

D3 Marine Electrical Engineering

Semester I					Semester II				
No	CODE	COURSES	CRD	HRS	No	CODE	COURSES	CRD	HRS
1	604102B	English I	2	2	1	604103B	English II	2	2
2	604105B	Indonesian Language	2	2	2	604202B	Computer Aided Drawing	2	4
3	604201B	Engineering Drawing	2	4	3	604209B	Applied Mathematic II	2	4
4	604203B	Electrical Circuit (+Instrumentation)	3	6	4	604304B	Electronics	3	6
5	604205B	Basic of Naval Architecture	2	4	5	604210B	Ship Equipments and System	2	4
6	604207B	Applied Physics I	2	4	6	604403B	Practical : Electrical Circuit	2	4
7	604208B	Material Engineering	1	2	7	604404B	Practical : Mechanical Engineering	2	4
8	604209B	Applied Mathematic I	2	4	8	604406B	Practical : Physics	2	4
9	604402B	Occupational Health and Safety	2	4	9	604409B	Computer II	2	4
10	604408B	Computer I	2	4					
TOTAL			20	36	TOTAL			19	36

Semester III					Semester IV				
No	CODE	COURSES	CRD	HRS	No	CODE	COURSES	CRD	HRS
1	604101B	Religious Study	2	2	1	604106B	Indonesian Values and Ideology	2	2
2	604206B	Basic Marine Engineering	1	2	2	604310B	Navigation Techniques	2	4
3	604301B	Law and Regulation	1	2	3	604309B	Setting System in the Ship	2	4
4	604211B	Electromagnetic Fields	1	2	4	604302B	Marine Power Plant	1	2
5	604303B	Power Distribution and Protection	2	4	5	604306B	Microprocessors & Microcontroller	1	2
6	604305B	Electrical Installation	5	10	6	604307B	Electric Propulsion	2	4
7	604308B	Maintenance of Electric Machines	3	6	7	604416B	practical : PLC	3	6
8	604413B	Pneumatic & Hydraulic Engineering	2	4	8	604407B	Practical Electrical Installation	3	6
9	604405B	Electronics	2	4	9	604412B	Practical Maintenance Electrical Machines	3	6
TOTAL			19	36	TOTAL			19	36

Semester V					Semester VI				
No	CODE	COURSES	CRD	HRS	No	CODE	COURSES	CRD	HRS
1	604410B	Motor Control and Protection	2	4	1	604502B	On the Job Training	13	30
2	604415B	Practical : Marine Power Plant	2	4	2	604503B	Field Project	5	10
3	604411B	Practical : Control Engineering	4	8					
4	604414B	Practical : Electrical Drive	4	8					
5	604107B	Personality	1	2					
6	604104B	English III	2	2					
7	604501B	Energy Management	2	4					
8	604401B	Enterpreneurship + Industrial Management	1	2					
9	604204B	Methodology of Scientific Writing	1	2					
TOTAL			19	36	TOTAL			18	40

SYLLABUS

No.	COURSE TITLE	CREDITS/ HOURS	Objectives/Course Topics/References
1.	English I	2/2	<p>Objective: Students are able to understand English grammar and discourse.</p> <p>Course Topics:</p> <ul style="list-style-type: none"> • Simple Reading and Writing • Reading manual instruction of safety equipments and documents • Reading Article especially in the field of shipbuilding • Create a summary. <p>References:</p> <ol style="list-style-type: none"> 1. Alexander, L. G., <i>Practice and Progress</i>, Yogyakarta, Kanisius. 2. Alexander, L. G., <i>Developing Skills</i>, Yogyakarta, Kanisius. 3. Bloemendal, M.G. 4. Hutchinson, Tom and Walters, Alan, <i>Interface : English for Technical Communication</i>. 5. Blakey , T.N., <i>English for Maritime Studies</i>, Oxford, Pergamon Press. 6. Subandi, <i>English Conversation on Shipping Business</i>, Jakarta, Arcan. 7. Donovan, Peter, <i>Basic English for Science</i>, Oxford Univ. Press.
2.	Indonesian Language	2/2	<p>Objectives: Students are able to prepare technical reports and scientific essay writing using Indonesian language standard.</p> <p>Course Topics:</p> <ul style="list-style-type: none"> • Public Briefing • Technical Report includes definition, purpose, type, language • Scientific Writing includes understanding, systematics, style and elements of writing. <p>References:</p> <ol style="list-style-type: none"> 1. Arifin, E. Zaenal, <i>Bahasa yang Lugas dalam Laporan Teknis</i>,

Jakarta, Akademika Pressindo, 1993.

2. Gorys Keraf, Prof. Dr., *Tata Bahasa Indonesia*, Cetakan XV, Penerbit Nusa Indah, 1996.

3.	Engineering Drawing	2/4	<p>Objectives: Students are able to create and read working drawing plan according to ISO standard images as well as making information precisely and objectively.</p> <p>Course Topics:</p> <ul style="list-style-type: none">• Picture Function• Introduction to drawing tools, standardization, geometrical constructions, orthographic projections• Visualization• Cutting Principle• Appointment• Tolerance• Aperture• Isometric Figure• Ship Plan Figure <p>References:</p> <ol style="list-style-type: none">1. PEDC, <i>Gambar Teknik</i>, 1984.2. Verren J. Huzadden, P. E., <i>Menggambar Teknik</i>, alih bahasa oleh Hendarsi, H. Erlangga Jakarta, Edisi ke 8, 1986.3. Sato G.T. dan Hartanto N.S., <i>Menggambar Mesin menurut Standar ISO</i>, PT. Pradaya Paramita Jakarta, 1983.
4.	Electrical circuit (electrical circuit + Instrumentation)	3/6	<p>Objectives: Students are able to know and understand the legal concepts and electrical systems.</p> <p>Course Topics:</p> <ul style="list-style-type: none">• Linear and non-linear resistors• Series and parallel resistors relation• Combination of series and parallel circuits• Superposition theorem• Thevenin and Norton theorem. <p>References:</p> <ol style="list-style-type: none">1. A. E. Fitzgerald, David E. H., <i>Basic Electrical Engineering</i>, 1975.2. A. R. Margunadi, <i>Dasar-dasar Teori Rangkaian</i>.3. Howard H. Gerrish, William E. Dugger, <i>Exploring Electricity and Electronics</i>, 1981.4. William H. Hyat, The Houw Liong Ph.D., <i>Elektromagnetika Teknologi Jilid I</i>, 1982.5. Grafe Loss Kuhn, <i>Grundlagen der Elektrotechnik</i>, Band I, 1989.6. GTZ GmbH., <i>Electrical Engineering Basic Technology</i>.
5.	Basic of Naval Architecture	2/4	<p>Objectives: Students are able to know and understand the types of ships, terms related to shipbuilding theory, general plan of the ship, the basic construction of ships and shipyard facilities.</p> <p>Course Topics:</p> <ul style="list-style-type: none">• Types of vessel• The terms in the theory of shipbuilding• Master plan ship• Construction of the shipyard. <p>References:</p> <ol style="list-style-type: none">1. Baxter, <i>Naval Architecture</i>.2. J. Eyres, <i>Ship Construction</i>, FRINA, 1978.3. TK-ITS, <i>Kamus Istilah Teknik Perkapalan</i>.
6.	Applied Physics	2/4	<p>Objectives:</p>

Students are able to understand the concepts of physics, basic electricity (physics), then apply them to solve engineering problems.

Course Topics:

- Unit system
- Vector
- Electrostatics
- Electric current
- Magnetic field
- Inductance
- Spectrum of electromagnetic waves
- Core of physics
- Kinematics and dynamics of particles
- Work and energy
- Impulse and momentum
- Dynamics of rotation
- Equilibrium
- Fluid Statics
- Fluid Dynamics
- Heat
- Theory of Gas Kinetic
- Sound
- Light

References:

1. Halliday-Resnick, *Fundamental of Physics*.
2. Alonso-Finn, *Fundamental University Physics*.
3. Lecturer in Physics FMIPA-ITS, *Modul Fisika I & II*.

7. Material Technology 1/2

Objectives:

Students are able to understand, explain and select the types and properties of engineering materials in the field of engineering in general and electricity in particular.

Course Topics:

- Classification of engineering materials
- Ferrous Metal
- nonferrous metal
- non-metallic material
- Composite material
- Insulating material
- Conductor material
- Semi-conductor material
- Super conductor material
- Magnetic material.
- Organic materials
- Synthetic material
- Solar cells material

References:

1. Higgins R. A., *Material for Engineer Technicians*.
2. Tareev B. M., *Material for Engineering*, Higher School Publish Moscow.
3. JohnVernon B., *Introduction to Engineering Materials*, London Inc., 1979.
4. H. Hubscher, J. Klaue, W. Pfluger. S. Appelt, *Electrical Engineering Basic Technology*.

8. Applied Mathematics 2/4

Objectives:

Students are able understand the foundations of mathematics, particularly matrix algebra, vector and probability in solving engineering problem.

Course Topics:

- Matrix algebra

- Determinants
- Vector algebra
- Vector Analysis
- Numbers of complex
- Absolute value, inequalities and graphing equations
- Function
- Limit function
- Polar Coordinates
- Continuity
- Derivatives
- Derivative function
- Trigonometric Function
- Geometric Analysis

References:

1. Edwin Kreyzig, *Advance Engineering Mathematics*.
2. Bird and May, *Mathematics for Electrical Technicians*.
3. W. L. Baily & T. Shioda, *Complex Analysis and Algebraic Geometry*.
4. Edwin J. Purcell, *Calculus with Analytic Geometry, 4th edition*, Prentice Hall Inc., 1984.
5. Lecturers in Mathematic FMIPA-ITS, *Matematika I*.

9. Occupational Health and Safety 2/4

Objectives:

Objectives:

1. To comprehend and implement health and safety in the workplace (workshop, laboratory or on board)
2. To understand the ways of self-rescue in an accident due to electricity
3. To understand safety legislation as well as *Pancasila* Industrial Relations

Course Topics:

- Humans as the subject of work, as object of work injury and its prevention.
- Work motivation and safety.
- Regulation about safety.
- Safety on Fire field work.
- Safety on pressure vessel field.
- Safety on lift aircraft areas.
- Safety of the electrical field.
- Safety on working with hazardous materials.
- Safety at the company.
- Introduction to *Pancasila* Industrial Relations (PIR).

References:

1. K. Sumakmur P., *Keselamatan Kerja dan Pencegahan Kecelakaan*, Gunung Agung, Jakarta.
2. Blake R.P. , *Industrial Safety*, Englewood Cliffs N.J. , Prentice Hall Inc. 1963.
3. De Reamer R, *Modern Safety Practices*, Newyork, John Willey & Sons Inc, 1958

10. Computer I (Practical)

Objectives:

Students are able to use computer as a tool for word and data processing and be able to make a simple program using the programming language (BASIC) properly.

Course Topics:

- Introduction to computers
- Information and data
- Software
- Hardware
- Representation of data

- Computer Architecture
- Word Exploring (Word processing, Microsoft Word)
- Spreadsheet
- Data base
- Windows Application
- Utility program
- Basic programming with BASIC.

References:

1. Parker, *Introduction to Data Processing, Understanding Today & Tomorrow.*
2. Januar Hakim dkk., *Mengenal Chi Writer, Pengolah Kata Multifon untuk rumus matematika Naskah Ilmiah dan bahasa Asing,* Pustaka Bandung, 1988.
3. Chandra Husnan, *Menggunakan Microsoft Windows 3.1,* Elex Media Komputindo, 1992.
4. Yogianto HM, *Teori dan Aplikasi Program Komputer Bahasa BASIC.*
5. Kris Jamsa, *Dos The Complete Reference.*

11. English II

Objectives:

To understand simple English discourse (oral and written) especially in the field of engineering and general maritime.

Course Topics:

- Daily conversation (greeting, introduction, daily activities, requesting, agreeing-disagreeing, etc.)
- Describe the characteristics and position of objects
- Comparing the characteristics and position of objects
- Filling out a simple form.

References:

1. Alexander, LG. *Practice and Progress*
2. Alexander, LG. *Developing Skills*
3. Richards, JC and Bycina, David. *Person to person : Communicate Speaking and listening skills.* Oxford University Press
4. Curry Dean. *Everyday conversation 2.* Jakarta : PT Gramedia Pustaka Utama
5. Blakey, TN. *English for Maritime Studies*

12. Electronics

3/6

Objectives:

Students are able to understand basics of electronics as well as explain the working principle of electronic components, its applications and basic circuit calculation.

Course Topics:

- Stabilization of Z-diode voltage
- Bipolar transistor Circuit
- FET and MOSFET
- Transistor as a switch
- Theory of elementary number and its conversion
- Logic gates
- Establishment of logic functions
- Simplification of logic functions (Boolean algebra, Karnough Map and Quin McCluskey)
- Implementation of logic functions.

References:

1. A. E. Fitzgerald Sc.D., David E. Higginbotham S. M., Arvin Gabel Sc.D., *Basic Electrical Engineering,* 1975.
2. Milman & Halkias, *Integrated Electronics,* Mac Graw Hill Inc., 1971.
3. Malvino, *Semiconductor Circuit Approximations,* Mac Graw Hill Inc., 1985.
4. Grafe Loss Kuhn, *Grundlagen der Elektrotechnik, Band I,* 1989. R. J. Tooci, *Digital System,* Prentice Hall, 1988.

5. M. Morris Mano, *Digital Design*, Prentice Hall, 1984.
6. T. L. Floyd, *Digital Fundamentals*, Maxwell Macmillan, 1990.

13. Ship Systems and Equipment 2/4

Objectives:

Students are able to understand and determine the need for tools supporting vessel system.

Course Topics:

- Pipe Systems
- Valves
- Filter
- Pump
- Freshwater Systems
- Sea water system
- Ballast system
- The system of oil cargo
- Ventilation system
- Fuel system
- Lubricating oil system
- Refrigeration

References:

1. D. Smith, *Marine Auxiliary Machinery*, Butterworths, 1983.
2. D. Arca Angelo, *Ship Design and Construction*.
3. M. Khetagurov, *Marine Auxiliary Machine and System*.
4. J. P. Dehaan, *Practical Shipbuilding*, Part B, 1961.

14. Electrical Circuit Practical (Electric circuit + Instrumentation) 2/4

Objectives:

Students are able to comprehend the legal concepts and electrical systems.

Course Topics:

- Linear and non-linear resistors
- Series and parallel resistors relation
- Series and parallel circuits combination
- Superposition Theorem
- Thevenin and Norton Theorem

References:

1. A. E. Fitzgerald, David E. H., *Basic Electrical Engineering*, 1975.
2. A. R. Margunadi, *Dasar-dasar Teori Rangkaian*.
3. Howard H. Gerrish, William E. Dugger, *Exploring Electricity and Electronics*, 1981.
4. William H. Hyat, The Houw Liong Ph.D., *Elektromagnetika Teknologi Jilid I*, 1982.
5. Grafe Loss Kuhn, *Grundlagen der Elektrotechnik*, Band I, 1989.
6. GTZ GmbH., *Electrical Engineering Basic Technology*.

15. Mechanical Engineering Practical 2/4

Objectives:

Students are able to comprehend the operation of machinery tools, electric welding machine, spot welding machine. Student are able to know how to use a mechanical gauge precisely, accurately and efficiently.

Course Topics:

- System knowledge and accurate measurements
- Layout
- Workbench
- Sheet metal
- Metal flakes and lubricating oil
- Drill Machine (drill press)
- Work planning
- Sawing Machine
- Lathes
- Trim machine

- Scrap machine
- grinding machine
- electric welding machine
- spot welding machine

References:

1. *Metalwork Technology and Practice*, Ludwig, Oswald Amand/Mc.Knight.
2. *Machine Tool Operation*, Krar, Oswald, St. Amand/Mc.Graw Hill.
3. *All About Machine Tools H*, Gerling.
4. *Pengerjaan Logam DGW Mesin*, Alowz Sctcnements.
5. *Westerman Tbles* PSM-ITB.
6. *Tool Design Construction* PMS-ITB.

16. Physics (Practical)

2/4

Objectives:

Students are able to comprehend and explain physical phenomena in nature such as the dynamics of motion, heat and electric induction.

Course Topics:

- Motion on inclined plane
- Centrifugal force
- Pulley systems
- Circular motion on the wheel
- Inertia Moment
- Earth gravity acceleration
- Earth gravity acceleration with a physical pendulum
- Calorimetry
- Archimedes Law
- Transformator

References:

1. Halliday-Resnick, *Fundamental of Physics*.
2. Alonso-Finn, *Fundamental University Physics*.
3. Lecturers in Physics- FMIPA-ITS, Diktat Fisika I & II.

17. Computer II (Practical)

2/4

Objectives:

Students are able to comprehend and implement skills of programming using Visual Basic language for data processing through the creation of an application program is good and right.

Course Topics:

- Review of *Computer I*
- Box Dialog
- Menu
- Database
- File Management
- Integration with other applications
- Creating a database application

References:

1. Peter Norton's, *Guide to Visual Basic 6*, SAMS Publishing, 1998.
2. Richard Mansfield, *Panduan Berilustrasi Visual Basic dalam Aplikasi*, Dinastindo, Jakarta, 1995.
3. Djoko Pramono, *Mudah Mengenal Visual Basic 6*, Elex Media Komputindo, Jakarta, 1998.

18. Islamic Values

Objectives:

Students are able to understand, believe, and practice islamic values in everyday life.

Course Topics:

- The role of religion in life
- Islamic concept of God, the Book of Allah, the Prophet, Judgement Day, the universe
- Islamic prospective about people
- The basic principles of science and technology development.

- Self Purification, personal and social education, social justice, fasting, Hajj, sources of Islamic Law.
- Morals
- Establishment of a family, the islamic society.
- Research approach in the future.

References:

1. Depag, *Alquran dan terjemahannya*, Bumi Restu, Jakarta 1971.
2. Lecturer of ITS, *Dasar-dasar Agama Islam*.
3. Harun Nasution, *Islam ditinjau dari berbagai aspeknya*, UI Press, Jakarta 1979.
4. Endang Syaifudin A, *Wawasan Islam*, Pustaka Jakarta 1985
5. Zakiyah Darajat, A. Sadali, *Dasar-dasar Agama Islam, Proyek Pembinaan Agama pada Perguruan Tinggi Umum*, Jakarta, 1985.
6. Maurici Bucaille, *Asal-uyusul Manusia menurut Al Qur'an Bibel dan Sains*, Pustaka Jakarta.

19. Protestant

Objectives:

Students are able to understand and become a new creation of Jesus Christ. It is expected that the students can devote the whole of his life and all his scientific work for the benefit of others in all aspects of life and the field of which he/she serves for the honor and glory of God.

Course Topics:

- Awareness of religion in human life.
- The meaning of faith (recognition, revelation, testimony).
- Religion Phenomonology (similarities and differences of understanding).
- Religion and *Pancasila*
- Man as the image of God (man as bearer of God's mandate).
- Human relations and science.
- The meaning of God's law and human's responsibilities for the community and the nation

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 Bertanggung jawab*.
7. Dr. Walter Lempp, *Membangun Manusia Pembangun*.
8. Dr. H. Hadiwijono, Iman Kristen. Malcon Brwonly, M.Th, *Pengambilan Keputusan Etis*.
9. Dr. DC Mulder, *Iman Kristen dan Ilmu Pengetahuan*.
10. Sularso Sopater, *Iman Kristen dan Ilmu Pengetahuan*.
11. Dr.J.Verkuyl, *Etika Kristen*.

20. Catholics

Objectives:

Students are able to improve the understanding of the concept of faith in the Church properly. Adopt church values and society in developing attitudes and mentality of a Catholics that can prove himself to the interests of the people of Indonesia as an expression of faith.

Course Topics:

- Faith of church
- Church as sacraments of salvation
- The decision of the church
- Human responsibility as a member of the church
- Church services
- Leadership in church

References:

1. R. Hadiwiyono Sy, *Membina Jemaat Beriman*, Jakarta : Dokpen MAWI.
2. Y. Riberu, *Ilham bagi para pengilham*, Jakarta, Penerbit Luseat.
3. Thom Yakobs, *Dinamika Gereja*, Yogyakarta : Yayasan Canisius.
4. A.P. Budiyo, *Mendalami Kitab Suci Dalam Kelompok dengan 30 orang*, Yogyakarta : Yayasan Canisius.
5. A.M. Mangunwijaya, *Mengatasi Hambatan-hambatan Kepribadian*, Yogyakarta : Yayasan Canisius.

21. Hinduism

Objectives:

Students are able to understand and appreciate the religious values, reinforce the belief, faith and worship a Hindu to Sang Hyang Widhi Wasa / God, so that they can control their thinking, speaking and acting in the service to nation and society.

Course Topics:

- History of Hinduism
- Sources of Hindu teachings
- The scope, Mawa Darsana
- Tantrayaman, Panca Siadha Tattwa
- Chess Marga Yoga Social institutions
- Kala Dharma, Dharmadaa,
- Budhisatewa and the concept of religious harmony

References:

1. Sociology of Hindu Dharma.
2. Introduction to Hinduism I, II.
3. Hindu Theology.
4. P4 and Hinduism.
5. Hindu leadership.

22. Buddhism

Objectives:

Students are able to understand and practice the precepts belief in God Almighty, Dharma and services to strengthen the faith (sodha) in maintaining the the harmony of life.

Course Topics:

- The nature of God
- The conception of religious harmony
- Budhisatwa and Buddhism.

References:

1. Oka Diputhera, *Citra Agama Budha dalam filsafat Pancasila*.
2. Departemen Agama RI, *Pedoman Pelaksanaan P-4 bagi Agama Budha*.
3. Proyek Pengadaan Kitab Suci Budha, *Dhammapada*.
4. Bhikku kheniyo, *Pancasila dan Pancadharm*.

23. Electromagnetic Fields

2/4

Objectives:

Students are able to comprehend the concepts, and theories and the characteristics of static electric fields related to physical problems in the field of electrical engineering.

Course Topics:

- Review of vector analysis
- Orthogonal coordinate systems
- Static electric field
- Coulomb's law
- The flux and electric flux density
- Gauss's Law and how to get a static electric field
- Energy and electric potency
- Potential Gradient
- Conductors, dielectrics and capacitance
- Potential field mapping
- Poisson and Laplace equation

References:

1. W. H. Hayt, *Engineering Electromagnetics*, McGraw Hill, 1988.
2. Joseph A. Edminister, *Theory and Problem of Electromagnetics*, McGraw Hill, 1979.
3. N. Narayana Naro, *Basic Electromagnetics with applications*, Prentice Hall of India, 1974.

24. Distribution of Electric Power 2/4

Objectives:

Students are able to comprehend and explain the types of electric power distribution, mechanical and electrical calculation, as well as security grid.

Course Topics:

- The concept of power distribution
- Primary and secondary distribution system
- Distribution transformer
- Substation distribution
- Load Calculation
- The basic principles of safety relay
- Overcurrent Relay
- Directional relay (relay directions)
- Differential Relay
- Distance Relay
- Calculation of short-circuit current
- Security
- System unity
- Model the system
- Theory pengetanahan
- Component symmetry.

References:

1. Stevenson W. D., Budiono Mismail, *Analisis Sistem Tenaga*, Malang, 1982.
2. Hutauruk T. S., *Transmisi Daya Listrik*, ITB, Bandung.
3. Upal A. S., *Electrical Power*, Khana Publishers, 1981.
4. A. Aris Munandar, *Teknik Tenaga Listrik*, Jilid II, Jakarta, 1979.
5. The Kansai Electric Power Co. Inc., *Overhead Transmission Lines*.
6. The Kansai Electric Power Co. Inc., *Design of Insulation for Overhead Transmission Lines*.
7. Hutauruk T. S., *Pengetanahan Netral Sistem Tenaga dan Pengetanahan Peralatan*, FTI ITB, 1984.
8. Williem R. & Waters M., *Neutral Grounding in High Voltage Transmission*, Elsevies Publishing Co., Amsterdam, 1956.
9. Sunil S. Rau, *Switchgear and Protection*, New Delhi, 1978.
10. Turan Gonen, *Electric Power Distribution System Engineering*, McGraw Hill, 1986.

25. Electrical Installation (Vessel
Electrical Installation +
Installation plan)

Objectives:

Students are able to comprehend electrical installation and vessels as well as its system.

Course Topics:

- Planning of general electrical installations
- Standards and regulations
- Installation Equipment
- The intensity of illumination
- Dissipation and safety
- Load Calculation
- Installers

References:

1. *Peraturan Umum Instalasi Listrik (PUIL)*, 1987.
2. Biro Kalsifikasi Indonesia, Jilid IV *Peraturan Instalasi Listrik*
3. GA Watson, *Marine Electrical Practice*.

		<p>4. BL Theraja, <i>Electrical Engineering Handbook</i>.</p> <p>5. Setiawan, <i>Instalasi Arus Kuat Jilid 1,2,3</i>.</p> <p>6. Zuhul, <i>Dasar Tenaga Listrik</i></p>
26.	Vessel Electrical Installation I	<p>Objectives: Students are able to comprehend a variety of electrical tools/equipment, basic of power distribution in the vessel.</p> <p>Course Topics:</p> <ul style="list-style-type: none"> • Isolation and temperature rating of the machinery. • Vessel Generator and flat flow switch. • Automatic voltage settings. • Electric motors on board and its application. • Safety Equipment. • Motor controllers Equipment. • Battery and its control equipment. • Distribution and electrical wiring on boat. • Lighting system. • Electric deck Equipment. • Electricity regulations on board <p>References:</p> <ol style="list-style-type: none"> 1. G.O. Watson, <i>Marine Electrical Practice</i>. 2. Zuhul, <i>Dasar Tenaga Listrik</i>. 3. B.L. Teraja, <i>Electrical Engineering Handbook</i>. 4. Biro Klasifikasi Indonesia, Jilid IV.
27.	Maintenance of Electrical Machines (Electrical Engineering + Govt. Machinery Electric)	<p>Objectives: Students are able to comprehend how to maintain and repair electrical machines.</p> <p>Course Topics:</p> <ul style="list-style-type: none"> • Maintenance and repair with damage / disruption to direct current motor • Maintenance and repair with damage / disruption to 1 phase alternating current motor • Maintenance and repair with damage / disruption to 3 phase alternating current motor • Maintenance and repair with damage / disruption on the transformator <p>References:</p> <ol style="list-style-type: none"> 1. <i>Petunjuk praktek listrik tenaga</i>. 2. unknown, <i>Cara memperbaiki dan merawat mesin listrik</i>. 3. F. Soeryatmo, <i>Reparasi Motor-motor Listrik</i>.
28.	Indonesian Values and Ideology	<p>Objectives: Students are able to have a national comprehensive knowledge and have integral approach in addressing the problems of social life, economic, politics, culture, and also defense.</p> <p>Course Topics:</p> <ul style="list-style-type: none"> • The nature of state study • The theory of the state • The purpose and shape of the state • History of the Indonesian independence • History of Republic of Indonesia constitution • Archipelago • National Security • <i>GBHN and Repelita</i> <p>References:</p> <ol style="list-style-type: none"> 1. Mr. M. Hutahuruk, dkk, <i>Civics P dan K Jakarta</i>, 1960 2. Prof. Mr. M. Nasroen, <i>Asal Ilmu Negara</i>, Aksara, Jakarta, 1986 3. Suhino, SH, <i>Sejarah Ketatanegaraan Indonesia</i>, Leberty, Jogyakarta, 1984

4. Hasan Zainuri, SH, *Pengantar Hukum Tata Negara*, Alumni, Bandung 1992

29. Navigation Techniques

Objectives:

Students are able to understand and explain the basic concepts of telecommunications engineering properly.

Course Topics:

- Basic communication system
- Network system
- Telephone
- Diagram of network equivalent
- Characteristic of impedance
- Attenuation
- Reflection
- Matching
- Types of cables
- Meshes Filter
- Types of signal
- Acoustic electro changer (microphone, loudspeaker)
- Phone system on board
- Transmission of electromagnetic waves: the transmitter.
- Antenna and function
- Receiver
- Telegraph systems on board
- Facsimile System on board
- Navigation systems: echo sounding, sonar soundings, radio direction fender, satellite positioning systems
- Autopilot.

References:

1. Roger L. Freeman, *Telecommunication System Engineering*, John Wiley & Son Inc., 2nd Edition, 1989.
2. Shanmugam, K. Sam, *Digital and Analog Communication System*, John Wiley & Son Inc., 1981
3. Theodore S. Rappaport, *Wireless Communications, Principles and Practices*, Prentice Hall Inc., 1996.
4. Pratt & Bostian, *Satellite Communications*, John Willey, 1986.
5. C. A. Balanis, *Antenna Theory, Analysis and Design*, Haper & Row, 1982.
6. Maral, *Satellite Communication System*, John Willey, 1992.

30. Electrical Activator (Activator + Electric Power)

2/4

Objectives:

Students are able to comprehend some method of electric motor setting as well as the relationship between electric motor as a proper activator and load.

Course Topics:

- Leonard Set Methods
- diesel generator set simulation
- Generator DC otto wangkel drive
- AC to AC drive
- AC to DC drive
- The series of power electronics
- Switching and commutation
- Refrigeration
- Static Converters
- The series of static converters for DC equipment
- The series converter for appliances AC 1 phase and 3 phase
- Thyristors
- Triac as power electronics components
- Three-phase six-pulse rectifier Control (B2CH, B2C)
- DC power control with MOSFET

- 1 MC Murry phase Inverter with BJ transistors power.

References:

1. Kingsly C. Ftzgerald A. E., Kusto A., *Electrical Machinery*, McGraw Hill, 1971.
2. Wolfgang Muller, *Electrical Power Engineering Proficiency Course*.
3. Ewar J. D., *Electrical Machinery*, Macmillan Education Ltd., 1986.
4. B.L. Theraja A., *Text Book of Electrical Tehnology*, India, 1980
5. J. R. Penketh, *Electronic Power for Technicians*.
6. Ramshaouw R. S., *Power Electronics Thyristor Controlled for Electric Motor 3 Scaums Out lines Series*, Electric Circuit.

31.	Electrical Installation (Practical)	3/6	<p>Objectives:</p> <ul style="list-style-type: none"> • Students are able to plan, install, test and improve a series of lighting installations. • Students are able to explain and do the work of planning, installation, testing and repair of the distribution and low voltage installation. • Students are able to explain and analyze electrical quantities in a series of lighting installations. <p>Course Topics:</p> <ul style="list-style-type: none"> • A series of single switch, lamp and socket • A series of series switch, lamp and socket • A series of single switch, series, lamp and socket • A series of hotel/exchange switch, lamp and socket • A series of two-pole switch, lamp and socket • A series of cross switch, lamp and socket • Troubleshooting • Safety on lighting installation • Introduction of the component and supporting tools • Calculation of the flow and type of safety • Planning the layout of safety component • Installation of safety components • Testing • Low voltage panel • Analyze single switch, lamp and socket • Analyze series switch, lamp and socket • Analyze single switch, series, lamp and socket • Analyze hotel/exchange switch, lamp and socket • Analyze two-pole switch, lamp and socket • Analyze cross switch, lamp and socket <p>References:</p> <ol style="list-style-type: none"> 1. LIPI, PUIL, Jakarta, 1987. 2. PEDC Bandung, <i>Course Note Bengkel Listrik Semester II, III & IV</i>. 3. Klockner Moeller, <i>Wiring Manual</i>, 1987. 4. <i>Electrical Instalation Handbook Vol. I & II</i>.
32.	Electrical Machinery Maintenance (Practical)	3/6	<p>Objectives:</p> <p>Students are able to comphrent how to maintain and repair electrical machines.</p> <p>Course Topics:</p> <ul style="list-style-type: none"> • Maintenance and repair of direct current motor • Maintenance and repair of 1 phase alternating current motor • Maintenance and repair of 3 phase alternating current motor • Transformator <p>References:</p> <ol style="list-style-type: none"> 1. <i>Petunjuk praktek listrik tenaga</i>. 2. unknown, <i>Cara memperbaiki dan merawat mesin listrik</i>. 3. F. Soeryatmo, <i>Reparasi Motor-motor Listrik</i>.

33.	Motor Control & Protection (Practical)	2/4	<p>Objectives: Students are able to explain and do the work of planning, installation, testing and repair of the motor control panel and protection properly.</p> <p>Course Topics:</p> <ul style="list-style-type: none"> • DOL Systems • Star delta system • Left/Right Automatic Turn • Airblash system • Milling system • Crane System • Safety on electric motor <p>References:</p> <ol style="list-style-type: none"> 1. LIPI, PUIL, Jakarta, 1987. 2. PEDC Bandung, <i>Rancangan Listrik Sem. III & IV</i>, 1986. 3. PEDC Bandung, <i>Course Note Bengkel Listrik Sem. II & VI</i>, 1986. 4. <i>Electrical Instalation Handbook Vol. I & Vol. II</i>.
34.	Electrical Activator –Practical (Activator + Electric Power)		<p>Objectives:</p> <ul style="list-style-type: none"> • Students are able to explain and analyze several methods of electric motor setting as well as the relationship between the electric motor as a proper activator and load. • Students are able to explain and make an introduction to the power electronics and control systems with power electronic. <p>Course Topics:</p> <ul style="list-style-type: none"> • Leonard Set Methods • diesel set simulation generator • Generator DC otto wangkel drive • AC to AC drive • AC to DC drive • single phase two-pulse rectifier (M1) • single phase full wave rectifier (B2) • three-phase three-pulse rectifier (M3) • three-phase six-pulse rectifier (B6) • Control of single-phase two-pulse rectifier (B2CH, B2C) • Control of three-phase three-pulse rectifier (M3C) • Control of three-phase six-pulse rectifier (B6CH, B6C) • 4 quadrant DC drive • Asynchronous steering motor by the inverter with variable voltage and variable frequency (AC Drive variable voltage and variable frequency) • Power controlling of AC 1 phase (W1) • AC Thyristors Controlling of with AC diode • Control with UJT • DC power control with MOSFET • DC Chopper • MC Murry Inverter 1 phase with with BJ Transistor power • Cycloconverter. <p>References:</p> <ol style="list-style-type: none"> 1. Kingsly C. Ftzgerald A. E., Kusto A., <i>Electrical Machinery</i>, McGraw Hill. 1971. 2. Wolfgang Muller, <i>Electrical Power Engineering Proficiency Course</i>. 3. Ewar J. D. <i>Electricak Machinery</i>, Macmillan Education Ltd., 1986. 2. B. L. Theraja A., <i>Text Book of Electrical Tehnology</i>, India, 1980. 3. J. R. Penketh, <i>Electronic Power for Technicians</i>. 4. Ramshaouw R. S., <i>Power Electronics Thyristor Controlled for Electric Motor 3 Scaums Out lines Series</i>, Electric Circuit.
35.	Entrepreneurship (+ Industrial		<p>Objectives:</p>

Management)

Students are able to comprehend and apply business and entrepreneurship.

Course Topics:

- Entrepreneurship Characteristics
- Excavation and idea development
- Business Franchise
- Fundamentals of Marketing
- Asset management
- Organization and general management

References:

1. Geoffrey G. Meredith, *Kewirausahaan*, Pustaka Banaman Pressindo, Jakarta, 1996.
2. Rusman Hakim, *Kiat Sukses Berwiraswasta*, Gramedia, Jakarta, 1998.
3. Silvia Herawaty, *Kewiraswastaan*, IPWI, Jakarta, 1998.
4. Peter F. Drucker, *Kewiraswastaan*, PT. Gelora Aksara Pratama, 1994.

36. Final Project

Objectives:

Students are able to apply their knowledge in the form of a report.

Course Topics:

- Planning and tool creation
- Object/Tools Testing
- Case studies Analysis
- Preparation of reports

References:

Puslit, *Bahan Penataran Metodologi Penelitian*, Pusat Penelitian ITS, Surabaya, 1989.