




## 5. MO18-5201 Coastal and Marine Structures Design


<b>Module name</b>	<b>Coastal and Marine Structures Design</b>
<b>Module level, if applicable</b>	Master
<b>Code, if applicable</b>	MO18-5201
<b>Subtitle, if applicable</b>	-
<b>Course, if applicable</b>	Coastal and Marine Structures Design
<b>Semester</b>	2 <sup>nd</sup> Semester
<b>Person responsible for the module</b>	Ir. Handayanu, M.Sc., Ph.D Yoyok Setyo Hadiwidodo, S.T., M.T., Ph.D
<b>Lecturer</b>	Ir. Handayanu, M.Sc., Ph.D Yoyok Setyo Hadiwidodo, S.T., M.T., Ph.D
<b>Language</b>	Indonesian
<b>Relation to curriculum</b>	Mandatory course for master degree program in Ocean Engineering, 2 <sup>nd</sup> semester.
<b>Type of teaching, contact hours</b>	Lecture, <50 students 150 minutes x 16 weeks per semester
<b>Workload</b>	7. Class, $3 \times 50' = 150$ minutes per week 8. Independent Study, $3 \times 60' = 180$ minutes per week 9. Structured Activities, $3 \times 60' = 180$ minutes per week
<b>Credit points</b>	3 CREDITS ~ 4.8 ECTS CREDITS $\times$ 1.6 ECTS
<b>Requirements according to the examination regulations</b>	A student must have attended at least 80% of the lectures to sit in the exams.
<b>Recommended prerequisites</b>	-


<b>Learning outcomes and their corresponding PLOs</b>	<p>CLO.1. Able to apply all primary design concepts of offshore structures in design of fixed offshore platforms.</p> <p>CLO.2. Able to understand the important factors in development of offshore oil and gas marginal field with appropriate novel concept of offshore platforms.</p> <p>CLO.3. Able to explain the consequences of applying the jacket fixed offshore platforms in deepwater area</p>	<p>LO.3. Able to propose complex designs and analyze them using logical thinking by considering standards, codes, rules, regulations and recommended practices</p>
<b>Content</b>	<p>This course provide relevant studies related to the design concept of coastal and marine structures for coastal and deepwater area by considering several important parameters as the consequences. Several analysis of coastal and marine structures are also described. Following subjects will be discussed in this course:</p> <ol style="list-style-type: none"> <li>1. Design concepts of offshore platforms</li> <li>2. Offshore platforms and oil and gas marginal field</li> <li>3. Environmental loads on offshore platforms</li> <li>4. Design of tubular joints</li> <li>5. Fixed offshore platforms in deppwater area</li> <li>6. Dynamic analysis of offshore platforms</li> </ol>	
<b>Study and examination requirements and forms of examination</b>	<ul style="list-style-type: none"> <li> In-class exercise</li> <li> Assignment</li> <li> Mid-term exam</li> <li> Final exam</li> </ul>	
<b>Media employed</b>	<p>Offline: LCD, whiteboard, PowerPoint presentation</p> <p>Online: websites (myITS Classroom), Zoom, Microsoft Teams, PowerPoint presentation.</p>	
<b>Reading list</b>	<p><b>Main:</b></p> <ol style="list-style-type: none"> <li>1. Dawson, T. H., <i>Offshore Structural Engineering</i>, New Jersey, Prentice-Hall, 1983.</li> <li>2. Chakrabarti, S. K., <i>Handbook of Offshore Engineering: Vol. 1 &amp; 2</i>, New York, Elsevier, 2005.</li> <li>3. Lloyd's Register of Shipping, <i>Stress Concentration Factors for Simple Tubular Joints: Assesment of existing and development of new parametric formulae</i>, OTH 354, London, THE-OTR, 1997.</li> </ol>	




	Program Studi <i>Study Program</i>	S2 Teknik Kelautan <i>Master of Ocean Engineering</i>
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	Semester <i>Semester</i>	2 <sup>nd</sup>
	SKS <i>Credit</i>	3
RP-S2	Dosen Pengampu <i>Lecturer</i>	Ir. Handayanu, M.Sc., Ph.D; Yoyok Setyo Hadiwidodo, S.T., M.T., Ph.D





















<p><b>Bahan Kajian</b></p> <p><i>Study Materials</i></p>	<p>Dalam mata kuliah ini mahasiswa akan mempelajari pokok-pokok bahasan sebagai berikut:</p> <ol style="list-style-type: none"> <li>1. Konsep desain struktur bangunan laut</li> <li>2. Anjungan lepas pantai untuk ladang migas marginal</li> <li>3. Beban lingkungan pada anjungan lepas pantai</li> <li>4. Desain sambungan tubular</li> <li>5. Anjungan terpancang pada laut dalam</li> <li>6. Analisis dinamis pada bangunan laut</li> </ol> <p><i>The students will get the following materials:</i></p> <ol style="list-style-type: none"> <li>1. Design concepts of offshore platforms</li> <li>2. Offshore platforms and oil and gas marginal field</li> <li>3. Environmental loads on offshore platforms</li> <li>4. Design of tubular joints</li> <li>5. Fixed offshore platforms in deepwater area</li> <li>6. Dynamic analysis of offshore platforms</li> </ol>
<p><b>CPL yang dibebankan MK</b></p> <p><i>PLO</i></p>	<p>Mampu merumuskan pertanyaan penelitian baru untuk mengakomodasi pengetahuan multidisiplin untuk pengembangan teknologi di bidang desain dan konstruksi struktur laut</p> <p><i>Able to formulate new research questions to accommodate multidisciplinary knowledge for technology development in the field of design and construction of marine structures</i></p>
<p><b>CP-MK</b></p> <p><i>CLO</i></p>	<ol style="list-style-type: none"> <li>1. Mampu menerapkan semua konsep dasar perancangan bangunan lepas pantai pada perancangan jenis anjungan lepas pantai terpancang</li> <li>2. Memahami faktor-faktor penting dalam pengembangan suatu ladang migas lepas pantai marginal beserta jenis anjungan yang sesuai</li> <li>3. Mampu menjelaskan konsekuensi penerapan jenis anjungan terpancang di lingkungan perairan dalam</li> </ol> <p><i>1. Able to apply all primary design concepts of offshore structures in design of fixed offshore platforms.</i></p> <p><i>2. Able to understand the important factors in development of offshore oil and gas marginal field with appropriate novel concept of offshore platforms.</i></p> <p><i>3. Able to explain the consequences of applying the jacket fixed offshore platforms in deepwater area</i></p>


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Pertemuan Meeting	Kemampuan Akhir Sub CP-MK Final Ability	Keluasan (materi pembelajaran) Extent (learning material)	Metode Pembelajaran Learning methods	Estimasi Waktu Duration	Bentuk Evaluasi Evaluation Type	Kriteria dan Indikator Penilaian Assessment Criteria and Indicators	Bobot Penilaian Scoring
1	Mampu memahami dan menjelaskan konsep, jenis-jenis struktur bangunan laut, perkembangannya  <i>Able to understand and explain the types and development of coastal and marine structures</i>	Struktur bangunan laut: konsep dan jenis-jenisnya  <i>Concepts and types of coastal and marine structures:</i>	<ul style="list-style-type: none"> <li>📄 Paparan teori</li> <li>📄 Handout</li> <li>📄 Diskusi</li> <li>📄 Theoretical presentation</li> <li>📄 Handout</li> <li>📄 Discussion</li> </ul>	3 × 50'	<ul style="list-style-type: none"> <li>📄 Pertanyaan-pertanyaan langsung di kelas</li> <li>📄 Tugas: studi literatur</li> <li>📄 Questions in class</li> <li>📄 Assignment: literature study</li> </ul>	<p>Ketepatan dalam menjelaskan jenis-jenis struktur bangunan laut dan perkembangannya</p> <p><i>Accuracy in explaining the types and development of coastal and marine structures</i></p>	5%
2-3	<ol style="list-style-type: none"> <li>1. Mampu memahami konsep pengembangan lapangan minyak dan gas marginal</li> <li>2. Mampu memahami proses dan menjelaskan seleksi struktur bangunan laut</li> <li>3. Mampu memahami dan menjelaskan terkait faktor-faktor yang memengaruhi seleksi pemilihan struktur</li> </ol>	<b>Konsep pengembangan lapangan minyak dan gas marginal, proses seleksi struktur, faktor yang memengaruhi seleksi konsep struktur</b>	<ul style="list-style-type: none"> <li>📄 Paparan teori</li> <li>📄 Handout</li> <li>📄 Diskusi</li> </ul>		<ul style="list-style-type: none"> <li>📄 Pertanyaan-pertanyaan langsung di kelas</li> <li>📄 Tugas: studi literatur</li> </ul>	<ol style="list-style-type: none"> <li>1. Ketepatan dalam menjelaskan konsep pengembangan lapangan minyak dan gas secara umum</li> <li>2. Ketepatan dalam menjelaskan proses dan menjelaskan seleksi struktur bangunan laut</li> <li>3. Ketepatan dalam menjelaskan terkait faktor-faktor yang memengaruhi seleksi pemilihan struktur</li> </ol>	5%


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










	<ol style="list-style-type: none"> <li>1. <i>Able to understand the development concept of marginal field</i></li> <li>2. <i>Able to understand the selection process of marine structures</i></li> <li>3. <i>Able to understand factors that affect the concept selection</i></li> </ol>	<i>Development of marginal field, selection of marine structures, factor that affect the selection of marine structures</i>	<ul style="list-style-type: none"> <li> <i>Theoretical presentation</i></li> <li> <i>Handout</i></li> <li> <i>Discussion</i></li> </ul>		<ul style="list-style-type: none"> <li> <i>Questions in class</i></li> <li> <i>Assignment: literature study</i></li> </ul>	<ol style="list-style-type: none"> <li>1. <i>Accuracy in explaining the development concept of marginal field</i></li> <li>2. <i>Accuracy in explaining the selection process of marine structures</i></li> <li>3. <i>Accuracy in explaining factors that affect the concept selection</i></li> </ol>	
4-5	<p>Memahami dan mampu menjelaskan konsep beban lingkungan serta melakukan analisis beban lingkungan pada struktur bangunan laut</p> <p><i>Able to understand and explain about concept environmental loads, also conduct analysis of the environmental loads on coastal and marine structures</i></p>	<p>Beban lingkungan yang mengenai bangunan laut. Konsep analisis beban lingkungan</p> <p><i>environmental loads on coastal and marine structures. Analysis process of environmental loads on coastal and marine structures</i></p>	<ul style="list-style-type: none"> <li> <i>Paparan teori</i></li> <li> <i>Handout</i></li> <li> <i>Diskusi</i></li> <li> <i>Theoretical presentation</i></li> <li> <i>Handout</i></li> <li> <i>Discussion</i></li> </ul>	3 x 50'	<ul style="list-style-type: none"> <li> <i>Pertanyaan-pertanyaan langsung di kelas</i></li> <li> <i>Tugas: studi literatur</i></li> <li> <i>Questions in class</i></li> <li> <i>Assignment: literature study</i></li> </ul>	<p>Ketepatan dalam menjelaskan konsep dan melakukan analisis beban lingkungan pada struktur bangunan laut</p> <p><i>Accuracy in explaining about concept environmental loads, also analyzing the environmental loads on coastal and marine structures</i></p>	10%
6-7	<ol style="list-style-type: none"> <li>1. <i>Mampu memahami konsep desain sambungan tubular pada struktur bangunan laut</i></li> <li>2. <i>Mampu memahami dan mengetahui persamaan faktor konsentrasi tegangan pada sambungan tubular</i></li> </ol>	<p>Desain sambungan tubular, persamaan faktor konsentrasi tegangan pada sambungan tubular.</p>	<ul style="list-style-type: none"> <li> <i>Paparan teori</i></li> <li> <i>Handout</i></li> <li> <i>Diskusi</i></li> </ul>	3 x 50'	<ul style="list-style-type: none"> <li> <i>Pertanyaan-pertanyaan langsung di kelas</i></li> <li> <i>Tugas: studi literatur</i></li> </ul>	<ol style="list-style-type: none"> <li>1. <i>Ketepatan dalam menjelaskan konsep desain sambungan tubular pada struktur bangunan laut</i></li> <li>2. <i>Ketepatan dalam menjelaskan persamaan faktor konsentrasi tegangan pada sambungan tubular</i></li> </ol>	5%


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	<ol style="list-style-type: none"> <li>1. <i>Able to understand design concept of tubular joints of marine structures</i></li> <li>2. <i>Able to understand stress concentration factor (SCF) of tubular joints</i></li> </ol>	<i>Tubular joint designs, stress concentration factor (SCF) of tubular joints</i>	<ul style="list-style-type: none"> <li> <i>Theoretical presentation</i></li> <li> <i>Handout</i></li> <li> <i>Discussion</i></li> </ul>		<ul style="list-style-type: none"> <li> <i>Questions in class</i></li> <li> <i>Assignment: literature study</i></li> </ul>	<ol style="list-style-type: none"> <li>1. <i>Accuracy in explaining design concept of tubular joints of marine structures</i></li> <li>2. <i>Accuracy in explaining stress concentration factor (SCF) of tubular joints</i></li> </ol>	
8	<b>Evaluasi Tengah Semester</b> <i>Mid Semester Evaluation</i>						10%
9-10	Mampu memahami prinsip desain struktur bangunan laut  <i>Able to understand principal design of coastal and marine structures</i>	Prinsip desain struktur bangunan laut: - Design by rule - Design by analysis - Design based on performance  <i>Principle design of coastal and marine structures:</i> - <i>Design by rule</i> - <i>Design by analysis</i> - <i>Design based on performance</i>	<ul style="list-style-type: none"> <li> <i>Paparan teori</i></li> <li> <i>Handout</i></li> <li> <i>Diskusi</i></li> <li> <i>Theoretical presentation</i></li> <li> <i>Handout</i></li> <li> <i>Discussion</i></li> </ul>	3 × 50'	<ul style="list-style-type: none"> <li> <i>Pertanyaan-pertanyaan langsung di kelas</i></li> <li> <i>Tugas: studi literatur</i></li> <li> <i>Questions in class</i></li> <li> <i>Assignment: literature study</i></li> </ul>	Ketepatan dalam menjelaskan prinsip desain struktur bangunan laut  <i>Accuracy in explaining principal design of coastal and marine structures</i>	5%
11	Mampu memahami konsep dan proses desain berdasarkan performa bangunan laut	Karakteristik dan perilaku pada struktur bangunan laut, alur desain berdasarkan performa pada struktur bangunan laut	<ul style="list-style-type: none"> <li> <i>Paparan teori</i></li> <li> <i>Handout</i></li> <li> <i>Diskusi</i></li> </ul>		<ul style="list-style-type: none"> <li> <i>Pertanyaan-pertanyaan langsung di kelas</i></li> <li> <i>Tugas</i></li> </ul>	Ketepatan dalam menjelaskan prinsip dasar analisis dinamis pada struktur bangunan laut	5%




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<b>RP-S2</b>	Dosen Pengampu <i>Lecturer</i>	Ir. Handayanu, M.Sc., Ph.D; Yoyok Setyo Hadiwidodo, S.T., M.T., Ph.D

	<i>Able to understand concept and design process based on performance for coastal and marine structures</i>	<i>Characteristic and behaviour of coastal and marine structures. Process of design based by performance.</i>	<ul style="list-style-type: none"> <li> Theoretical presentation</li> <li> Handout</li> <li> Discussion</li> </ul>		<ul style="list-style-type: none"> <li> Questions in class</li> <li> Assignment</li> </ul>	<i>Accuracy in explaining concept and design process based on performance for coastal and marine structures</i>	
12,13,14	<p><b>Mampu memahami prinsip dasar analisis dinamis pada struktur bangunan laut</b></p> <p><i>Able to understand principal of dynamic analysis of coastal and marine structures</i></p>	<p><b>Prinsip analisis dinamis dan spektra seismik pada struktur bangunan laut</b></p> <p><i>Dynamic analysis of coastal and marine structures, seismic spectra</i></p>	<ul style="list-style-type: none"> <li> Paparan teori</li> <li> Handout</li> <li> Diskusi</li> <li> Theoretical presentation</li> <li> Handout</li> <li> Discussion</li> </ul>		<ul style="list-style-type: none"> <li> Pertanyaan-pertanyaan langsung di kelas</li> <li> Tugas</li> <li> Questions in class</li> <li> Assignment</li> </ul>	<p><b>Ketepatan dalam menjelaskan prinsip dasar analisis dinamis pada struktur bangunan laut</b></p> <p><i>Accuracy in explaining principal of dynamic analysis of coastal and marine structures</i></p>	5%
<b>Pertemuan Meeting</b>	<b>Kemampuan Akhir Sub CP-MK Final Ability</b>	<b>Keluasan (materi pembelajaran) Extent (learning material)</b>	<b>Metode Pembelajaran Learning methods</b>	<b>Estimasi Waktu Duration</b>	<b>Bentuk Evaluasi Evaluation Type</b>	<b>Kriteria dan Indikator Penilaian Assessment Criteria and Indicators</b>	<b>Bobot Penilaian Scoring</b>
15	Mampu memahami konsep dan proses analisis desain berdasarkan performa untuk struktur terapung (studi kasus: breakwater terapung)	Kegagalan, pemodelan beban gelombang, dan analisis stabilitas pada breakwater	<ul style="list-style-type: none"> <li> Paparan teori</li> <li> Handout</li> <li> Contoh pemodelan</li> <li> Diskusi</li> </ul>	3 × 50'	<ul style="list-style-type: none"> <li> Pertanyaan-pertanyaan langsung di kelas</li> <li> Tugas: studi literatur</li> </ul>	Ketepatan dalam menjelaskan konsep dan proses analisis desain berdasarkan performa untuk struktur terapung (studi kasus: breakwater terapung)	15%

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	Able to understand the concept and analysis process of design by performance for floating structure (study case: floating breakwater).	Failure mechanism, wave model, and stability analysis of breakwater	<ul style="list-style-type: none"> <li> Theoretical presentation</li> <li> Handout</li> <li> Modeling example</li> <li> Discussion</li> </ul>	<ul style="list-style-type: none"> <li> Questions in class</li> <li> Assignment: literature study</li> </ul>	Accuracy in explaining the concept and analysis process of design by performance for floating structure (study case: floating breakwater).	
16	Evaluasi Akhir Semester <i>Final Semester Evaluation</i>					10%

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#### PUSTAKA/REFERENCES:

Main:

7. Mukhtasor (2015), *Mengenal Energi Laut*, ICEES (Indonesian Counterpart for Energy and Environmental Solutions)
8. Lynn, Paul A (2014), *Electricity from Wave and Tide: An Introduction to Ocean energy*, John Wiley & Sons Ltd, Chennai India
9. Constans, J., (1979), *Marine Sources of Energy*, Pergamon Press, New York