-to-Face (F2F)							NF2F Independent Learning for Assessment (Asynchronous)			
			Physical				Online/ Technology-mediated (Synchronous)						
1	Final exam	40	2							8			
2													
3													

4						
5						
SUB-TOTAL SLT:						10
SLT for Assessment:						44
GRAND TOTAL SLT:						120
A	% SLT for F2F Physical Component: $[\text{Total F2F Physical} / (\text{Total F2F Physical} + \text{Total F2F Online} + \text{Total Independent Learning}) \times 100]$					26.67
B	% SLT for Online & Independent Learning Component: $[(\text{Total F2F Online} + \text{Total Independent Learning}) / (\text{Total F2F Physical} + \text{Total F2F Online} + \text{Total Independent Learning}) \times 100]$					73.33
C	% SLT for All Practical Component: $[\% \text{ F2F Physical Practical} + \% \text{ F2F Online Practical}]$					
C1	% SLT for F2F Physical Practical Component: $[\text{Total F2F Physical Practical} / (\text{Total F2F Physical} + \text{Total F2F Online} + \text{Total Independent Learning}) \times 100]$					
C2	% SLT for F2F Online Practical Component: $[\text{Total F2F Online Practical} / (\text{Total F2F Physical} + \text{Total F2F Online} + \text{Total Independent Learning}) \times 100]$					

Please tick (✓) if this course is **Industrial Training/ Clinical Placement/ Practicum** using 50% of Effective Learning Time (ELT)

Note:



* Indicate the CLO based on the CLO's numbering in Item 8

** For ODIL programme: Courses with mandatory practical requirements imposed by the programme standards or any related standards can be exempted from complying to the minimum 80% ODIL delivery rule in the SLT.

*** L = Lecture, T = Tutorial, P = Practical, O = Others

11	Identify special requirement or resources to deliver the course (e.g., software, nursery, computer lab, simulation room etc)	
----	--	--

12	References (include required and further readings, and should be the most current)	<ol style="list-style-type: none"> 1. Acevedo, M. F. (2016). Real-time environmental monitoring: Sensors and systems. Boca Raton: CRC Press, Taylor & Francis Group. 2. Ballard, H. L., & Cigliano, J. A. (2018). Citizen Science for Coastal and Marine Conservation. London: Routledge Taylor & Francis Ltd. 3. Higgins, M. (2019). Environmental quality, monitoring and management. Forest Hill, NY: Callisto Reference. 4. Jones, P.J.S. 2016. Governing Marine Protected Areas: Resilience through Diversity. Routledge. 256pp. 5. Pauly, D, Zeller, D. 2016. Global Atlas of Marine Fisheries: A Critical Appraisal of Catches and Ecosystem Impacts. Island Press, 520 pp. 6. Poh, S. C., Muhammad Hafiz Borkhanuddin, Tan, C. H., & Siti Nurhahirah Jaafar. (2020). Citizen scientist coral reef rescue program: Coral reef restoration handbook. Kuala Nerus, Terengganu: Penerbit UMT.
13	Other additional information (if applicable)	
Note: Number of PLO indicated is purely for illustration purposes only and the number is subjected to the curriculum design.		

Date of Approval		Notes of Improvements (if any)	Checked By	Approved By	
Programme	1/3/2021		 DR. SHARIFAH NOOR EMILIA BINTI SYED JAMIL FAD'AAK Pemyarah Universiti Fakulti Perikanan dan Sains Makanan Universiti Malaysia Terengganu 21030 Kuala Nerus, Terengganu	 DR. WAN MOHD RAJMAN BIN WAN HUSSAIN Pengerusi Bidang Perikanan dan Akuakultur Sarjana Sains Perikanan Tropika Sarjana Sains (Akuakultur) Fakulti Perikanan dan Sains Makanan Universiti Malaysia Terengganu 21030 Kuala Nerus, Terengganu	
Faculty	7/3/2021				
JPPPU	14/7/2021				
Senate	25/7/2021				
Version	1				
Effective Session	Sem I 2021-2022				
		Date :	1/3/2021	Date :	7/3/2021



FACULTY OF FISHERIES AND FOOD SCIENCE



Course Information

1	Course Name:	Fisheries Post-harvest Technology (Teknologi Lepas Tual Perikanan)														
	Course Code:	FIS5193														
	Course Classification:	Elective (core)	Remarks:													
2	Synopsis:	The course provides knowledge on process and/or activities immediately after catch, handling and transportation, processing and distribution of fish and fish products. It covers the aspects of physicochemical and biochemical changes, method of quality assessment and current technological development for product shelf-life extension.														
3	Name(s) of Academic Staff:	1	Dr. Nurul Ulfah Karim													
		2														
		3														
4	Semester and Year offered:	Year Offered	1	Semester	2	Remarks:										
5	Credit Value:	3	3(2+1)													
6	Pre-requisite/ co-requisite (if any):															
7	At the end of the course, student should be able to:															
Course Learning Outcomes (CLO)	CLO1	Explain the common practices involved in fish and fish product processing and packaging. (PLO3, C5)														
	CLO2	Perform standard procedure in processing, packaging and quality assessment. (PLO2, P4)														
	CLO3	Identify the appropriate approaches in assessing the quality of fish and fish product. (PLO7, A4)														
8	Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment Methods															
		Programme Learning Outcomes (PLO)														
	Course Learning Outcomes	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11		Teaching Methods	Assessment Methods	
	CLO1			v										Lecture, E-learning	Test, Final exam	
	CLO2		v											Demonstration, Practical	Lab assessment, lab report	
	CLO3							v						Lecture, Discussion	Assignment	
	Mapping with MQF Cluster of Learning Outcomes			C2												
			C3A													
							C4A									
	Indicate the primary causal link between the CLO and PLO by ticking "v" in the appropriate box.															
	<small>PLO1-Knowledge & Understanding=C1, PLO2-Practical Skills=C3A, PLO3-Cognitive Skills=C2, PLO4-Communication Skills=C3C, PLO5-Interpersonal Skills=C3B, PLO6-Ethics & Professionalism=C5, PLO7-Personal Skills=C4A, PLO8-Entrepreneurial Skills=C4B, PLO9-Leadership, Autonomy & Responsibility=C3F, PLO10-Digital Skills=C3D, PLO11-Numeracy Skills=C3E</small>															
9	Transferable Skills (if applicable)															
	(Skills learned in the course of study which can be useful and utilized in other settings)		1	Cognitive skills												
			2	Personal Skills												
			3													
			Open-ended response (if any)													
			4													
10	Distribution of Student Learning Time (SLT) Note: This SLT calculation is designed for home grown programme only.															

Course Content Outline and Subtopics		CLO*	Learning and Teaching Activities**										Total SLT
			Face-to-Face (F2F)							NF2F Independent Learning (Asynchronous)			
			Physical				Online/ Technology-mediated (Synchronous)						
			L	T	P	O	L	T	P	O			
1	Introduction - Seafood industry - Harvesting techniques - Handling and transportation	CLO1	2									2	
2	Processing - Fish texture - Flesh quality - Techniques of fish and fish product processing	CLO1	2									2	
3	Physico-chemical and biochemical changes - Fish enzyme - Microbial degradation	CLO1	2									2	
4	Packaging - Common packaging techniques - Thermal processing technologies - Non-thermal processing technologies - Packaging and storage	CLO1	2			2						4	
5	Quality assessment - Common procedure	CLO3	3			4						6	
6	Practical - fish and fish product processing	CLO2			6							6	
7	Practical - Packaging	CLO2			6							6	
8	Practical - Quality assessment	CLO2			3							3	
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
SUB-TOTAL SLT:												63	
Continuous Assessment		%	Face-to-Face (F2F)							NF2F Independent Learning for Assessment (Asynchronous)			
			Physical				Online/ Technology-mediated (Synchronous)						
			L	T	P	O	L	T	P	O			
1	Test	15	1							4			
2	Lab assessment	20								20			
3	Lab report	10								10			
4	Assignment	15								12			
5													
SUB-TOTAL SLT:												47	
Final Assessment		%	Face-to-Face (F2F)							NF2F Independent Learning for Assessment (Asynchronous)			
			Physical				Online/ Technology-mediated (Synchronous)						
			L	T	P	O	L	T	P	O			
1	Final exam	40	2							8			
2													
3													
4													
5													
SUB-TOTAL SLT:												10	
SLT for Assessment:												57	
GRAND TOTAL SLT:												120	
A	% SLT for F2F Physical Component: $[(Total\ F2F\ Physical) / (Total\ F2F\ Physical + Total\ F2F\ Online + Total\ Independent\ Learning)] \times 100]$											29.17	
B	% SLT for Online & Independent Learning Component: $[(Total\ F2F\ Online + Total\ Independent\ Learning) / (Total\ F2F\ Physical + Total\ F2F\ Online + Total\ Independent\ Learning)] \times 100]$											70.83	

C	$\frac{[\% \text{ F2F Physical Practical} + \% \text{ F2F Online Practical}]}{[\% \text{ SLT for F2F Physical Practical Component}]}$	12.50
C1	$\frac{[\% \text{ SLT for F2F Physical Practical Component}]}{[\text{Total F2F Physical Practical} / (\text{Total F2F Physical} + \text{Total F2F Online} + \text{Total Independent Learning}) \times 100]}$	12.50
C2	$\frac{[\% \text{ SLT for F2F Online Practical Component}]}{[\text{Total F2F Online Practical} / (\text{Total F2F Physical} + \text{Total F2F Online} + \text{Total Independent Learning}) \times 100]}$	

Please tick (v) if this course is **Industrial Training/ Clinical Placement/ Practicum** using 50% of Effective Learning Time (ELT)

Note:


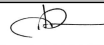
* Indicate the CLO based on the CLO's numbering in Item 8

** For ODL programme: Courses with mandatory practical requirements imposed by the programme standards or any related standards can be exempted from complying to the minimum 80% ODL delivery rule in the SLT.

*** L = Lecture, T = Tutorial, P = Practical, O = Others

11	Identify special requirement or resources to deliver the course (e.g., software, nursery, computer lab, simulation room etc)	
----	--	--

12	References (include required and further readings, and should be the most current)	<ol style="list-style-type: none"> 1. Auteur, (2019), Food chemistry, New York: 3G E-Learning LLC, USA. 2. Garduno-Diaz, S. D. (2019), Food lipids: Chemistry, nutrition and biotechnology, Oakville, ON Canada: Delve Publishing. 3. Ozogul, Y. (2020), Innovative technologies in seafood processing, Boca Raton, FL: CRC Press. 4. Sanjeevi, S. (2020), Enzymes used In food and textile technologies, Oakville, ON: Delve Publishing. 5. Spizziri, U. G., Cirillo, G. (, 1.), & Kozlowski, M. A. (, 9.), (2018), Composites materials for food packaging, USA: Wiley. 6. Yamazaki, K. 1., & Bari, M. L. (2018), Seafood safety and quality, Boca Raton: CRC Press/Taylor & Francis Group.
13	Other additional information (if applicable)	
Note: Number of PLO indicated is purely for illustration purposes only and the number is subjected to the curriculum design.		

Date of Approval		Notes of Improvements (if any)	Checked By	Approved By
Programme	1/3/2021		 DR. SHARIFAH NOOR EMILIA BINTI SYED JAMIL FAD'AAK Pensyarah Universiti Fakulti Perikanan dan Sains Makanan Universiti Malaysia Terengganu 21030 Kuala Nerus, Terengganu Date : 1/3/2021	 DR. WAN MURNI RUSMAN BIN WAN HUSSIN Pengerusi Bidang Perikanan dan Akuakultur Sarjana Sains Perikanan Tropika Sarjana Sains (Akuakultur) Fakulti Perikanan dan Sains Makanan Universiti Malaysia Terengganu 21030 Kuala Nerus, Terengganu Date : 7/3/2021
Faculty	7/3/2021			
JPPPU	14/7/2021			
Senate	25/7/2021			
Version	1			
Effective Session	Sem I 2021-2022			



FACULTY OF FISHERIES AND FOOD SCIENCE





Course Information

1	Course Name:	Biosecurity and Seafood Safety (Biosekuriti dan Keselamatan Makanan Laut)													
	Course Code:	FIS5203													
	Course Classification:	Elective (core)	Remarks:												
2	Synopsis:	The aim of this course is to emphasize the importance of biosecurity and seafood safety. It is also aims to provide students to the best management concept that can be used in aquaculture with the development of an environmental friendly and sustainable sector. Topics covered include a food-chain perspective from chemical contaminants in farmed fish and potential impact on human health and also methods of improving fish health, quality and safety, as well as managing such issues. Students will also learn about good aquaculture practices (GAP) in different aspects of best practice which includes local and global nature of aquaculture, roles of stakeholders, compliance issues in the authorization of new projects, and environmental, management and operational specifications that make up best practices around aquaculture.													
3	Name(s) of Academic Staff:	1	Dr. Mok Wen Jye												
		2													
		3													
4	Semester and Year offered:	Year Offered		Semester	Remarks:										
5	Credit Value:	3	3(2+1)												
6	Pre-requisite/ co-requisite (if any):														
7	At the end of the course, student should be able to:														
Course Learning Outcomes (CLO)	CLO1	Evaluate biosecurity protocols and seafood safety measures. (PLO3, C5)													
	CLO2	Display ability to determine the quality and safety parameters. (PLO2, P4)													
	CLO3	Formulate a framework which can be used to resolve issues relating to biosecurity and seafood safety. (PLO7, A4)													
8	Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment Methods														
		Programme Learning Outcomes (PLO)											Teaching Methods	Assessment Methods	
	Course Learning Outcomes	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11			
	CLO1			√										Lecture, E-learning	Test, Final exam
	CLO2		√											Demonstration, practical	Lab Report
	CLO3							√						Lecture, Discussion	Assignment, Presentation
	Mapping with MQF Cluster of Learning Outcomes			C2											
			C3A												
							C4A								
	Indicate the primary causal link between the CLO and PLO by ticking "√" in the appropriate box.														
	PLO1-Knowledge & Understanding=C1, PLO2-Practical Skills=C3A, PLO3-Cognitive Skills=C2, PLO4-Communication Skills=C3C, PLO5-Interpersonal Skills=C3B, PLO6-Ethics & Professionalism=C5, PLO7-Personal Skills=C4A, PLO8-Entrepreneurial Skills=C4B, PLO9-Leadership, Autonomy & Responsibility=C3F, PLO10-Digital Skills=C3D, PLO11-Numeracy Skills=C3E														
9	Transferable Skills (if applicable)														
	(Skills learned in the course of study which can be useful and utilized in other settings)														
	1	Personal Skills													
	2	Cognitive skills													
	3														
	Open-ended response (if any)														
	4														
10	Distribution of Student Learning Time (SLT) Note: This SLT calculation is designed for home grown programme only.														

Course Content Outline and Subtopics		CLO*	Learning and Teaching Activities**										Total SLT	
			Face-to-Face (F2F)							NF2F Independent Learning (Asynchronous)				
			Physical				Online/ Technology-mediated (Synchronous)							
			L	T	P	O	L	T	P		O			
1	Introduction to safety in the pre- and post-fishery - Relevence of biosecurity act and regulation in seafood industry.	CLO1	2									2		
2	Infection in aquaculture and seafood: Microbiology, parasite	CLO1	3					3					6	
3	Toxic elements in seafood: Mercury, arsenic, lead and cadmium, latest issues to human health, etc.	CLO1	3					3					6	
4	Organic pollutants and Chemoterapeutants used in aquaculture: Trends in pesticide used, Risks to human health in aquaculture products, Future trends	CLO1	3					3					6	
5	Seafood quality: Factors affecting flesh quality in aquac	CLO1	3					3					6	
6	Quality management of seafood: Methods of improving aquaculture products quality, Husbandary techniques	CLO3	3				2						5	
7														
8	Lab 1: Microbiology quality	CLO2			2								2	
9	Lab 2: Parasites residues	CLO2			3								3	
10	Lab 3: Antibiotic residues	CLO2			2								2	
11	Lab 4: Seafood quality determination	CLO2			2								2	
12														
13														
14														
15														
16														
17														
18														
19														
20														
SUB-TOTAL SLT:												80		
Continous Assessment		%	Face-to-Face (F2F)							NF2F Independent Learning for Assessment (Asynchronous)				
			Physical				Online/ Technology-mediated (Synchronous)							
1	Test	15	1							4				
2	Lab report	15								10				
3	Assignment	15								10				
4	Presentation	15	1							4				
5														
SUB-TOTAL SLT:												30		
Final Assessment		%	Face-to-Face (F2F)							NF2F Independent Learning for Assessment (Asynchronous)				
			Physical				Online/ Technology-mediated (Synchronous)							
1	Final exam	40	2							8				
2														
3														
4														
5														
SUB-TOTAL SLT:												10		
SLT for Assessment:												40		
GRAND TOTAL SLT:												120		
A	$\frac{[Total\ F2F\ Physical]}{[Total\ F2F\ Physical + Total\ F2F\ Online + Total\ Independent\ Learning]} \times 100\%$											26.67		
B	$\frac{[Total\ F2F\ Online + Total\ Independent\ Learning]}{[Total\ F2F\ Physical + Total\ F2F\ Online + Total\ Independent\ Learning]} \times 100\%$											73.33		
C	$\frac{[Total\ F2F\ Physical\ Practical]}{[Total\ F2F\ Physical + Total\ F2F\ Online + Total\ Independent\ Learning]} \times 100\%$											7.50		
C1	$\frac{[Total\ F2F\ Physical\ Practical]}{[Total\ F2F\ Physical + Total\ F2F\ Online + Total\ Independent\ Learning]} \times 100\%$											7.50		

	<p>C2</p>	<p style="text-align: right;">% SLT for F2F Online Practical Component $\frac{[Total\ F2F\ Online\ Practical]}{[Total\ F2F\ Physical + Total\ F2F\ Online + Total\ Independent\ Learning]} \times 100$</p> <p>Please tick (✓) if this course is Industrial Training/ Clinical Placement/ Practicum using 50% of Effective Learning Time (ELT) <input type="checkbox"/></p> <p>Note: * Indicate the CLO based on the CLO's numbering in Item 8 ** For ODL programme: Courses with mandatory practical requirements imposed by the programme standards or any related standards can be exempted from complying to the minimum 80% ODL delivery rule in the SLT. *** L = Lecture, T = Tutorial, P= Practical, O= Others</p>
11	<p>Identify special requirement or resources to deliver the course (e.g., software, nursery, computer lab, simulation room etc)</p>	

12	References (include required and further readings, and should be the most current)	<ol style="list-style-type: none"> 1. Ades, G., Leith, K., & Leith, P. (2016). Food safety: A roadmap to success, London, UK: Elsevier. 2. Bai, J. A., & Rai, V. R. (2018). Trends in food safety and protection, Boca Raton: CRC Press. 3. Fiscal-Arjona, M. (2019). Food safety: Contaminants and toxins, Canada: Delye Publication. 4. Hanter, R. H., & Naaum, A. M. (2016). Seafood authenticity and traceability: A DNA-based perspective, London: Academic Press. 5. Hu, L. L. (2019). Food safety: Rapid detection and effective prevention of foodborne hazards, New Jersey: Apple Academic Press. 6. Ozogul, Y. (2020). Innovative technologies in seafood processing, Boca Raton, FL: CRC Press. 7. Yamazaki, K. I., & Bari, M. L. (2018). Seafood safety and quality, Boca Raton: CRC Press/Taylor & Francis Group.
13	Other additional information (if applicable)	
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Programme	1/3/2021		 DR. SHARIFAH NOOR EMILIA BINTI SYED JAMIL FAD'AAK Pensyarah Universiti Fakulti Perikanan dan Sains Makanan Universiti Malaysia Terengganu 21030 Kuala Nerus, Terengganu	 DR. WAN MOHD RAUMAN BIN WAN HUSSEIN Pengerusi Bidang Perikanan dan Akuakultur Sarjana Sains Perikanan Tropika Sarjana Sains (Akuakultur) Fakulti Perikanan dan Sains Makanan Universiti Malaysia Terengganu 21030 Kuala Nerus, Terengganu	
Faculty	7/3/2021				
JPPPU	14/7/2021				
Senate	25/7/2021				
Version	1				
Effective Session	Sem I 2021-2022	Date :	1/3/2021	Date :	7/3/2021



FACULTY OF FISHERIES AND FOOD SCIENCE



Course Information

1	Course Name:	Fisheries Biosystems (Biosistem Perikanan)														
	Course Code:	FIS5213														
	Course Classification:	Elective (core)	Remarks:													
2	Synopsis:	The course aims to introduce students to fisheries biosystems and its concept, importance and application in sustainable fisheries management. It comprise of several main topics including introduction to fisheries biosystems, component of fisheries biosystems, mechanism and function of biosystems in fisheries. The course will also look into the interaction between fish population with their biotic and abiotic environment based on the biological and molecular aspects. The integration of basic biological information with genomics, transcriptomics and metabolomics of the organisms will also be introduced. In addition, the application of the systems towards sustainable fisheries management will be discussed. At the end of this course, student should be able to analyze and outline the application of various biological systems for management of fisheries resources.														
3	Name(s) of Academic Staff:	1	Dr. Tun Nurul Aimi Mat Jaafar													
		2														
		3														
4	Semester and Year offered:	Year Offered	2	Semester	1	Remarks:										
5	Credit Value:	3	3(3+0)													
6	Pre-requisite/ co-requisite (if any):															
7	At the end of the course, student should be able to:															
Course Learning Outcomes (CLO)	CLO1	Evaluate the concept, importance and application of fisheries biosystems in sustainable fisheries management. (PLO3, C5)														
	CLO2	Identify the interaction between fish population and environmental factors based biological and molecular aspects. (PLO7, A4)														
	CLO3	Formulate an integrated data based on genomics, transcriptomics and metabolomics of the organisms for management. (PLO10, A4)														
8	Mapping of the Course Learning Outcomes to the Programme Learning Outcomes, Teaching Methods and Assessment Methods															
		Programme Learning Outcomes (PLO)										Teaching Methods	Assessment Methods			
	Course Learning Outcomes	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11				
	CLO1			√									Lecture, E-learning	Test, Final exam		
	CLO2							√					Lecture, E-learning, Discussion	Assignment, Presentation		
	CLO3										√		Demonstration, Discussion	Project, Presentation		
	Mapping with MQF Cluster of Learning Outcomes			C2				C4A								
											C3D					
	Indicate the primary causal link between the CLO and PLO by ticking "√" in the appropriate box.															
	<small>PLO1-Knowledge & Understanding=C1, PLO2-Practical Skills=C3A, PLO3-Cognitive Skills=C2, PLO4-Communication Skills=C3C, PLO5-Interpersonal Skills=C3B, PLO6-Ethics & Professionalism=C5, PLO7-Personal Skills=C4A, PLO8-Entrepreneurial Skills=C4B, PLO9-Leadership, Autonomy & Responsibility=C3F, PLO10-Digital Skills=C3D, PLO11-Numeracy Skills=C3E</small>															
9	Transferable Skills (if applicable)															
	(Skills learned in the course of study which can be useful and utilized in other settings)															
							1 Cognitive skills									
							2 Personal Skills									
							3 Digital Skills									
							Open-ended response (if any)									
							4									
10	Distribution of Student Learning Time (SLT) Note: This SLT calculation is designed for home grown programme only.															

Course Content Outline and Subtopics		CLO*	Learning and Teaching Activities**										Total SLT	
			Face-to-Face (F2F)											NF2F Independent Learning (Asynchronous)
			Physical					Online/ Technology-mediated (Synchronous)						
			L	T	P	O	L	T	P	O				
1	Introduction (concept, importance of fisheries biosystems for management)	CLO1	2										2	
2	Component of fisheries biosystems (biological and ecological components)	CLO1	2										2	
3	Mechanisms and functions (biological pathway, molecular information, biological response)	CLO1	4			4	2						10	
4	Interaction between fish and environment (biotic, abiotic)	CLO2	4			3	1						9	
5	Molecular approach (genomics, transcriptomics, metabolomics)	CLO3	2			4	1						7	
6	Application of fisheries biosystems towards sustainable fisheries management	CLO3	3			2	2						7	
7														
8														
9														
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														
SUB-TOTAL SLT:													73	
Continous Assessment		%	Face-to-Face (F2F)					NF2F Independent Learning for Assessment (Asynchronous)						
			Physical				Online/ Technology-mediated (Synchronous)							
1	Test	10	1								4			
2	Assignment	15									12			
3	Presentation 1	10	1								3			
4	Project	15									12			
5	Presentation 2	10	1								3			
SUB-TOTAL SLT:													37	
Final Assessment		%	Face-to-Face (F2F)					NF2F Independent Learning for Assessment (Asynchronous)						
			Physical				Online/ Technology-mediated (Synchronous)							
1	Final exam	40	2								8			
2														
3														
4														
5														
SUB-TOTAL SLT:													10	
SLT for Assessment:													47	
GRAND TOTAL SLT:													120	
A	$\frac{[Total\ F2F\ Physical]}{[Total\ F2F\ Physical + Total\ F2F\ Online + Total\ Independent\ Learning]} \times 100$											29.17		
B	$\frac{[Total\ F2F\ Online + Total\ Independent\ Learning]}{[Total\ F2F\ Physical + Total\ F2F\ Online + Total\ Independent\ Learning]} \times 100$											70.83		
C	$\frac{[%\ F2F\ Physical\ Practical + \%\ F2F\ Online\ Practical]}{[%\ F2F\ Physical\ Practical + \%\ F2F\ Online\ Practical]} \times 100$													
C1	$\frac{[Total\ F2F\ Physical\ Practical]}{[Total\ F2F\ Physical + Total\ F2F\ Online + Total\ Independent\ Learning]} \times 100$													
C2	$\frac{[Total\ F2F\ Online\ Practical]}{[Total\ F2F\ Physical + Total\ F2F\ Online + Total\ Independent\ Learning]} \times 100$													

Please tick (✓) if this course is **Industrial Training/ Clinical Placement/ Practicum** using 50% of Effective Learning Time (ELT)

Note:



* Indicate the CLO based on the CLO's numbering in Item 8

** For ODL programme: Courses with mandatory practical requirements imposed by the programme standards or any related standards can be exempted from complying to the minimum 80% ODL delivery rule in the SLT.

*** L = Lecture, T = Tutorial, P= Practical, O= Others

11	Identify special requirement or resources to deliver the course (e.g., software, nursery, computer lab, simulation room etc)	
----	--	--

12	References (include required and further readings, and should be the most current)	<ol style="list-style-type: none"> 1. Bouffat, S. J. (2016). Marine genomics: Methods and protocols. New York: Humana Press/Springer Science+Business Media LLC. 2. Clark, D. P., McGehee, M. R., & Pazdernik, N. J. (2019). Molecular biology (Third edition). London, United Kingdom: Academic Press. 3. Foulkes, N. S. (2016). Genetics, genomics and fish phenomics. Cambridge, MA: Academic Press Inc. 4. Gabriel, K. R. (2020). Bioinformatics and genomics: Concepts and protocols. New York: Intelliz Press. 5. Perrice, M., & Pulpitel, T. (2016). Gene expression & molecular biology. New York: Intelliz Press LLC.
13	Other additional information (if applicable)	
Note: Number of PLO indicated is purely for illustration purposes only and the number is subjected to the curriculum design.		

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Programme	1/3/2021		 DR. SHARIFAH NOOR EMILIA BINTI SYED JAMIL FAD'AAK Pensyarah Universiti Fakulti Perikanan dan Sains Makanan Universiti Malaysia Terengganu 21030 Kuala Nerus, Terengganu	 DR. WAN MOHD RUKMAN BIN WAN HUSSIN Pengerusi Bidang Perikanan dan Akuakultur Sarjana Sains Perikanan Tropika Sarjana Sains (Akuakultur) Fakulti Perikanan dan Sains Makanan Universiti Malaysia Terengganu 21030 Kuala Nerus, Terengganu	
Faculty	7/3/2021				
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