

**D3 SHIPBUILDING ENGINEERING**

SEMESTER I					SEMESTER III						
No	CODE	COURSES		HRS	CRDT	No	CODE	COURSES		HRS	CRDT
1	602104	A	English I	3	3	1	602214	A	Ship Construction	4	2
2	602201	A	Applied Physics	6	3	2	602215	A	Ship Equipment and System	4	2
3	602202	A	Applied Chemistry	2	1	3	602216	A	Non-Steel Ships	2	1
4	602203	A	Applied Mathematics	4	2	4	602217	A	NDT Theory	2	1
5	602204	A	Engineering Drawing	4	2	5	602218	A	Welding Technology	6	3
6	602205	A	Mechanical Technology	2	1	6	602304	A	Mould Loft Practice	0	0
7	602206	A	Computer Operating Procedure	4	2	7	602305	A	Practice of Ship Building Theory	4	2
8	602207	A	Occupational Health and Safety	2	1	8	602306	A	Design Drawing I	12	6
9	602301	A	Workshop I	12	6						
<b>TOTAL</b>				39	21	<b>TOTAL</b>				34	17
0											
SEMESTER II					SEMESTER IV						
No	CODE	COURSES		HRS	CRDT	No	CODE	COURSES		HRS	CRDT
1	602105	A	English II	3	3	1	602101	A	Religious Study	2	2
2	602208	A	Applied Mathematics II	2	1	2	602102	A	Indonesian Values and Ideology	2	2
3	602209	A	Applied Mechanics	4	2	3	602103	A	Indonesian Language	2	2
4	602210	A	Material Sciences	4	2	4	602219	A	Ship Electrical Systems	2	1
5	602211	A	Ship Building Theory	4	2	5	602220	A	Ship Repair Technology	4	2
6	602212	A	Power Boat Drive	2	1	6	602307	A	Non Metal Practice	4	2
7	602213	A	Ship Design	2	1	7	602308	A	Image Design II	12	6
8	602302	A	Workshop II	8	4	8	602309	A	Welding Practice I	8	4
9	602303	A	Engineering Drawing	6	3	9	602310	A	Material Testing	4	2
<b>TOTAL</b>				35	19	<b>TOTAL</b>				40	23
SEMESTER V					SEMESTER VI						
No	CODE	COURSES		HRS	CRDT	No	CODE	COURSES		HRS	CRDT
1	602106	A	English III	2	2	1	602501	A	On the Job Training	30	13
2	602221	A	Lift Aircraft	2	1	2	602403	A	Project Work	10	5
3	602222	A	Ship Inspection	2	1						
4	602223	A	New Building Technology	4	2						
5	602311	A	Welding Practice II	6	3						
6	602401	A	Enterpreneurship	2	1						
7	602402	A	Engineering Economics	2	1						
8			Scientific Writing Methodology	4	2						
			Competency Certification	2	1						
<b>TOTAL</b>				26	14	<b>TOTAL</b>				40	18

## SYLLABUS

NO.	COURSE TITLE	CREDIT/ HOUR	OBJECTIVE/COURSE TOPIC/REFERENCES
1.	English I	2/4	<p><b>Objective:</b> Students are able to understand english text, practice ESP (English for Specific Purposes) conversation, and able to write simple work document.</p> <p><b>Course Topics:</b> General conversation, specific conversation, understanding and giving information, summarizing, simple imperative sentence, simple letters, work documents, hand tools instruction, occupational health and safety.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. I.A. Hill, 1965. <i>Elementary Stories for Reproduction</i></li> <li>2. Richard and Long. 1988. <i>Breakthrough: A Course in English Communication Practice</i>. Oxford. Oxford University Press</li> <li>3. PURNOMO. 1996. <i>English for Technology and Vocational Education</i>. Bandung. Remaja Rosdakarya</li> <li>4. Susan Norman 1990. <i>We mean Business. An Elementary Course in Business English</i></li> <li>5. Alice Oshima, N. Hogue, 1991 <i>Writing Academic English</i> California</li> <li>6. TNBlakey, 1983 <i>English for Maritime Studies</i> Pergamon Press Oxford New York</li> </ol>
2.	Applied Physics	3/6	<p><b>Objective:</b> Students are able to understand and apply Physics law of simple application</p> <p><b>Course Topics:</b> Scalar and Vector, Statics, Rigid Body Balance, Dynamics, Kinematics, Work and Energy, Impulse and Momentum, Power and Energy, Fluid Statics, Fluid Dynamics, Electricity, Magnetic, Thermodynamics, Atomic, Radiation</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. David Halliday, Robert Resnick, Physics, Edisi ke 3, McGraw Hill, 1985</li> <li>2. Frederick J. Bueche, Theory and Problem of College Physics, Edisi ke 8, McGraw Hill, 1989</li> <li>3. Dosen – dosen Fisika, Fisika, ITS, 1997</li> <li>4. Dosen-dosen Fisika, Modul Fisika Terapan dan Modul Praktikum, PPNS ITS, 2005</li> </ol>
3.	Applied Chemistry	1/2	<p><b>Objective:</b> Students understand and know general principles of chemistry explaining the characteristics of matters mostly faced in society, can make decision using basic knowledge of chemistry, and solve problems related to them.</p> <p><b>Course Topics:</b> Material, Combustion Chemistry, Polymer Chemistry, Sea Corrosion and Control, Types of corrosion, Corrosion Control, Environmental Chemistry, Work Safely with Chemical Substance.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Miller, Francis Marion, 1985, Chemistry: Structure and Dynamics, McGraw Hill Book Co., Singapore</li> <li>2. Fontana, Mars Guy, 1986, Corrosion Engineering, USA</li> <li>3. NACE, 1984, Corrosion Basic, An Introduction, NACE-Texas</li> <li>4. Threteway, 1985, Korosi untuk Mahasiswa Sains dan Rekayasawan (Terjemahan), Gramedia, Jakarta</li> <li>5. Chandler, Kenneth A., 1985, Marine and Offshore Corrosion, Butter Worths, London</li> <li>6. Munger, Charles G., 1997, Corrosion Prevention by Protective Coating, National Association of Corrosion Engineers, Houston, Texas</li> <li>7. Morgan, John, 1993, Cathodic Protection, National Association of Corrosion Engineers, Houston, Texas</li> <li>8. IMO, 1992, MARPOL, London</li> <li>9. Modul Pelatihan K3 Kimia, Kerjasama JICA-Depnakertrans RI</li> </ol>

4.	Applied Mathematic I	2/4	<p><b>Objective:</b> Students are able to understand and use basic formula of mathematic, especially differential, integration, numerical method.</p> <p><b>Course Topics:</b> Matrix and Determinant, Differential, Differential Application, Integral and Numerical Method.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Matematika Untuk Teknik, KA STROUD</li> <li>2. Matematika Dasar I, FMIPA – ITS</li> <li>3. Matematika Dasar II, FMIPA – ITS</li> <li>4. Kalkulus, HM Hasyim Baisuni</li> <li>5. Technician Mathematic 3, JO Bird &amp; AJC May</li> <li>6. Matematika Teknik Lanjutan jilid 1, Erwin Kreyzig</li> <li>7. Matematika Teknik Lanjutan jilid 2, Erwin Kreyzig</li> <li>8. Essentials of Applied Mathematics, JR Irwin</li> <li>9. Metoda Numerik, Bambang Triatmodjo</li> <li>10. Komputasi Numerik dengan Turbo Pascal, R Soegeng</li> </ol>
5.	Technical Drawing	2/4	<p><b>Objectives:</b> Students are able to make and read drawing planning that meet the ISO standard, able to use drawing as an accurate and objective information.</p> <p><b>Course Topics:</b> Technical Drawing, Art Drawing, Standard use in technical drawing, Three Dimension Objects, Two Dimension Objects, Sketch Drawing, Projection System, Cutting, Size and Tolerance, Bolts and Nuts Drawing , expansion dan Welding Symbols.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Walter C Brown , “ Drafting For Industry “</li> <li>2. GTZ , “ Technical Drawing Metal Work 2 Advanced Course With Test “</li> <li>3. G.Takhesi Sato dan N.Sugiarto , “ Menggambar Mesin “</li> <li>4. Warren J. Luzadder, dan Hendarsin , “ Menggambar Teknik untuk desain pengembangan produk dan control numerik “</li> <li>5. Aida Mahmuda, “ Gambar Teknik Mesin “</li> </ol>
6.	Mechanical Technology	1/2	<p><b>Objective:</b> Students know kinds of equipment and machine operation or hydraulic system precisely, accurately and efficiently</p> <p><b>Course Topics:</b> Introduction and the use of work bench tools, accurate measurement system, fabrication system in workshop, need analysis or material estimation, cutting plan and machining system.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Proses pemesinan Taufiq Rachi</li> <li>2. Teknologi Bengkel P M S</li> <li>3. Teknologi Fabrikasi Box Hill Institute of TAFE</li> </ol>
7.	Computer Practice	2/4	<p><b>Objective:</b> Students know the hardware and software of computer.</p> <p><b>Course Topics:</b> Hardware &amp; Network, Ms Word, Ms.Excel, Ms PowerPoint, Ms Visio, Ms Project, Turbo Pascal, Ms Access and Visual Basic</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Instalasi dan Aplikasi Netware Novell, 1992</li> <li>2. Novell Netware 3.11, 1993</li> <li>3. Teknologi Wireless Internet dengan Kecepatan Tinggi, 2002</li> <li>4. Teknologi Warung Internet, 1999</li> <li>5. Buku Pintar Internet TCP/IP, 2001</li> <li>6. Panduan Lengkap Microsoft Word 2000, 2000</li> <li>7. Microsoft Office 97 Integration Step By Microsoft Word 2000, 2000</li> <li>8. Panduan Lengkap Microsoft Excel 97, 1999</li> <li>9. Belajar Praktis Microsoft Excel 2000,2001</li> <li>10. Panduan Praktis Microsoft Excel 2002,2002</li> <li>11. Microsoft Powerpoint 2000, 2001</li> </ol>

12. Microsoft Office 97 Integration Step By Step, 1997
13. Panduan Praktis Pengelolaan Proyek Konstruksi dengan Microsoft Project
14. Teori dan Aplikasi Program Komputer Bahasa Pascal
15. Penuntun Praktis Belajar Database menggunakan Microsoft Access
16. Sen Visual Basic Acuan Lengkap Pemrograman Database, 1997
17. Visual Basic 6.0 Pemrograman Gratis & Multimedia, 2002
18. Dasar-Dasar Pemrograman Visual Basic 5.0, 1999
19. Database Visual Basic 6.0 dengan Crystal Reports, 2002

8. Occupational Health and Safety 1/2

**Objectives:**

Students are able to know and understand occupational health and safety, hazard and control in work environment.

**Course Topics:**

Introduction and study contract, Introduction to Occupational health and safety , work accident, work safety approach, danger potency control, safety for mechanic, Fire and Hygiene of work Health Company.

**References:**

1. Modul Keselamatan dan Kesehatan Kerja, PPNS-ITS, 2004
2. Materi Dasar-dasar K3, dalam seminar Ahli K3,, 2004
3. Keselamatan dan Kesehatan kerja, Suma"mur P.K., M.Sc
4. Himpunan peraturan keselamatan dan kesehatan kerja, Pungky W, ASEAN-OSHNET
5. Fundamental of Higiene Industri
6. Materi Pengawasan K3 Mekanik, dalam seminar AK32004
7. Materi Pengawasan K3 kebakaran, dalam seminar AK3, 2004
8. Penyakit Akibat Kerja
9. Permenaker 4/Men/1980
10. Permenaker 2/Men/1983
11. Inmenaker Inst. 11M/BW/1997
12. Kepmenaker 186/Men/1999

9. Workshop Practice I 6/12

**Objective:**

Students are able to use bench and measurement tools meet with the working requirement at workshop, able to do basic fabrication work, able to operate cutting, bending, and rolling machines.

**Course Topics:**

Basic Metal Work, Stud Grip Work, Klem Parallel Work, Introduction and the Use of Work Bench Tools, Marking, Cutting and Chisel, Plate Shaping, thin plate Joint, assembling plate profile, rolling into cylinder, and making transition shapes.

**References:**

1. Elementary Metal Course Training Section I Exercises “,Published by Bundesinstitut Fur Berufsbildungs forchung Berlin.
2. E.M. Trent ,1977 , Metal Cutting, Butterworths, London.
3. Hermann Jutz and Eduard Scharkes, Westeman Tables for The Metal Trade.,Wiley Eastern Limited
4. John R.Wolker :Exploring metal working
5. Praktek Bengkel 5,1977 PMS-ITB,
6. T.Rochim ,1993, Teoti dan Teknologi Proses Pemesinan,Jurusan Teknik Mesin FTI-ITB.
7. Technology Of The Metal Trade, Wiley Eastern Limited ,Special edition for GTZ
8. Teknologi Bengkel A.T.M.I.
9. Teknologi Bengkel P M S
10. Teknologi Fabrikasi Box Hill Institute of TAFE

10. English II 2/4

**Objective:**

Students are able to practice ESP conversation and able to comprehend reading text.

**Course Topics:**

Giving Instructions, Work Documents, Maritime Articles, Describing Objects,

Presentation, Meetings, Letters, and Interviews

**References:**

1. Richards & Long, 1985, Breakthrough : A Course in English Communication, Buku 1, 2, 3, Oxford : Oxford Univ Press.
2. Alice Oshima, 1991, Writing Academic English, Addison-Wesley Publishing Company
3. Tom Hutchinson, INTERFACE English for Technical Communication, Longman
4. TN Blakey, 1983 English for Maritime Studies Pergamon Press Oxford New York
5. Dale Carnegie, High Impact Presentation
6. Malcolm Goodale, The Language of Meetings
7. George J. Searles, 2003, Workplace Communications, Pearson Education Inc

11. Applied Mathematic II 2/4

**Objective:**

Students are able to understand and use basic methods of mathematic especially Integration, Differential equations, Matrix and Determinant.

**Course Topics:**

Integral Application, Mass Centre, Moment of Inertia, Fluid Pressure and differential equation.

**References:**

1. Matematika Untuk Teknik, KA STROUD
2. Matematika Dasar I, FMIPA – ITS
3. Matematika Dasar II, FMIPA – ITS
4. Kalkulus, HM Hasyim Baisuni
5. Technician Mathematic level 3, JO Bird & AJC May
6. Matematika Teknik Lanjutan jilid 1, Erwin Kreyzig
7. Essentials of Applied Mathematics, JR Irwin

12. Applied Mechanics 2/4

**Objective:**

Students are able to apply calculation of axial structure, beam, shaft and column implemented on parts of ship construction and ship equipment such as derrick boom, crane, ramp door, drive, hatch cover, anchor, propeller shaft, coupling, bolt, capstan, winch, and pillar.

**Course Topics:**

Tensile stress, Shear stress, Deformation, strain, compression, Torsion, Deflection on thrust, shaft, beam, cantilever and column.

**References:**

1. Arkenbout Schokker, JC. Ir, The Design of Merchant Ship
2. Taylor, DA. Merchant Ship Construction
3. Arkenbout Schokker, JC. Ir, The Design of Merchant Ship
4. Timoshenko, S.P., Gere, J.M., [1984], Mechanics of Materials, Second SI Edition, PWS Egeineering, Boston, Massachusetts
5. Dickie, D. E., [1981], Lifting Tackle Manual, Butterworth & Co Ltd, UK
6. Germanischer Lloyd, [1992], Grundsätze für die Ausführung und Prüfung von Hebezeugen, Hamburd
7. Rudenko, N., [1996], Mesin Pengangkat , Erlangga

13. Material Science 2/4

**Objective:**

Students are able to understand mechanical characteristics, the use of ferro metal and its mixture, Non Ferro metal and its mixture, Non Metal Material and heat treatment process in order to change metal characteristics and also able to choose technical material meet with the design requirements.

**Course Topics:**

Mechanical Characteristics and its testing, Deformation and Crystal Structure, Phase Diagram, Ferro and Steel, Kinds of Steel Usage, Non Ferro Metals and their uses, Non Metal and its use, Transformation Phase, Heat Treatment Process, Surface Treatment, Special Heat Treatment, Heat treatment process tools, metalography.

**References:**

1. Young, J.F., Materials and Processes, The Goodheart-Willcox Co., Inc., Illinois

2. Pengetahuan Bahan Teknik, Prof.Ir. Tata Surdia.
3. Davies, D.J., and L. A. Oelmann , The Structure, Properties and Heat Treatment of Metals, Pitman Book Limited, London, 1983
4. Daniel A. Brant, Metalurgy Fundamentals, The Goodheart-Willcox Co., 1985
5. Williams D. Callister Jr, Material Science abd Engineering on Introduction, Wiley, 1985
6. Jastrzebski, The Nature and Properties of Engineering Materials
7. Hertzberg, Deformation and Fracture Mechanics of Engineering Materials
8. KW. Vohdin, Mengolah Logam
9. Van Vlack, Ilmu dan Teknik Bahan

14. Naval Architecture 2/4

**Objective:**

Students are able to calculate flat bandwidth, volume, Centre of Gravity, moment of inertia, and understand the way to make and calculate linesplan drawing, Hydrostatic and Bonjean, Tonnage, freeboard (plimsoll mark), floodable length curve. They are also able to understand the effect of displacement/ loading and discharging on the ship condition when sailing on the sea.

**Course Topics:**

Ship terminology, numerical integration method, lines plan, hydrostatic and bonjean, Tonnage, Floodable Length, Free Board, Basic theory of stability.

**References:**

1. Lester AR, Merchant Ship Stability, Butter Worths, London, 1985.
2. Baxter, Brian, Naval Architecture, Holder and Stoughton Ltd, London, 1976.
3. Muckle W, Naval Architecture, Butter Worths, London, 1987
4. Semyonov V, Statics and Dynamic of The Ship, Peace Publisher, Moscow, 1960

15. Ship Propulsion 2/4

**Objective:**

Students are able to know the resistance in ship and the use of ship propulsion, able to understand the main function of marine engines as the main activator and also the position of power plant in ship.

**Course Topics:**

Mathematic Model, Physics Model, Ship Resistance, Method to determine ship resistance, Characteristics of any propeller types.

**References:**

1. Harvald, SW. As, Resistance and Propulsion of Ship, John Wiley and Sons, 1983
2. Will Bohl, Technische stromungslehre, seven edition
3. Glover E. J., Ship Propulsion, University of New Castle

16. Ship Design 1/2

**Objective:**

Students are able to understand and explain the ship design concept by translating the demand lists into the main ship variables, general requirements in ship design and also the economical calculation of ship life time.

**Course Topics:**

Ship Design Procedures, Ship Demand List, The main Variable of Ship Design, General Arrangement, Classification Bureau and General Classification Survey and Light Weight Calculation.

**References:**

1. Arkenbout Schokker, JC. Ir, " The Design of Merchant Ship "
2. Biro Klasifikasi Indonesia, " Register 1998 "
3. G. DE. Rooij, Ir. " Practical Ship Building "
4. Harry Benford, " Naval Architecture for Non-Naval Architects "
5. Japan International Cooperation Agency (JICA), Basic Design, Maritime Technology and Safety Bureau, Ministry of Transport Overseas Shipbuilding Cooperation Centre, 1991
6. Lloyd Register of Shipping Cargo Ships, " Distribution of Light Weight for Still Water Bending Moment Calculation "
7. Poehls, I. " Lecture of Ship Design and Ship Theory "

8. Taylor, DA. " Merchant Ship Construction "
9. Schnnekluth, H. " Ship Design for Efficiency and Economy "
10. Smith, R.M. " Applied of Naval Architecture "

17.	Workshop Practice II	4/8	<p><b>Objective:</b> Students are able to operate plate machines and do assembling work, perform piping project especially piping installation in ships. Related to practices of welding, Basic Metal, Tools and other Subjects such as Ship System, Welding, Technical Drawing. They also have knowledge and basic skill about Manual Metal Arc Welding, Manual and Automatic Cutting, SMAW, GMAW and GTAW.</p> <p><b>Course Topics:</b> Marking plate, Cutting Plate, Bending Plate, Joining, Fabrication, Assembling, Cutting pipe, marking pipe, bending pipe (Cool bending pipe); Joining Pipe Installation, OAW : Bead Welding, Plate Welding at 1G, 2G, 3G and 4G positions, Pipe Welding at 1G and 5G positions, Manual Cutting (Gas Cutting), Automatic Cutting (NC Cutting), Plasma Cutting, SMAW : Bead Welding, Plate Welding at 1G, 2G &amp;3G position, GMAW : Plate Welding at 1G &amp;3G position, GTAW : Plate Welding at 1G position, and Pipe welding at 1G position.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Bundensinstitut Fur Berufsbuiding Berlin.</li> <li>2. Industri und Handelskammer PAL Stuttgart.</li> <li>3. Oil and Gas Pipiline Fundamentals by Jhon L. Kennedy</li> </ol>
18.	Computer Aided Design	3/6	<p><b>Objective:</b> Introducing basic Autocad rules and also the way how to use them, introducing additional Autocad rules and the way to use them in order to show the effeciency and effectivity in working, introducing the special rules in 3D drawing and its use.</p> <p><b>Course Topics:</b> Drawing preparation, Drawing instruction, Editing Instruction, supplementary instruction, Display Instruction, Printing Instruction, Block and Attribute Instruction, Screen Operation, File Management, Customizing Menu, Customizing Library, 3D Coordinate System, 3D Drawing Display Instruction, 3D Drawing Instruction, 3D Drawing Printing Instruction.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. AutoCAD, AutoDesk Inc</li> <li>2. 3D Studio, AutoDesk Inc.</li> <li>3. Electric Image Animation System, Electric Image Inc.</li> <li>4. FormZ, Auto-des-sys</li> </ol>
19.	Ship Construction	2/4	<p><b>Objective:</b> Students are able to understand parts of ship construction and also determine profile size and ship plate based on BKI VOL II classification.</p> <p><b>Course Topics:</b> General explanation about construction and evaluation system, Ship types, parts of Ship construction, Bending Load, Construction Types, external load, Internal Load, single layer Construction, Double layer Construction, Board Construction, Deck, Insulator, Cantilever, Plate, Main Engine Fondation and Hatch treshhold.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Taylor , DA , " Merchant Ship Construction "</li> <li>2. Robert Togart ( 1980 ) , " Ship design and Construction "</li> <li>3. Barabanov , N , " Structural Design Of Sea Going "</li> <li>4. M. Mahfud , Ir MMT, " Konstruksi Kapal "</li> <li>5. Biro Klasifikasi Indonesia , Vol II , Register 2001</li> </ol>
20.	Ship System and Equipment	2/4	<p><b>Objective:</b> Students are able to understand piping system and calculate ship equipment needs.</p> <p><b>Course Topics:</b> Piping system that serves sea water need, fresh water, dirty water, ballast, oil load for tankers, natural and mechanical ventilation system, mooring tools, tether tools, navigation safety system, navigation lights, loading and</p>

discharging tools, hatch cover, stairs, doors and windows, rudder and its machine, pumps and compressor calculation, Isolation and cargo handling.

**References:**

1. D'Smith, Marine Auxiliary Machiner, Butter Worths 1983
2. D'Arca Angelo, Shipdesign and Construction.
3. JP. Dehanan, Ing, Practical Shipbuilding, part B, 1957.
4. Edward P. Georking, Marine Piping Handbook

**21.** Non Ferro Ship 1/2

**Objectives:**

Students are able to explain material requirements for wooden boat and FRP, calculate construction dimension of wooden boat and FRP based on standard rules, explain the stage of wooden boat and FRP building process and also explain the maintenance and repair procedures of wooden boat and FRP.

**Course Topics:**

Introduction, Wood material for ship, wooden boat construction, wooden boat building process, FRP material for FRP ship building, FRP ship construction, FRP Ship building process, and wooden and FRP ship repair.

**References:**

1. Heri S. Bangunan Kapal Non Baja
2. BKI Kayu 1996
3. BKI FRP 1996
4. Martawijaya, Atlas Kayu Indonesia
5. LR Small Craft 1978
6. David, C. How to Build a Wooden Boat
7. Gardner J. Buiding Classic Small Craft
8. Staton T. Osmosis & Glassfiber Yacht Construction
9. ABS Reinforced Plastic Vessel 1978

**22.** NDT Theory

**Objective:**

Students are able to explain the application of non-destructive testing and also know its strength and weakness

**Course Topics:**

Visual Test Penetrant Test, Magnetic Particle Test, Radiography Test and Ultrasonic test.

**References:**

1. Davis, E. Harmer, "The Testing and Inspection of Engineering Materials"
2. ASNT, "Methods of Penetrant Test", "Methods of Magnetic Particle Test", "Methods of Ultrasonic Test" dan "Methods of Radiography"
3. ASTM Standard
4. Diktat Keselamatan dan Kesehatan Kerja
5. NDT Training program "Liquid Penetrant Methode"
6. ASME Sect. V ASME Sect. VIII
7. STANDAR KOMPETENSI NASIONAL
8. NDT Training program "Magnetic Particle Methode"
9. Principles of Magnetic Particle Testing C.E. BETZ
10. ASM Handbook, Atlas of Microstructure

**23.** Welding Technology 3/6

**Objective:**

Students are able to understand kinds of welding process and associated factors, and know how to operate it.

**Course Topics:**

Kinds of welding and cutting process, Welding Metallurgy, welding material, welding position, welding joints, welding defects, welding symbols, how to operate electric arch welding, electric resistant welding, operation of gas welding and soldering/brazing, operating MIG/MAG, TIG welding.

**References:**

1. Prof.Dr.Ir.Harsono., Teknologi pengelasan logam
2. Howard D, Modern Welding Technology

**24.** Mould Loft Practice 2/4

**Objective:**

Students are able to understand definition, function, and scope of loft work, explain marking work for plate and profile of mouldloft work scope and perform



mouldloft work scope including drawing, lofting, signing and marking.

**Course Topics:**

Scope of loft work, Geometrical Expansion , ship drawing on 1:1 scale mould loft, Marking, Expansion of ship flat parts, Expansion of ship curved surface parts, expansion of ship stem and stern and Building jig information.

**References:**

1. Lofting Lambung Kapal, Pramudya Ir, PT. PAL Indonesia
2. Menggambar Mesin ( Takhesi Sato )
3. Boatbuilding Manual,John Atkin
4. Gudgeon Brothers

25. Practice of Naval Architecture 2/4

**Objective:**

Students are able to perform process of : ship linesplan making based on available ship forms, ship weight and balance point calculation based on construction details and inclining test process, ship trim trial, ship stability trial, ship launching process.

**Course Topics:**

Main measurement definition, Basic technique of measurement, Ship offset data, Lines plan drawing, Main parts of ship construction weight component, Ship weight calculation, Ship draught measurement, moment trim measurement, Metacentra (MG) measurement, Ship balance point calculation, Condition I stability calculation, Condition II stability calculation, Condition III stability calculation, Pra-launching calculation, Launching process.

**References:**

1. Arkenbout Schokker, JC. Ir, " The Design of Merchant Ship "
2. Biro Klasifikasi Indonesia, " Register 1998 "
3. G. DE. Rooij, Ir. " Practical Ship Building "
4. Harry Benford, " Naval Architecture for Non-Naval Architects "
5. IMO 1993
6. Lloyd Register of Shipping Cargo Ships, " Distribution of Light Weight for Still Water Bending Moment Calculation "
7. Poehls, I. " Lecture of Ship Design and Ship Theory "
8. Schnnekluth, H. " Ship Design for Efficiency and Economy "
9. Smith, R.M. " Applied of Naval Architecture "
10. Taylor, DA. " Merchant Ship Construction "

26. Design Assignment I 7/14

**Objective:**

Students are able to explain and design lines plan drawing, Hydrostatic graph shape, bonjean and also ship general plan drawing.

**Course Topics:**

Determining ship main size, Designing CSA, shape control, station shape, projecting water lines cutting shape (halfbreadth plan), projecting sheerplan shape, Hydrostatic Graph, Bonjean Graph, Machine power calculation, and determining the amount and position of waterproof screen, Ship DWT calculation, liquid tanks calculation, Determine ship equipment, design accomodation room and determine navigation equipment.

**References:**

1. Arkenbout Schokker, JC. Ir, " The Design of Merchant Ship "
2. Biro Klasifikasi Indonesia, " Register 1998 "
3. G. DE. Rooij, Ir. " Practical Ship Building "
4. Harry Benford, " Naval Architecture for Non-Naval Architects "
5. IMO 1993
6. Japan International Cooperation Agency (JICA), Basic Design, Maritime Technology and Safety Bureau, Ministry of Transport Overseas Shipbuilding Cooperation Centre, 1991
7. Lloyd Register of Shipping Cargo Ships, " Distribution of Light Weight for Still Water Bending Moment Calculation "
8. Poehls, I. " Lecture of Ship Design and Ship Theory "
9. Schnnekluth, H. " Ship Design for Efficiency and Economy "
10. Smith, R.M. " Applied of Naval Architecture "
11. Taylor, DA. " Merchant Ship Construction "

27. Religion 2/2

**Objectives:**

## Islamic Values

Helping to make students have faithful, devout, virtuous, philosophical and rational thinking and dynamic, long view, cooperate with members of a religious community in developing and using knowledge and technology and also the art for the human and national concerns.

### Course Topics:

Divinity concept in Islam, human essence in Islam, Law, Science and democracy, Moral ethics and characters, Science and technology in Islam, Reconciliation between members of religious community, Madani Society and their welfare, Islamic culture, Islamic Political System.

### References:

1. *Terjemah Al Quran* : Depag RI
2. *Kuliah Al Islam* : T.PAI ITS
3. *PAI di PTK* : Depag RI
4. *Moral dan Kognisi Islam* : Muslim Nurdin
5. *Karakteristik Islam* : Yusuf Qordowi
6. *Islam dan Pluralitas* : M Imarah
7. *Cita-cita Politik Islam* : Nurcholikh Majid
8. *Etika Islam* : Hamzah Ya'qub
9. *Filsafat Islam* : M Rasyidi

## Christian

2/2

### Objectives:

Completing human so that they can grow and create themselves as the new creation of Jesus Christ, between human and environment. Willing to devote their lives for other concerns in every aspects and life field in which they serve to respect and the glory of Allah.

### Course Topics:

The awareness to live religiously in human life, the meaning of Faith (confession, divine revelation, witness), Religions phenomenology (the similarity and difference of meaning), Religion and Pancasila, Human as Allah's map (human should be responsible, human as the God will's bearer), the relation between human and science, the meaning of God's laws and the call duty for society and nation life.

### References:

1. Lembaga Alkitab Indonesia, *Alkitab*.
2. Dr. Franz Dahler, *Masalah agama*.
3. Dr. Honig, *Ilmu Agama*.
4. Dr. Bleeker, *Pertemuan Agama Dunia*.
5. Dr. Schuman Olaf, *Dialog Antar Umat Beragama*.
6. Dr. Walter Lempp, *Mahasiswa Bertanggungjawab*.
7. Dr. Walter Lempp, *Membangun Manusia Pembangunan*.
8. Dr. H. Hadiwijono, *Iman Kristen*.
9. Malcon Brownly, M. Th, *Pengambilan Keputusan Etis*.
10. Dr. DC Mulder, *Iman Kristen dan Ilmu Pengetahuan*.
11. Sularso Sopater, *Iman Kristen dan Ilmu Pengetahuan*.

## Catholic

2/2

### Objectives:

The increase understanding of faith concept in Church, Life in church and society in developing attitudes and personality as catholic that can prove their faith for the sake of Indonesian society.

### Course Topics:

Church Faith, Church as the safety sacrament, Church decision, human responsibility as the church member, the service church, leadership in Church.

### References:

1. R. Hadiwijono Sy, *Membina Jemaat Beriman*, Jakarta : Dopken MAWI.
2. Y. Riberu, *Ilham bagi para pengilham*, Jakarta, Penerbit Luseat.
3. Thom Yakobs, *Dinamika Gereja*, Jogjakarte : Yayasan Canisius.
4. A.P. Budiyo, *Mendalami Kitab Suci Dalam Kelompok dengan 30 orang*, Yogyakarta Yayasan Canisius

## Hinduism

2/2

### Objectives:

Firm understanding and comprehension of religion, strengthen the faith and worship as hindustan to Sang Hyang Widhi Wasa (God) so that they can control themselves in thinking, speaking, and behaving to our nation and UUD 1945,

support National development and achieve human life objectives.

**Course Topics:**

The history of Hindu, the source of hindu, scope, Mawa Darsana, Tantrayanam, Panca Sradha Tattwa, Catur Marga Yoga pranata Sosial, Kala Dharma, Dharmada, Budhisatewa and reconciliation concept.

**References:**

1. Sosiologi Hindu Dharma.
2. Pengantar Agama Hindu I, II.
3. Theologi Hindu.
4. P4 dan Agama Hindu.
5. Kepemimpinan Hindu

Buddhism

2/2

**Objectives:**

Understand, comprehend and also apply the first principle of Pancasila, Dharma and worshipping to strengthen faith (saddha) in keeping the life of religion and nation based on Pancasila and UUD 1945.

**Course Topics:**

The essence of God, The concept of religious life, Budhisatwa and Budha

**References:**

1. Oka Diputhera, *Citra Agama Budha dalam filsafat Pancasila*.
2. Departemen Agama RI, *Pedoman Pelaksanaan P4 bagi Agama Budha*.
3. Proyek Pengadaan Kitab Suci Budha, *Dhammapada*.
4. Bhikku Kheniyo, *Pancasila dan Panca dharma*

28.

Indonesian Values and Ideology

2/2

**Objectives:**

Students are able to have comprehensive concept and able to make an integral approach in social, economic, politic, defence and culture problem solving.

**Course Topics:**

The characteristic and essence of state science, theory of state formation, Theory of state objectives, Form of government, Countries relation, Countries association, History of Indonesian defence, Civic history of Indonesian republic, the archipelago concept, National defence, GBHN (Broad Outlines of the Nation's Direction) and Repelita ( Five-year Development Plan).

**References:**

1. Mr..M. Hutahuruk, dkk, Civics, P dan K Jakarta 1960.
2. Prof. Mr.M. Nasroen, *Asal Ilmu Negara*, Aksara, Jakarta 1986.
3. Darji Darmodiharjo, *Pancasila Sumber Dari Segala Sumber Hukum*, Unibraw Malang 1982.
4. Suhino,SH, *Sejarah Ketatanegaraan Indonesia*, Leberty, Jogjakarta, 1984.
5. Hasan Zainuri,SH., *Pengantar Hukum Tata Negara*, Alumni, Bandung 1992.
6. GBHN, 1988-1993. Tap MPR No. II/MPR/1988, Sinar Grafika, Jakarta 1988

29.

Indonesian Language

2/4

**Objectives:**

Students are able to use and communicate Indonesian language well and correct its grammar, and also able to apply it into scientific writing.

**Course Topics:**

Grammar matters, the use of vocabulary/ terminology, effective sentences and linguistic styles, reasoning/ expressing idea, sentence formation, theme, topic, composition objectives, composition organization and presentation, the mechanic of scientific composition, general cover, other mechanical source (EYD and PUPI).

**References:**

1. Kamus besar bahasa Indonesia , Jakarta: Balai Pustaka, c1990
2. Pedoman penulisan tata bahasa Indonesia Jakarta : Pusat Pembinaan dan Pengembangan bahasa - Depdikbud, 1983
3. Pemakaian bahasa Indonesia ragam tulis di lingkungan perguruan tinggi Martin Jakarta: Pusat Pembinaan dan Pengembangan Bahasa Depdikbud, 1995

30.

Ship Electrical System

1/2

**Objective:**

Students are able to understand basic theory, electrical machine calculation, and its application.

**Course Topics:**

DC series, AC series, DC motor, AC motor, Calculating motor power, 3 phase alternator(generator), synchronization, parallel, 1 phase motor, their application in ship electrical field.

**References:**

1. Benkovsky, et all, Technology of Ship Repairing, MIR,Publisher, Moscow.
2. Broto Sasongko, Reparasi Kapal, Diktat FT Kelautan ITS, 1972
3. Outline of Shipbuilding in Tamano, Shipbuilding Factory, Mitsui Heavy Industries, Japan

31. Non Metal Practice 2/4

**Objective:**

Students are able to build wooden and FRP ship based on the determined design.

**Course Topics:**

Tools operation practice, wooden ship lofting, shipboard construction building, shipboard construction set up, shipboard assembly and finishing.

**References:**

1. Heri S. Bangunan Kapal Non Baja
2. David, C. How to Build a Wooden Boat
3. Gardner J. Buiding Classic Small Craft

32. Design Assigment II 6/12

**Objective:**

Students are able to understand transversal, combined, longitudinal construction system of steel ship, to draw it lengthwise, cross cutting. They are able to understand how to draw shell expansion and understand steering wheel construction and also draw it on ship stern.

**Course Topics:**

Ship Cross Construction drawing, Cross construction drawing of cargo space on the ship ribs, Cross construction drawing of cargo space on the cantilever of hatchway, Construction drawing on the crossing layer of cargo space or watertight bulkhead, Cross construction drawing of cargo space on the hatch end coming, Cross construction drawing of engine room on the big ribs of main engine foundation.

Construction drawing of longitudinal view in ship: drawing of longitudinal point and cutting in specific scales, upper point drawing of main deck in specific scales, upper point drawing of base construction in specific scales, longitudinal cutting drawing on centre line, longitudinal drawing of ship in vertical view, upper point drawing of poop deck, Boat deck, Lower Bridge deck, Upper Bridge Deck, Navigation Bridge Deck, Top Deck and Fore Castle Deck in spesific scales.

Shell expansion Drawing and Construction Drawing of ship rudder.

**References:**

1. Ship design and construction editor Robert Taggart
2. BKI volume II
3. Drafting for industry oleh Walter C Brown

33. Welding Practice I 4/8

**Objective:**

Students are able to understand and apply Work and Safety procedures, welding procedures, SMAW and OAW welding standard.

**Course Topics:**

Welding Work Health and Safety, the equipment of OAW and SMAW welding, plate 1 surface thickening by OAW, plate 2 surface thickening (weaving) by OAW, 1G butt weld joint by OAW, 1F hook scarf joint by OAW (inner and outside), plate 1 surface thickening by SMAW, plate 2 surface thickening (swing) by SMAW, 1G butt weld joint by SMAW, 1F hook scarf joint by SMAW (inner and outside).

**References:**

1. W, harsono, Okumura, tashie, Teknologi Pengelasan logam, pradnya Paramita, Jakrta, 1994
2. Carry, Howard B, Modern welding Technology, Prentice hall, California,

1989

3. Kobelco, Fundamental of welding and inspection, Kobe steel Ltd.
4. Witjaksono, Untung, Las busur manual, TEDC, Bandung

34. Material Testing Practice 2/4

**Objective:**

Students are able to test mechanical characteristic of material ( load, tensile strength, elongation, contraction, modulus of elasticity) and also able to test welding in order to know the quality by using destructive Test and non-destructive Test.

**Course Topics:**

Destructive Test; Tensile Test, Impact Test, Hardness Test, Macro Etsa Test, fracture Test; Non Destructive Test : Visual Test, magnetic, Ultrasonic, radiography (X-ray), Dye penetrant

**References:**

1. Measurement of mechanical properties.
2. Testing and inspection of Engineering Materials.
3. Non Destructive Testing, Barry, Hull, Vermanjau

35. On the Job Training 13/30

**Objectives:**

Increasing students' horizon about technology application in industry or shipyard based on the knowledge learned at campus.

**Course Topics:**

Industrial management, occupational health and safety, PPC, field work including designing welding mechanic, repair, measurement, examinations, and reporting.

**References:**

1. K. Sumakmur P, "Keselamatan Kerja dan Pencegahan Kecelakaan", Gunung Agung Jakarta.
2. Sofyan Assantri, "Manajemen Produksi", UI, 1978  
Ishikanta Kamru, "Pedoman dan Pengendalian Mutu", Alih Bahasa Hasil tamsil 1983

36. Material Handling Equipment 1/2

**Objective:**

Students understand many kinds of equipment to move and lift material, know how to operate and use them.

**Course Topics:**

Various of material movement including its mechanism, equipment components, construction of the equipment, and kinds of material transfer equipment

**References:**

1. Apple, Houres, Plant Put and Material Handling, edisi ke-3 Jhon Wilwy & Sons, Agustus 1977.
2. Fred, a. Aunent; Elevator, Electrical and Electro Hidralic Elevator, Escalator, Moving Sidewolks

37. Ship Inspection 1/2

**Objective:**

Students are able to understand and perform the inspection of ship building process based on the classification requirements.

**Course Topics:**

Fabrication shop, Sub Assembly shop, Assembly stage, Block blasting shop, Erection stage and pre launching inspection

**References:**

1. JSQS
2. BKI
3. SKKB PT. Pal Surabaya

38. Shipbuilding Technology 2/4

**Objectives:**

Students are able to understand the design and process of building a new ship including sea-trial, and also understand dock facilities.

**Course Topics:**

Kinds and characteristics of dock including the facilities, Ship construction method, New ship construction process (including PPC), ship interior, painting, launching, inspection procedures, sea trial.

**References:**

1. Dormindontov, .V.K., Shipbuilding Technology, MIR Publisher, Moskow
2. Schlott, H.W., Shipyard Plan Lay Out, Diktat Kuliah FT Kelautan ITS 1985References:

39.	Entrepreneurship	1/2	<p><b>Objective:</b> Students are able to understand entrepreneurship principles and apply them well.</p> <p><b>Course Topics</b> Entrepreneurship principles, the differences of entrepreneur and intra preneur, establishing entrepreneur spirit, entrepreneur strategy, thoughts and ideas, works and creativity, designing and running a business, designing and running capital, project visibility, good relationship and marketing techniques.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Hodges, Judy, "The Rise of The Self Service Employee", Computer world HR Online, September 8, 1997.</li> <li>2. O' Brien, Houres A., Management Information System, 4<sup>th</sup> Edition, By The Mc Graw-Hill Companies, North America, 1999</li> </ol>
40.	Engineering Economics	1/2	<p><b>Objective:</b> Students understand the economic principles with its project cost and implementation</p> <p><b>Course Topics:</b> Students understand the economic principles with its project cost and implementation</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Buxton I.L., Engineering Economics and Ship Design, 3<sup>rd</sup> Edition, British Maritime Technology, 1989.</li> <li>2. Djojohadi Kusumo Sumitro, Ekonomi Pembangunan LP3ES, JKT.</li> <li>3. PEDC CN, Ekonomi Teknik, Bandung, 1988.</li> <li>4. DeGarmo, E.P., Canada, J.R. Sullivan, W.G, EngineeringEconomy, 6<sup>th</sup> edition,Mac Millan Publishing Company Inc., New York, 1979</li> </ol>
41.	Welding Practice II	3/6	<p><b>Objective:</b> Students are able to understand, apply occupational Health and Safety, Welding procedure and perform special welding.</p> <p><b>Course Topics:</b> Welding occupational Health and Safety, Equipment and Tools of FCAW, TIG, GMAW, GTAW, SAW, MIG / MAG welding.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. W, harsono, Okumura, Teknologi Pengelasan logam, pradnya Paramita, Jakarta, 1994</li> <li>2. Carry, Howard B, Modern welding Technology, Prentice hall, California, 1989</li> <li>3. Kobelco, Fundamental of welding and inspection, Kobe steel Ltd.</li> <li>4. Witjaksono, Untung, Las busur manual, TEDC, Bandung</li> </ol>
42.	Project Work	5/10	<p><b>Objective:</b> Students are able to apply knowledge learned during their study, design, analyze, evaluate and solve problems in shipbuilding engineering scope.</p> <p><b>Course Topics:</b> Enrichment material in Design Assignment I, II, III, IV, V and VI, writing scientific paper including design and transportation, construction and strength, and ship production techniques.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Relevant literatures</li> </ol>