

<b>MATA KULIAH</b>	<b>Nama Mata Kuliah</b> : Menggambar Instrumen
	<b>Kode MK</b> : VI231416
	<b>Kredit</b> : 3 SKS
	<b>Semester</b> : IV

#### **DESKRIPSI MATA KULIAH**

Mata kuliah Menggambar Instrumen ini termasuk dalam rumpun mata kuliah Instrumentasi di PS S. Tr. TRI – ITS. Matakuliah ini membahas tentang perancangan dan aplikasi sistem instrumen dan kontrol pada proses industry, atau bekerja dalam dokumen mulai BFD, PFD P&ID, wiring diagram, gambar isometric, bill of material.

#### **CAPAIAN PEMBELAJARAN LULUSAN YANG DIBEBANKAN MATA KULIAH**

- Mampu mengkaji kasus penerapan ilmu pengetahuan dan teknologi di bidang keahlian sesuai standar kompetensi kerja, serta mampu mengambil keputusan secara tepat dari hasil kerja sendiri maupun kerja kelompok dalam bentuk laporan tugas akhir atau bentuk kegiatan pembelajaran lain yang luarannya setara dengan tugas akhir melalui pemikiran logis, kritis, inovatif, bermutu dan terukur dengan mempertimbangkan kesehatan, keselamatan, keamanan, dan lingkungan. (CPL 2)
- Mampu berkomunikasi, menulis laporan serta membuat presentasi secara efektif (CPL 4)
- Mampu merancang solusi untuk masalah teknologi dan rekayasa Instrumentasi serta dapat berkontribusi pada desain sistem, komponen maupun proses untuk memenuhi kebutuhan tertentu dengan mempertimbangkan standar keamanan, kesehatan dan keselamatan publik (CPL 7)

#### **CAPAIAN PEMBELAJARAN MATA KULIAH**

- Mahasiswa mampu mengetahui dan memahami kegunaan alat-alat instrument

- Mahasiswa mampu memahami, mematuhi dan mempraktekkan standarisasi gambar (ISO)
- Mahasiswa mampu memahami dan mempraktekkan simbol-simbol dalam gambar instrument, seperti pada P&ID
- Mahasiswa mampu menginterpretasikan, menafsirkan dan menampilkan gambar sesuai dengan proses sistem
- Mahasiswa mampu mengoperasikan Auto Cad P&ID sesuai dengan standar ISO
- Mahasiswa mampu menjelaskan proses yang ada pada gambar P&ID

### **POKOK BAHASAN**

- Pengantar Menggambar Instrument
- Philosophy process pada PFD (Process Flow Diagram)
- MEB (Mass & Energy Balance)
- Konsep LOPA (Layer of Protection Analysis)
- ISA Standard PFD dan P&I D (symbol dan design).
- Identifikasi protection layer yang diperlukan pada setiap NODE
- Melakukan desain instrument sesuai dengan hasil identifikasi protection layer setiap NODE
- Melakukan design electric wiring diagram pada P&I D sesuai standard ISA.
- Melakukan design logic diagram pada P&I D sesuai standard ISA.
- Hook Up drawing
- Look Up drawing
- Dokumen datasheet, bill of material, line codes, material construction, pipe sizing, pipe designation

### **PRASYARAT**

### **PUSTAKA**

John S. Page, Conceptual cost estimating manual, Elsevier, 1996.  
ANSI/ISA-5.2-1976 (R1992) Binary Logic Diagrams for Process Operations Graphic Symbols for Distributed Control/Shared Display Instrumentation, Logic and Computer Systems ISA 67 Alexander Drive P.O. Box 12277 Research Triangle Park, North Carolina 27709, 1984  
ANSI/ISA-5.4-1991 Instrument Loop Diagrams ISA 67 Alexander Drive P.O. Box 12277 Research Triangle Park, North Carolina 27709, 1984  
ISA-5.5-1985 Graphic Symbols for Process Displays ISA 67 Alexander Drive P.O. Box 12277 Research Triangle Park, North Carolina 27709, 1984  
ANSI/ISA-5.1-1984 (R1992), Instrumentation Symbols and Identification ISA 67 Alexander Drive P.O. Box 12277 Research Triangle Park, North Carolina 27709, 1984  
Warren L. McCabe, Julian C. Smith, Peter Harriott, Unit operation, McGRAW-HILL INTERNATIONAL, 2011.

<b>COURSE</b>	<b>Course Name</b> : Instrumentation Drawings
	<b>Course Code</b> : VI231416
	<b>Credit</b> : 3 SKS
	<b>Semester</b> : IV

### **DESCRIPTION OF COURSE**

This Instrument Drawing course is included in the Instrumentation subject group at PS S. Tr. TRI – ITS. This course discusses the design and application of instrument and control systems in industrial processes, or work on documents ranging from BFD, PFD P&ID, wiring diagrams, isometric drawings, bills of materials.

### **LEARNING OUTCOMES**

- Able to review cases of the application of science and technology in the field of expertise according to work competency standards, and able to make appropriate decisions from the results of their own work or group work in the form of final project reports or other forms of learning activities whose output is equivalent to the final task through logical, critical thinking , innovative, quality and measurable by considering health, safety, security and the environment. (CPL 2)
- Able to communicate, write reports and make presentations effectively (CPL 4)
- Able to design solutions to Instrumentation technology and engineering problems and can contribute to the design of systems, components and processes to meet specific needs by considering public security, health and safety standards (CPL 7)

### **COURSE LEARNING OUTCOME**

- Students are able to know and understand the use of instrument tools
- Students are able to understand, comply with and practice image standardization (ISO)

- Students are able to understand and practice symbols in instrument images, such as in P&ID
- Students are able to interpret, interpret and display images according to system processes
- Students are able to operate Auto Cad P&ID according to ISO standards
- Students are able to explain the process in the P&ID image

### **MAIN SUBJECT**

- Introduction to Drawing Instrument
- Philosophy process on PFD (Process Flow Diagram)
- MEB (Mass & Energy Balance)
- LOPA (Layer of Protection Analysis) concept
- ISA Standard PFD and P&I D (symbol and design).
- Identify the required protection layer for each NODE
- Perform instrument design according to the results of the identification of the protection layer for each NODE
- Designing electric wiring diagrams on P&I D according to ISA standards.
- Perform design logic diagrams on P&I D according to ISA standards.
- Hook Up drawing
- Look Up drawing
- Data sheet documents, bill of materials, line codes, material construction, pipe sizing, pipe design antion

### **PREREQUISITES**

### **REFERENCE**

John S. Page, Conceptual cost estimating manual, Elsevier, 1996.  
ANSI/ISA-5.2-1976 (R1992) Binary Logic Diagrams for Process Operations Graphic Symbols for Distributed Control/Shared Display Instrumentation, Logic and Computer Systems ISA 67 Alexander Drive P.O. Box 12277 Research Triangle Park, North Carolina 27709, 1984

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