



# POLITEKNIK PERKAPALAN NEGERI SURABAYA (PPNS)

## SHIPBUILDING INSTITUTE OF POLYTECHNIC SURABAYA

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### D4 AUTOMATION ENGINEERING

SEMESTER I					SEMESTER III				
NO.	CODE	COURSES	CRDT	HRS	NO.	CODE	COURSES	CRDT	HRS
1	609102A	English I	2	2	1	609207A	Ship Machinery Systems	1	2
2	609106A	Indonesian Values and Ideology	2	2	2	609214A	Machine Elements	1	2
3	609201A	Applied Mathematic I	2	4	3	609218A	Control System Design	2	4
4	609203A	Applied Physics I	2	4	4	609219A	Modeling System	2	4
5	609205A	Electrical circuit analysis	2	4	5	609222A	Sensors and Signal Conditioning (+Instrumentation)	2	4
6	609206A	Basic Shipping Techniques	2	4	6	609225A	Microprocessor and microcontroller	2	4
7	609216A	Introduction to Industrial Technology	1	2	7	609301A	Practice : Physics	1	2
8	609217A	Computer Hardware	1	2	8	609304A	Practice : Electronics	3	6
9	609303A	Engineering Drawing (TG.Tek+TG.List)	3	6	9	609305A	Practice: Pneumatic & Hydraulic	2	4
10	609402A	Occupational Health and Safety	3	6	10	609308A	Practice : Electrical Machine	2	4
Total			20	36	Total			18	36
SEMESTER II					SEMESTER IV				
NO.	CODE	COURSES	CRDT	HRS	NO.	CODE	COURSES	CRDT	HRS
1	609103A	English II	3	3	1	609101A	Religious Study	2	2
2	609202A	Applied Mathematic II	2	4	2	609105A	Indonesian Language	2	2
3	609204A	Applied Physics II	1	2	3	609208A	Ship Equipment and System	2	4
4	609209A	Electronics	3	6	4	609210A	Driving Motor	2	4
5	609212A	Pneumatic and Hydraulic Engineering	1	2	5	609221A	Discrete Control System	1	2
6	609213A	Mechanical Engineering	1	2	6	609215A	Introduction to Manufacturing Systems	1	2
7	609302A	Practice: Electrical circuit analysis	2	4	7	609307A	Automation Manufacturing Machine	2	4
8	609306A	Practice: Machine Tools	2	4	8	609316A	Practice : Controlling System	2	4
9	609310A	Ship Drawing	2	4	9	609317A	Practice : Microprocessor and Microcontroller	2	4
10	609311A	Computer Programming	3	6	10	609318A	Practice: Interfacing	2	4
Total			20	37	11	609404A	Industrial Management	2	4
Total			20	37	Total			20	36

SEMESTER V					SEMESTER VII				
NO.	CODE	COURSES	CRDT	HRS	NO.	CODE	COURSES	CRDT	HRS
1	609227A	Automation and Robotics	2	4	1	609501A	On the Job Training	18	40
2	609211A	Research Methodology	1	2					
3	609226A	Intelligent control	2	4					
4	609224A	Protection System	2	4					
5	609223A	Power Plant Control Systems	2	4					
6	609220A	System Optimization	1	2					
7	609319A	PLC	3	6					
8	609309A	Practice : Installation of Electrical Machine	2	4					
9	609312A	Practice : Applied Computer	2	4					
10	609314A	Practice : Discrete Control System	2	4					
	Total		19	38		Total		18	40

SEMESTER VI					SEMESTER VIII				
NO.	CODE	COURSES	CRDT	HRS	NO.	CODE	COURSES	CRDT	HRS
1	609107A	Personality	1	2	1	609104A	Advanced English	3	3
2	609228A	Machine Vision ( + image proc)	3	6	2	609322A	Practice: SCADA	2	4
3	609229A	SCADA	2	4	3	609323A	Particular Assignment	2	4
4	609313A	Practice : Multimedia Networks	2	4	4	609401A	Entrepreneurship	1	2
5	609315A	Practice: Telemetry	2	4	5	609502A	Thesis	6	12
6	609320A	Practice: Troubleshooting PLC	1	2					
7	609321A	Practice : Automation and Robotics	2	4					
8	609403A	Management of information Systems	2	4					
9	609405A	Maintenance Management	2	4					
	Total		17	34		Total		14	25

## SYLLABUS - D4 Automation Engineering

NO.	COURSE TITLE	CREDITS/ HOURS	OBJECTIVE/COURSE TOPICS/REFERENCES
1.	Electrical Circuit Analysis		<p><b>Objectives:</b></p> <ol style="list-style-type: none"> <li>1. To understand the concept of law and the electrical system</li> <li>2. To explain the concept of law and the electrical system</li> <li>3. To explain the characteristic of alternating current circuit for 3 phase balanced and unbalanced load</li> <li>4. To conduct an analysis of the characteristic of alternating current circuit for 3 phase balanced and unbalanced load</li> </ol> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• Linear and non-linear resistors</li> <li>• Link of series and parallel resistors</li> <li>• Combination of series and parallel circuits</li> <li>• Superposition theorem</li> <li>• Thevenin and Norton Theorem</li> <li>• Charging and discharging condensator</li> <li>• Charging and discharging inductor</li> <li>• Complex Impedance</li> <li>• Series and parallel resonance</li> <li>• 3 phase system with balanced and unbalanced load</li> </ul> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. A.E. Fitzgerald, David E.H., <i>Basic Electrical Engineering</i>, 1975.</li> <li>2. A.R. Margunadi, <i>Dasar-dasar Teori Rangkaian</i>.</li> <li>3. Howard H Gerrish, William E. Dugger, <i>Exploring Electricity and Electronics</i>, 1981.</li> </ol>
2.	English I		<p><b>Objectives:</b></p> <p>Students are able to perform everyday conversation and be able to understand a general and specific discourse.</p> <p><b>Course topics:</b></p> <ul style="list-style-type: none"> <li>• Maritime Potential</li> <li>• Action</li> <li>• General Business</li> <li>• Safety</li> <li>• What a story?</li> <li>• Trouble shooting</li> </ul> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Richards &amp; Long, 1985, <i>Breakthrough : A Course in English Communication, Edition: 1, 2, 3</i>, Oxford : Oxford Univ Press.</li> <li>2. Alice Oshima, 1991, <i>Writing Academic English</i>, Addison-Wesley Publishing Company</li> <li>3. Tom Hutchinson, <i>INTERFACE English for Technical Communication</i>, Longman</li> <li>4. TN Blakey, 1983 <i>English for Maritime Studies</i>, Pergamon Press Oxford New York</li> <li>5. Betty Schrampher Azar, <i>Understanding English Grammar</i></li> <li>6. George J. Searles, 2003, <i>Workplace Communications</i>, Pearson Education Inc</li> <li>7. David Bonamy, 2008, <i>Technical English 1</i>, England, Pearson Education Limited</li> <li>8. Bonamy, David. 2008, <i>Technical English 2</i>, England, Pearson Education Limited</li> <li>9. Richard, Jack C. 1997. <i>New Interchange 2</i>. Cambridge University Press.</li> </ol>
3.	Basic Theory of Shipbuilding Engineering	2/4	<p><b>Objectives:</b></p> <p>To understand the terms commonly used in the theory of ship building, plan outline, numerical integration, hydrostatic curves, bonjean curves, and tonage and leak's length.</p>

			<p>To apply or practice drawing board related to theories of ship building.</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• The terms in ship</li> <li>• Method of Numerical Integration</li> <li>• Line Plan</li> <li>• Hydrostatic and Bonjean</li> <li>• Transverse Stability</li> <li>• Elongated Stability</li> <li>• Stability at large angles (above 90°)</li> </ul> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. T. Shanaby, <i>Static and Dynamics of Ship</i></li> <li>2. Van Lammeren, <i>Baouyancy and Dtability of Ship</i></li> <li>3. Van Lammeren, <i>The Design of Merchant Ship.</i></li> </ol>
4.	Applied Physics I	2/4	<p><b>Objective:</b></p> <p>To understand and analyze the concept of theoretical physics</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• Vector</li> <li>• Kinematics</li> <li>• Dynamics of effort and energy</li> <li>• Impulse momentum</li> <li>• Moment of force</li> <li>• Equilibrium</li> <li>• Dynamics of rotation</li> <li>• Fluid Mechanics</li> </ul> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Sears and Zemansky, <i>University Phisycs</i></li> <li>2. Halliday &amp; Resnick, <i>Fisika</i>, Publisher Erlangga 1993</li> </ol>
5.	Computer Hardware	1/2	<p><b>Objectives:</b></p> <p>To know and understand computer hardware principles and its application</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• Computer Working System</li> <li>• CPU Structure</li> <li>• Memory</li> <li>• Data storage Equipment</li> <li>• I/O Principle</li> <li>• BUS System</li> </ul> <p><b>References:</b></p> <p><i>Organisasi Komputer</i>, John Regard P. Wiley, 2003.</p>
6.	Occupational Health and Safety Engineering		<p><b>Objectives:</b></p> <ol style="list-style-type: none"> <li>1. To comprehend and implement health and safety in the workplace (workshop, laboratory or on board)</li> <li>2. To understand health and safety in the workplace (workshop, laboratory or on board)</li> <li>3. To implement safety and health in the workplace (workshop, laboratory or on board)</li> <li>4. To understand the ways of self-rescue in an accident due to electricity</li> <li>5. To understand safety legislation as well as <i>Pancasila</i> Industrial Relations</li> </ol> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• Humans as the subject of work, as object of work injury and its prevention.</li> <li>• Work motivation and safety.</li> <li>• Regulation about safety.</li> <li>• Safety on Fire field work.</li> <li>• Safety on pressure vessel field.</li> <li>• Safety on lift aircraft areas.</li> </ul>

- 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

7. Indonesian Values and Ideology

**Objectives:**

To understand and implement national education and also defense (PPBN)

**Course Topics:**

Rights and obligations

Democracy

Human rights

Archipelago Knowledge

The concept of national security

Politics and national strategy

Defense Law

Role of Indonesia in international relations

Internalization of values of struggle in order to enter globalization era

The basic theory of geopolitics and geostrategic

**References:**

1. *Himpunan hasil seminar Kursus Regular Angkatan (KRA) XXX, XXXI dan XXXII*, LEMHANNAS 2000
2. *HAM di dunia yang berubah by Antonio Cassese*, Yayasan Obor JKT 1994
3. *Ilmu Social Dasar, Teori dan Konsep Ilmu Sosial*, by : Ir. M.Munandar Soelaeman, Penerbit Eresco, Bandung 1995
4. *Indonesia dalam Kancah Isu Lingkungan Global*, Otto Soemarwoto, Penerbit Pustaka Utama, Jakarta 1992
5. *Reformasi Poltik*, by : Arbi Sanit, Yogyakarta 1998
6. *Penyemaian Jati Diri; Strategi Membentuk Pribadi, Keluarga, dan Lingkungan Menjadi Bangsa yang Profesional; Bermoral dan Berkarakter*, by : Soemarno Soedarsono, Gramedia, Jakarta 2000
7. *Diklat Pendidikan Kewarganegaraan*, by : S.Sumarsono dkk, Lemhannas, Jakarta 2000
8. *UUD 1945 amandemen*
9. GBHN
10. Provision No. 62/1958 about citizenship
11. Provision No. 39/1999 about Human Rights
12. Hasan Zainuri, SH, *Pengantar Hukum Tata Negara*, Alumni, Bandung 1992

8. Applied Mathematic I

**Objectives:**

1. To know basic math, especially algebra matrices, vectors, probability in solving engineering problem.
2. To understand basic math, especially algebra matrices, vectors, probability in solving engineering problem.
3. To know basic math, especially Partial derivatives, Integral, Series, Differential Equations, Laplace Transformation to be applied in solving engineering problems.
4. To understand the foundations of mathematics, particularly Partial derivatives, Integral, Series, Differential Equations, Laplace Transformation to be applied in solving engineering problems properly.

**Course Topics:**

- Matrix Algebra
- Determinants
- Vector Algebra
- Vector Analysis
- Numbers of complex
- Absolute value, Inequality and graph equations
- Functions, Limit Function
- Pole Coordinate
- Continuity
- Derivatives
- Derivation Function
- Trig Functions
- Geometry Analysis
- Partial Derivative - Integral
- Integral
- Equation
- Differential
- Laplace transform

**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 Department of Mathematic of FMIPA-ITS, Mathematics I and II

9. 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*

6. Electronics

**Objectives:**

1. To describe analog signals, amplifiers, gain and feedback
2. To mention the characteristics of diodes, transistors, triac and thyristors
3. To describe the basic semiconductor device, amplifier theory and its applications in general
4. To describe the power supply battery and electronic systems
5. To describe the binary and hexadecimal number system
6. To design a combinational logic system using basis gate
7. To simplify the logic design using Boolean algebra and Karnaugh maps
8. To describe the counter sequence and arithmetic
9. To describe the sequential digital circuit
10. To design a series of counters and shift registers
11. To describe the support series of microprocessors
12. To design combinational logic circuits using PLD.

**Course topics:**

		<ul style="list-style-type: none"> <li>• Basic semiconductor device</li> <li>• Power supply and system</li> <li>• Diodes</li> <li>• Bipolar and Field Effect Transistor</li> <li>• RC filters and LC resonance</li> <li>• Numbers</li> <li>• Logic operation</li> <li>• Design a logic circuit</li> <li>• Coding scheme</li> <li>• PLD</li> <li>• Microprocessor support series</li> </ul> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. <i>The Art of Electronics</i>, Horowitz, and Hill, Cambridge Press, 2<sup>nd</sup> Edition, 1989</li> <li>2. <i>Analogue electronics</i>, Morris John c., Edward arnold, 1991</li> <li>3. <i>Basic Digital Electronic</i>, 2<sup>nd</sup> Ed. Ryan R &amp; Doyle D.L.A US TAB 1990</li> <li>4. <i>Digital Fundamental</i>, 4<sup>th</sup> Ed. Floyd, Maxwell Macmillan, 1994</li> <li>5. PLD data books. AMD.</li> </ol>
7.	Applied Physics II	<p><b>Objective:</b> To understand and analyze the concept of theoretical physics.</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• Style</li> <li>• Strong electrical fields</li> <li>• Potential electricity</li> <li>• Energy of potential electricity</li> <li>• Capacitors</li> <li>• The magnetic field</li> <li>• Magnetic induction</li> <li>• Magnetic Flux</li> <li>• Lorentz force</li> <li>• The principle of generator</li> <li>• Direct current (DC) and alternating current (AC)</li> </ul> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Sears and Zemansky, University Phisycs</li> <li>2. Halliday &amp; Resnick, "<i>Fisika</i>" Penerbit Erlangga 1993</li> </ol>
8.	Electrical Circuit Analysis (Practical)	<p><b>Objectives:</b> To know about measuring devices and how the devices can be used to measure electrical quantities.</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• Errors in measurement</li> <li>• Types of measuring tools</li> <li>• Measurement of electrical quantities</li> <li>• electrical circuit and its characteristics</li> <li>• Principles of direct current electric circuits</li> <li>• Analysis of direct current electrical circuit.</li> </ul> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. <i>Buku Petunjuk Praktikum Analisa Rangkaian Listrik</i></li> <li>2. <i>Electronic Instrumentation and Measurements</i>, David A. Bell</li> </ol>
9.	Machine Tools (practical)	<p><b>Objective:</b> To be able to work with the machine tool</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• Lathes</li> <li>• Freis Machine</li> <li>• Scrap Engine</li> <li>• Grinder</li> </ul> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. C. Van Terheijden &amp; Harun; <i>Alat-alat Perkakas</i>,</li> </ol>

Gereedschapswerktuigen 3, Wolters Noordhoff by Groningen, 1971.

2. F. Koenigsberger; *Design Principles of Metal Cutting Machine Tool*, Pergamon, Mcmillan Co., New York, 1964.
3. J.A. Schey; *Introduction to Manufacturing Processes*, McGraw-Hill international Editions, Singapore, 1987.
4. E. M. Trent; *Metal Cutting*, Butterworths, London, 1977.
5. T. Rochim; *Teori dan Teknologi Proses Pemesinan*, Jurusan Teknik Mesin FTI – ITB, 1993.

10. Computer Programming  
(Practical)

**Objectives:**

Understanding and Using Visual Basic and MATLAB for programming

**Course Topics:**

- Describe the technical problem in Flowchart
- Basics of programming
- Control program
- Timer and graphs application
- Matrix Laboratory
- Graphic User Interface
- Application and Research
- Simulink
- M-Files

**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
4. Roos Nelson, *Menguasai Visual Basic For Windows*, Elek Media Komputindo, Jakarta, 1995
5. Imam Sutrisno, Boedi Herijono, *Pelatihan Super Cepat MATLAB Simulink, M-File dan GUI builDEr*, ITS Press, 2009
6. Imam Sutrisno, *Pemrograman Komputer menggunakan Software MATLAB disertai Contoh Skripsi dan Tesis*, ITS Press, 2009

11. Pneumatic and Hydraulic  
Engineering

**Objectives:**

1. To describe the system and working principle of pneumatic and hydraulic controls and applications in automation industry
2. To determine hydraulic and pneumatic device systems as well as PLC applied to pneumatic systems
3. To design pneumatic and hydraulic control systems

**Course Topics:**

- Applications in industrial hydraulic systems and functions
- Components of the hydraulic system and the interactions between components
- Graphic and circuit symbols
- Valve and actuator
- Characteristics and design of hydraulic systems
- Proportional control
- Integration with PLC systems and microprocessors
- Trouble shooting of hydraulic system
- Controls single acting and double acting cylinder
- The control system of pneumatic control circuits
- Felt Tools
- Crane
- Speed control
- Pressure control

**References:**

1. Hydraulics, *Basic Level TP 501 Textbook*, FESTO DIDACTIC
2. Logic Control, *Basic Level TP 301, Textbook*



3. Programmable Logic Controllers, *Basic Level D.LE-TP 301-1-GB*, Textbook

12.

Mechanical Technology

**Objectives:**

To know and understand the equipment mechanic technology in the shop Machine Tools and students are able to make the move work from the machining process and using equipment Mechanical Technology.

**Course Topics:**

- Tagging tools
- Measurement tools
- Various kinds of screw
- Machines tools
- Cutting tools
- Bench Vise
- Sheet metal tools

**References:**

1. C. Van Terheijden & Harun, *Alat-alat Perkakas, Gereedschapswerktuigen 3*, Wolters Noordhoff by Groningen, 1971.
2. F. Koenigsberger, *Design Principles of Metal Cutting Machine Tool*, Pergamon, Mcmillan Co., New York, 1964.
3. J.A. Schey, *Introduction to Manufacturing Processes*, McGraw-Hill international Editions, Singapore, 1987.
4. E. M. Trent, *Metal Cutting*, Butterworths, London, 1977.
5. T. Rochim, *Teori dan Teknologi Proses Pemesinan*, Jurusan Teknik Mesin FTI – ITB, 1993.
6. Teknik Bengkel, PMS-ITB, Bandung
7. Teknik Bengkel, PEDC, Bandung.

13.

CAD-CAM

**Objectives:**

To manage manufacturing projects and it is expected to simulate the CTS program, transfer program from PC to CNC machine, Setting tools and Simulation programs on CNC machines.

**Course Topics:**

- Basics CNC
- G and M codes
- CNC Program
- Interpolation
- Cutting tools replacement
- Subroutine

**References:**

1. SL.Automatisierung technik GmbH.1993
2. Deckel Ag Dialog 11Program HandBook. 1989
3. JJ.M.Hollenbrands. Teknik Pemrograman Dan Aplikasi CNC.1992
4. E. M. Trent, *Metal Cutting*, Butterworths, London, 1977.
5. Rochim, Taufiq, *Teori dan Teknologi Proses Pemesinan*, Jurusan Teknik Mesin FTI – ITB, 1993.

14.

Control System Design

**Objectives:**

Designing a control system.

**Course Topics:**

- Block Diagram
- Transfer function
- Signal flow graphic
- SISO Systems
- MIMO Systems
- Linear Systems
- Laplace transformation
- Transient Response
- Steady state response

		<ul style="list-style-type: none"> <li>• Frequency Response</li> <li>• Root locus</li> <li>• PID Control</li> <li>• Compensation</li> </ul> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. C.G. Graham, F.G. Stefan and E.S. Mario, <i>Control System Design</i>, University of Newcastle, 2001.</li> <li>2. G.O.M. Arthur, <i>Design and Analysis of Control Systems</i>, FAMU-FSU College of Engineering, 2000.</li> <li>3. K. Ogata, <i>Teknik Kontrol Automatik (Edisi 1)</i>, University of Minnesota, 1989.</li> <li>4. K. Ogata, <i>Teknik Kontrol Automatik (Edisi 2)</i>, University of Minnesota, 1997.</li> </ol>
15.	Microprocessor and Microcontroller	<p><b>Objectives:</b> To understand the basics of microprocessors and supporting circuits and to apply it for electronic equipment control.</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• Evolution and microprocessor architecture</li> <li>• Register</li> <li>• Memory</li> <li>• Assembly language</li> <li>• Peripheral interfacing with 8255 PPI</li> </ul> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Roger L. Tolkheim, <i>Elektronika Digital</i></li> <li>2. Douglas V. Hall, <i>Microprocessor &amp; Interfacing</i></li> <li>3. Brey Barry, <i>The Intel Microprocessor Architecture &amp; Programming</i></li> <li>4. Henri S.V.Simanjuntak, <i>Dasar-dasar Mikroprosesor</i></li> <li>5. Hartono, <i>Pemrograman Bahasa Assembly</i></li> </ol>
16.	Physics (Practical)	<p><b>Objectives:</b> To understand and analyze the theoretical concepts and also to apply in practice.</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• Motion on a flat</li> <li>• Circular motion</li> <li>• Physical and mathematical swing</li> <li>• Calorimetric</li> <li>• Energy</li> <li>• Basic Electricity</li> </ul> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Petunjuk Praktikum Fisika, Politeknik Perkapalan ITS</li> <li>2. Halliday &amp; Resnick, "Fisika" Penerbit Erlangga 1993.</li> </ol>
17.	Electrical Machines (Practical)	<p><b>Objectives:</b> To test and determine the performance of electrical machines.</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• DC Generator</li> <li>• AC Generator</li> <li>• DC Motor</li> <li>• AC Motor</li> <li>• Transformator</li> </ul> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. A.E. Fitzgerald, Charles Kingsley, Stephen D. Umans, <i>Electric Machinery, fifth edition</i>, Mc Graw Hill, London, 1992.</li> <li>2. BL Theraja, <i>A Text Book of Electrical Technology</i>, S. Chand Company Ltd, New Delhi, 1978</li> <li>3. Eugene C. Lister, <i>Electric Circuit And Machines, sixth edition</i>, Mc Graw Hill Inc., 1984.</li> <li>4. Klockner-Moeller, <i>Automation and Power Distribution Wiring Manual</i>, Printed in the Federal Republic of Germany, 1992</li> </ol>

		<ol style="list-style-type: none"> <li>5. Wolfgang Muller, <i>Electrical Power Engineering Proficiency Course, 3rd edition</i>, GTZ GmbH, Eschborn, 1988.</li> <li>6. Zuhail, <i>Dasar Tenaga Listrik</i>, Penerbit ITB, Bandung, 1991.</li> </ol>
18.	Pneumatic and Hydraulic Engineering Lab	<p><b>Objectives:</b> To understand the basics of pneumatic and hydraulic and be able to apply various types of pneumatic and hydraulic equipment controller.</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• Pneumatic</li> <li>• Designing of pneumatic</li> <li>• Electrical pneumatic</li> <li>• PLC</li> <li>• Hydraulic</li> <li>• Electrohydraulic</li> </ul> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Croser P., Ebel F., <i>pneumatics basic level, festo dedactic gmbh &amp; co.kg denkendorf germany</i>, 1999</li> <li>2. Hasebrink J.P., Kobler R, <i>fundamental of pneumatic control engineering</i>, festo dedactic kg d-7300 esslingen 1, 1978</li> <li>3. Melxner H., suara, <i>Introduction to electropneumatic</i>, festo dedactic kg d-7300 esslingen 1, 1989</li> <li>4. Merkle D., at all, <i>hydraulics basic level</i>, festo dedactic gmbh &amp; co.kg, denkendorf germany, 1998</li> <li>5. Waller D., Werner H., <i>hydraulics basic level-work book</i>, festo dedactic gmbh &amp; co.kg denkendorf germany, 2003</li> <li>6. Merkle d, werner H., <i>electrohydraulics basic level-work book</i>, festo dedactic gmbh &amp; co.kg denkendorf germany, 2006</li> <li>7. Loffler C. <i>electrohydraulics basic level</i>, festo dedactic gmbh &amp; co.kg denkendorf germany, 2006</li> <li>8. Ackermann R., <i>Programmable Logic Control basic level tp 301</i>, festo dedactic gmbh &amp; co.kg, denkendorf germany, 1998.</li> </ol>
19.	Sensors and Signal Conditioning	<p><b>Objectives:</b></p> <ol style="list-style-type: none"> <li>1. To understand the behavior and signal analysis and</li> <li>2. To understand the type and characteristics of the sensor.</li> </ol> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• Linear systems</li> <li>• Continuous time signal</li> <li>• Discrete time signal</li> <li>• Invariant time system</li> <li>• Differential Equations</li> <li>• Fourier series</li> <li>• Fourier transformation</li> <li>• Sensor</li> </ul> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. V.O. Alan and S.W. Alan, <i>Signals and Systems</i>, Massachusetts Institute of Technology, 1997.</li> <li>2. G.P. John and G.M. Dimitris, <i>Digital Signal Processing</i>, Northeastern University and Boston College, 1997.</li> <li>3. S. Pakpahan, <i>Automatic Control</i>, Bandung Institute of Technology, 1988.</li> <li>4. W. Bolton, <i>Systems Instrumentation and Control Systems</i>, grants, 2004.</li> </ol>
20.	Ship Machinery Systems	<p><b>Objectives:</b></p> <ol style="list-style-type: none"> <li>1. To identify basic principles of ship propulsion</li> <li>2. To choose the type of driving vessel according to the type of vessels.</li> </ol> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• Ship propulsion components</li> <li>• Ship propulsion supporting system</li> </ul>

- The placement of ship propulsion.

**References:**

1. *Motor Diesel Putaran Tinggi*, Shoichi Furuyama dan Nakoelo Soenarto, Penerbit PT. Pradnya Paramita Jakarta.
2. *Motor Serba Guna*, Shoichi Furuyama dan Nakoelo Soenarto, Penerbit PT. Pradnya Paramita Jakarta.
3. *Operasi dan Pemeliharaan Motor Diesel*, VL. Maleev dan Ir. Bambang Priambodo, Penerbit Erlangga Jakarta.
4. *Diesel Mechanics*, Erich J.Schulz & Ben L. Evridge, Mc-Graw-Hill Book Company.
5. *Motor Bakar Dalam*, Wiranto Arismunandar, Penerbit ITB Bandung.
6. *Turbin, Pompa dan Kompresor*, Fritz Dietzel, Penerbit Erlangga Jakarta.
7. *Prinsip – Prinsip Konversi Energi*, Archie W Culp, Penerbit Erlangga Jakarta.
8. *Termodinamika*, Werlin S Nainggolan, Penerbit CV. Armico Bandung
9. *Ketel Uap, Djokosetyardjo*, Penerbit Pradnya Paramita Jakarta.

21.

Motor Drive

**Objectives:**

Students are able to choose motor to be used as a driver.

**Course Topics:**

- Principles of DC motors
- Principles of AC motors
- Characteristics of motor power
- Calculation of motor power.

**References:**

1. Arnold Edward Electrical, *Installation Calculations*, Birmingham, 1980
2. Hermagasantos Z. Ir. MSc., *Aplikasi Instalasi Listrik*, Bandung, 1995
3. Setiawan E.Ir., *Instalasi Listrik Arus Kuat* jilid 3, 1995
4. PT. Dok dan Perkapalan Surabaya, *Main Switth Board in Caraka Jaya Niaga III Third Phase*, 1997

22.

CAD – CAM (Practical)

**Objectives:**

Students are able to draw well with Autocad 2002.

**Course Topics:**

- Drawing command
- Modify / Edit command
- Advanced commands
- Dimensioning
- Fundamentals of 3D drawing
- Surface modeling
- Solid modeling
- Plotting

**References:**

1. Bethune, James D., *Engineering Graphics With Autocad 2002*, 2002, Prentice Hall.
2. Ethier, Christtine A. And Ethier, Stephen J., *Autocad In 3 Dimensions Using AutoCAD 2002*, 2002, Prentice Hall.

23.

Interfacing (Practical)

**Objectives:**

To understand and implement interface hardware and software system along with its applications in digital data and analog.

**Course Topics:**

- Computers
- Programming languages C / C + +
- Digital Data Communications
- Analog data communication

**References:**

		<ol style="list-style-type: none"> <li>1. I Made Joni, Budi Raharjo, <i>Pemrograman C &amp; Implementasinya</i>, Bandung, 2006.</li> <li>2. Herbert Schildt, <i>C++ : The Complete Reference</i>, Mcgraw-Hill, 1998.</li> <li>3. Nalwan, Paulus Andi, <i>Panduan Praktis Teknik Antarmuka dan Pemrograman Mikrokontroler AT89C51</i>. Jakarta: Elex Media Komputindo, 2003.</li> </ol>
24.	Control System (Practical)	<p><b>Objectives:</b> To understand, design, analyze and apply the automatic control system with MATLAB.</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• The basic principle of automatic control system</li> <li>• MATLAB</li> <li>• Mechanical Modeling</li> <li>• Electrical Modeling</li> <li>• Hidrolic Control</li> <li>• Pneumatic Controls</li> <li>• Two positions "on - off" Controls</li> <li>• PID Control</li> <li>• PID electronic control.</li> </ul> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Isa Rachman, <i>Buku Petunjuk Praktikum Teknik Kontrol (Modul I)</i>, Politeknik Perkapalan Negeri Surabaya, 2009.</li> <li>2. Isa Rachman, <i>Buku Petunjuk Praktikum Teknik Kontrol (Modul II)</i>, Politeknik Perkapalan Negeri Surabaya, 2009.</li> </ol>
25.	Introduction to Manufacturing System	<p><b>Objectives:</b> To provide skills using AutoCAD software for drawing a single line of electrical systems installation.</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• Figures and Principles of Manufacturing</li> <li>• Concept of Goods and Services in Manufacturing Systems</li> <li>• Manufacturing System as Transformation Process</li> <li>• Characteristics of the project, job shop and flow shop</li> <li>• Manufacturing Function</li> <li>• Job Shop</li> <li>• Continuous Process</li> <li>• Flow Shop</li> <li>• Cellular Production</li> <li>• Project Operations</li> <li>• New Transformational Technologies and Reengineering</li> <li>• Business Process Design (Reengineering)</li> <li>• Lean Manufacturing</li> </ul> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. <i>Management Systems; Conceptual Consideration, 3rd edition</i>, by Peter P. Schoderbek, Charles G. Schoderbek, Asterios G. Kefalas, Business Publication Inc, Texas, 1985</li> <li>2. <i>Operations and Supply Management</i>, by F Robert Jacobs, Richard B Chase, Nicholas J Aquilano, McGraw-Hill/Irwin, 2009</li> <li>3. <i>Production Planning and Inventory Control</i>; Berdasarkan Pendekatan Sistem Terintegrasi MRP II dan JIT Menuju Manufaktur 21, Vincent Gaspersz, PT. Gramedia Pustaka Utama, 2004</li> <li>4. <i>Manufacturing Planning and Control</i>; Beyond MRP II, by Paul Higgins, Patrick Le Roy, Liam Tierney, Chapman &amp; Hall, London, 1996</li> <li>5. <i>Customer-driven Manufacturing</i>, by J.C Wortmann, D.R Muntslag, P.J.M Timmermans, Chapman &amp; Hall, London, 1997.</li> </ol>
26.	Ship Systems and	<p><b>Objectives:</b></p>

	Equipment	<p>To understand the basics of ship systems and its equipment.</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• Ships and its machinery</li> <li>• Diesel engines</li> <li>• Steam Turbine</li> <li>• Boiler</li> <li>• Pump</li> <li>• Piping</li> <li>• Supporting machinery</li> <li>• Fuel</li> <li>• Lubricating Oil and treatment</li> <li>• Refrigeration Systems</li> <li>• Air conditioning</li> <li>• Ventilation</li> <li>• Deck Machinery</li> <li>• Steering gear</li> </ul> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Taylor, D. A., <i>Introduction to Marine Engineering</i>, Butterworth Heinemann, 1996.</li> <li>2. Dokkum, V. K., <i>Ship Knowledge A Modern Encyclopedia</i>, Dokmar, Netherland, 2003.</li> <li>3. Rawson, K. J. Tupper, E. C., <i>Basic Ship Theory</i>, Butterworth, Heinemann, 2001.</li> <li>4. Watson, D. G. M., <i>Ocean engineering Book Series, Vol 1 Practical Ship Design</i>, Elsevier, 1998.</li> </ol>
27.	Intelligent control	<p><b>Objectives:</b></p> <p>To understand the modelling, design and implementation of intelligent control.</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• Modeling of intelligent control</li> <li>• Fuzzy Logic Controller</li> <li>• Genetic Algorithms</li> </ul> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Sutrisno, Imam, Pemrograman Komputer dengan MATLAB untuk Skripsi dan Tesis.</li> <li>2. Sutrisno, Imam, Pemodelan, Desain dan Aplikasi Sistem Kendali menggunakan MATLAB 7.01.</li> <li>3. Yan, J., <i>Using Fuzzy Logic</i>, MC Graw Hill.</li> <li>4. Sutrisno, Imam, Endrasmono, Joko, <i>Pemodelan, Desain dan Aplikasi Sistem Kendali menggunakan MATLAB 7.0.4</i>.</li> <li>5. Ogata, K., <i>Modern Control System</i>.</li> <li>6. Golten, J., <i>Control System Design and Simulation</i>.</li> <li>7. Saadat, Hadi, <i>Computational Aids in Control Systems Using MATLAB</i>.</li> <li>8. Arifin, S., <i>Kontrol Otomatik</i>.</li> </ol>
28.	Research Methodology	<p><b>Objectives:</b></p> <p>To understand how to make literature study and draft a scientific papers.</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• Philosophy of science and its relation to scientific research</li> <li>• Basic - Research Methodology</li> <li>• Scientific research principles and its process</li> <li>• Approach and scope of research</li> <li>• Fundamentals of statistics for research</li> <li>• Preparation for research proposal and research report framework.</li> </ul> <p><b>References:</b></p> <p>Masri Singarimbun &amp; Sofyan Effendi, <i>Metode Penelitian Survei</i>, 1998, Gajah Mada University Press,  Universitas Terbuka, Depdikbud, <i>Metodologi Penelitian Materi Dasar</i></p>

29.	Installation of Electrical Machine (Practical)	<p><b>Objectives:</b></p> <ol style="list-style-type: none"><li>1. To know conventional motor control system</li><li>2. To know the requirements of panel starter motor installation design</li><li>3. Security System and price estimation</li><li>4. Selection of electric motors settings system</li><li>5. To address troubleshooting that exists in conventional motor control circuit.</li></ol> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"><li>• Regulations and safety of electric motors</li><li>• Electromagnetic</li><li>• Starting of direct on line</li><li>• Automatic right and left rotation</li><li>• Motor Driver alternately</li><li>• Automatic star delta</li><li>• Automatic fail phase motor 3 phase</li><li>• Automatic main failure</li></ul> <p><b>References:</b></p> <ol style="list-style-type: none"><li>1. Training electrical control, freefort.</li><li>2. Elektronika Industri, Edisi II, 2000.</li><li>3. PEDC Appeals, Course Note Bengkel Listrik Semester II.</li><li>4. PEDC Appeals, Course Notes Bengkel Listrik Semester VI, 1986.</li><li>5. Electrical Hand Book Vol. I and Vol. II.</li></ol>
30.	PLC (Practical)	<p><b>Objectives:</b></p> <p>To understand basics PLC and be able to apply for electronic equipment controllers.</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"><li>• Architecture PLC</li><li>• Memory</li><li>• Input output</li><li>• AND Logic</li><li>• OR Logic</li><li>• NAND Logic</li><li>• NOR Logic</li><li>• Timer</li><li>• Counter</li><li>• Comparison Functions</li><li>• Calculations Function.</li></ul> <p><b>References:</b></p> <ol style="list-style-type: none"><li>1. Roger L. Tolkheim, <i>Elektronika Digital</i>.</li><li>2. Allen Bradley, <i>PLC &amp; Interfacing</i>.</li><li>3. Brey Barry, <i>The Intel Microprocessor Architecture &amp; Programming</i>.</li><li>4. Henri S.V. Simanjuntak, <i>Dasar-Dasar Mikroprosesor</i>.</li><li>5. Douglas V. Hall, <i>Microprocessor &amp; Interfacing</i>.</li></ol>
31.	Discrete Control System (Practical)	<p><b>Objectives:</b></p> <p>To understand and design discrete control systems.</p> <p><b>Course topics:</b></p> <ul style="list-style-type: none"><li>• Data acquisition system</li><li>• Theory of sampling</li><li>• Analog to Digital</li><li>• Digital to analog</li><li>• System Identification</li><li>• Modeling of the system</li><li>• Digital filter</li><li>• Transformation Z</li><li>• State Function</li><li>• Design of P, PI and PID controllers.</li></ul> <p><b>References:</b></p>

		<ol style="list-style-type: none"> <li>1. Katsuhiko Ogata, <i>Discrete Time Control Systems</i>, Prentice Hall, Upper Saddle River, New Jersey.</li> <li>2. Golten, J, <i>Control System Design and Simulation</i>.</li> <li>3. Ogata, K, <i>Modern Control System</i>.</li> </ol>
32.	Power Plant Control Systems	<p><b>Objectives:</b> Understanding electric power systems, electrical power systems design and analyze power system.</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• Identification of power system</li> <li>• The stability of the power system</li> <li>• The method of power system stability</li> <li>• Modeling of synchronous generators</li> <li>• Modeling the excitation system</li> <li>• Modeling steam turbine</li> <li>• Modeling water turbine</li> <li>• PSS (Power System Stabilizer)</li> <li>• Power Controller</li> <li>• Frequency Controller</li> <li>• Reactive and Power Controller</li> <li>• Case studies.</li> </ul> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Imam Robandi, <i>Desain Sistem Tenaga Listrik Modern</i>.</li> <li>2. Dorf, <i>Modern Control System Analysis and Design Using MATLAB</i>.</li> <li>3. Schwarzenbach, <i>System Modelling and Control</i>.</li> <li>4. Wilson and Pla, <i>Advanced Control System Technology</i>.</li> </ol>
33.	Protection System	<p><b>Objectives:</b> To understand the concept of protection on power system from the generation, distribution and loading, and to apply the simple practice.</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• Protection standard</li> <li>• Protection relay</li> <li>• Circuit breaker</li> <li>• Generator Protection</li> <li>• Transformation Protection</li> <li>• Coordination of protection devices</li> <li>• Simulation of protection system</li> </ul> <p><b>References:</b> Supriyadi Edi, <i>Sistem Pengaman Tenaga Listrik</i>, 1999 : 32 – 53.</p>
34.	Machine Vision	<p><b>Objectives:</b> To understand the concept of Machine Vision and be able to implement it by making creation using images and video.</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• Digital Image Processing</li> <li>• Video Processing</li> </ul> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Digital Image Processing Module</li> <li>2. Visual Basic Programming Module</li> <li>3. Kadir. A, <i>Pemrograman C</i>, Penerbit ANDI, 2009.</li> </ol>
35.	Maintenance Management	<p><b>Objectives:</b> To Implement the theory of electrical machines maintenance.</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• Motors components / equipment</li> <li>• Generator</li> <li>• Transformator</li> <li>• Megger test</li> <li>• Dielectric oil tester</li> </ul>



		<ul style="list-style-type: none"> <li>• Glower test.</li> </ul> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Hancock NN, <i>Electric Motor Utilization</i>, AH Wheeler and Co. Ltd., 1989.</li> <li>2. Despande MV, <i>Electric Application and Control</i>, AH Wheller, Co. Ltd., 1999.</li> <li>3. Smith R. T., <i>Rewinding Electric Motor</i>, Pergamon Press, 1982.</li> <li>4. Abdul K., <i>Mesin Arus Searah</i>, Jambatan Jakarta, 1998.</li> <li>5. Rawland J.R., <i>Power Transformator</i>, John wiley, 1997.</li> </ol>
36.	Multimedia Networks (Practical)	<p><b>Objectives:</b> To do and explain the basic knowledge of computer networks, to design or build a computer network in a group.</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• OSI Model Network</li> <li>• Subnetting</li> <li>• Network Setting (Routers, LAN and WAN).</li> </ul> <p><b>References:</b> Modul Praktek Jaringan dan Multimedia, PPNS.</p>
37.	Automation and Robotics (Practical)	<p><b>Objectives:</b> To understand and master the problems of automation and robotics in industrial world.</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• industrial automation systems</li> <li>• industrial robot systems</li> <li>• Computers</li> <li>• Electronics</li> <li>• PLC.</li> </ul> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Asfahl Ray C., <i>Robots and Manufacturing Automation</i>, John Wiley &amp; Sons, Inc. United States of America, 1992.</li> <li>2. Darf Richard C., Kusiak Andrew, <i>Handbook of Design Manufacturing and Automation</i>, Wiley Interscience. 1994.</li> <li>3. Morriss, S. Brian, <i>Automated Manufacturing System</i>, MicOTSW-UUi Int., 1995.</li> <li>4. Fu K.S., Gonzalez R. C., Lee C.S.G., <i>Robotic: Control, Sensing, Vision and Intelligence</i>, McGrwa-HiU. Inc. Singapore, 1987.</li> <li>5. Spong M.W., Vidyasagar M., <i>Robot Dynamics and Control</i>, John Willey &amp; Sons, Singapore, 1989.</li> </ol>
38.	Telemetry (Practical)	<p><b>Objectives:</b> To understand, apply sensing and remote control system using telemetry hardware.</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• Data acquisition system and data communication</li> <li>• Telemetric data modulation</li> <li>• Data transmission media</li> <li>• Radio Waves Modulation</li> <li>• Computer Networks</li> <li>• Data transmission via WiFi computer networks.</li> </ul> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. F. Carden &amp; R. Jedlicka &amp; R. Henri, <i>Telemetry System Engineering</i>, Artech House.</li> <li>2. John G. Proakis, <i>Digital Communication</i>, Mc.Graw Hill, 1995.</li> <li>3. Simon Haykin, <i>An Introduction to Analog &amp; Digital Communications</i>, John Wiley &amp; Sons.</li> <li>4. Bernard Sklar, <i>Digital Communications, Fundamental and Applications</i>, Prentice Hall.</li> </ol>
39.	PLC Troubleshooting	<p><b>Objectives:</b></p>

	(Practical)	<p>To understand and resolve problems with the master PLC troubleshooting.</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• Installation and troubleshooting PLC software</li> <li>• Installation and troubleshooting PLC hardware</li> <li>• Installation and troubleshooting of HMI PLC module</li> <li>• Integration of PLC Network</li> <li>• Data Communications of PLC</li> <li>• PLC monitoring system using PLC software</li> <li>• PLC monitoring system with internet and web based.</li> </ul> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Frank D. Petruzella, <i>Programmable Logic Controllers</i>. Glencoe, McGrawHill. USA.p374425, 1998.</li> <li>2. Colin D. Simpson, <i>Industrial electronics</i>, Prentice Hall, 1996.</li> <li>3. OMRON Corporation Industrial Automation Company, <i>CS/CJ/CP/CQ Operation Manual</i>, USA.</li> </ol>
40.	SCADA	<p><b>Objectives:</b></p> <p>To understand the application and benefits of SCADA systems in industries.</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• Basic SCADA</li> <li>• SCADA architecture</li> <li>• Protocol and SCADA software</li> <li>• SCADA communication media</li> <li>• SCADA LAN network system</li> <li>• Transmission of SCADA via modem</li> <li>• MTU SCADA Configuration</li> <li>• SCADA Troubleshooting and maintenance</li> <li>• SCADA Data Acquisition</li> <li>• SCADA applications in industry</li> <li>• PLC and HMI integration</li> <li>• SCADA Management.</li> </ul> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. David Bailey &amp; Edwin Wright, <i>Practical SCADA for Industry</i>, Perth, Australia.</li> <li>2. Frank D. Petruzella, <i>Programmable Logic Controllers</i>, Glencoe, McGrawHill, USA.p374425, 1998.</li> <li>3. Krutz R., <i>Securing SCADA Systems</i>, Wiley Publishing Inc., 2006.</li> </ol>
41.	Advanced English	<p><b>Objectives:</b></p> <p>To be able to write and speak fluently in English in working.</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• Speech</li> <li>• Writing a scientific essay</li> <li>• Write an essay</li> <li>• Job application</li> </ul> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Dale Carnegie® <i>High Impact Presentation : Participant Manual</i>.</li> <li>2. Oshima &amp; Hogue, <i>Writing Academic English</i>, Menlo Park : Addison-Wesley publishing Company, 1991.</li> <li>3. John Robert Powers, <i>General Public Relations</i></li> <li>4. Jolles, Robert L., <i>How to Run Seminars &amp; Workshops</i>, New York: John Wiley &amp; Son, Inc., 2001.</li> </ol>
42.	Entrepreneurship	<p><b>Objectives:</b></p> <ol style="list-style-type: none"> <li>1. To understand and implement the basics of entrepreneurship</li> <li>2. To acquire entrepreneurial knowledge and experience transfer, as initial activities for student who are interested to be an entrepreneur</li> <li>3. To be able to make a business plan in maritime field.</li> </ol>

		<p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• The nature of entrepreneurship</li> <li>• Strategy of entrepreneurship</li> <li>• Planning and finance control</li> <li>• Monitoring</li> <li>• Management of scarce resources</li> <li>• Management of external resources</li> <li>• Marketing strategies</li> </ul> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. <i>Small Bussiness Solution E-Commerre</i> by Brenda Kienan</li> <li>2. <i>Studi Kelayakan Bisnis</i> by Drs. Husein Umar, SE, M.M. MBA</li> <li>3. <i>Kewirausahaan Teori dan Praktek</i> by Geoffrey G. Meredith</li> <li>4. <i>Analisis Bisnis Terpadu</i> by Ir. Muhammad Fakhrudin &amp; Johar</li> <li>5. <i>Sembilan Fenomena Bisnis</i> by Rhenald Kasali</li> <li>6. <i>Masa Depan Kita (The road on head)</i> by Bill Gates</li> <li>7. <i>Pengantar Kewiraswastaan, Kerangka Dasar Memasuki Dunia Bisnis</i> by Drs. Masikur Wiratmo</li> <li>8. <i>Marketing Plus 2000, Siasat Memenangkan Persaingan Global</i> by Hermawan Kerta Jaya</li> <li>9. <i>Thick Face Black Heart (Mental Baja Pantang Menyerah)</i> by Chin ning Chu</li> <li>10. <i>The Asian Mind Game (Strategi Berpikir Orang Asia)</i> by Chin ning Chu</li> <li>11. <i>Tiga Ratus Ide Cemerlang dari Perusahaan-perusahaan yang paling Inovatif</i> by Leslie Blokow.</li> </ol>
43.	SCADA (Practical)	<p><b>Objectives:</b> To understand, design and analyze SCADA system.</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• The basic principle of PLC systems in industry</li> <li>• The basic principle of DCS systems in industry</li> <li>• The basic principle of SCADA systems in industry</li> </ul> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. David Bailey, BEng, Bailey and Associates, <i>Practical SCADA for Industry</i>, Perth, Australia.</li> <li>2. David Bailey, Edwin Wright, <i>Practical Fiber Optics</i>.</li> <li>3. David Bailey, Edwin Wright, <i>Practical SCADA for Industry</i>.</li> <li>4. Gordon Clarke, Deon Reynders, <i>Practical Modern SCADA Protocols : DNP3, 60870.5 and Related Systems</i>.</li> </ol>
44.	Thesis	<p><b>Objectives:</b> To apply the knowledge from lectures and practice in the form of a report.</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• Planning and tools creation</li> <li>• Testing objects / tools</li> <li>• Analysis of case studies</li> <li>• Writing a reports</li> </ul> <p><b>References:</b> Puslit, <i>Bahan Penataran Metodologi Penelitian</i>, Pusat Penelitian ITS, Surabaya, 1989.</p>
45.	Special Assignment	<p><b>Objectives:</b> To plan and design manufacturing automation systems, industrial control systems process and AI applications in image and sound.</p> <p><b>Course Topics:</b></p> <ul style="list-style-type: none"> <li>• Method of implementation</li> <li>• Modeling of continuous system</li> <li>• Modeling of discrete systems</li> </ul>

- Analysis of the stability of the system
- Continuous controller design
- The design of discrete controllers
- Testing controller with simulation
- Performance analysis of the control system
- The introduction of neural network and fuzzy
- Analysis model using recognition pattern, probability density function, likelihood estimation, blind source separation
- Optimization analysis

**References:**

1. William Bolton, *PLC sebuah Pengantar edisi ke 3*, Penerbit Erlangga, 2004.
2. Sutrisno, Imam, *Pemodelan, Desain dan Aplikasi Sistem Kendali menggunakan MATLAB 7.01*.
3. Yan, J., *Using Fuzzy Logic*, MC Graw Hill.
4. Babatunde Ogunnaike, *Process Control*.
5. JSR Jang, *Neuro and Soft Computing*.
6. Arhami, *Konsep Dasar Sistem Pakar*.
7. Thomas Sriwidodo, *Sistem Neuro Fuzzy*.