

MATA KULIAH	Nama Mata Kuliah : Sistem Kontrol Terdistribusi
	Kode MK : VI231522
	Kredit : 3 sks
	Semester : V

DESKRIPSI MATA KULIAH

Matakuliah Sistem Kontrol Terdistribusi ini termasuk dalam rumpun matakuliah *Instrumentation* di Departemen Teknik Instrumentasi FV – ITS. Mata kuliah ini membahas tentang sistem kontrol terdistribusi sesuai standar IEC 61499 pengembangan dari standar IEC 61131 tentang *programmable controller*, mulai dari arsitektur sistem kontrol, pemrograman sistem kontrol terdistribusi, hingga protokol komunikasi standar yang digunakan pada industri. Matakuliah ini juga memberikan keterampilan bagi mahasiswa dalam memprogram dan mensimulasikan sebuah rancangan sistem kontrol terdistribusi sederhana menggunakan *tools* dan simulator.

CAPAIAN PEMBELAJARAN LULUSAN YANG DIBEBANKAN MATA KULIAH

- Mampu menerapkan pengetahuan matematika, ilmu alam, dasar-dasar instrumentasi pengukuran, pengendalian dan pengamanan untuk prosedur, proses, sistem maupun metodologi teknik yang diterapkan dalam suatu proses industri (CPL 5)
- Mampu mengidentifikasi, merumuskan, meneliti literatur dan menganalisis masalah teknik di bidang teknologi Instrumentasi untuk mencapai kesimpulan yang dapat dibuktikan dengan menggunakan alat analisis sesuai standar disiplin ilmu teknik instrumentasi (CPL 6)
- 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)
- Mampu melakukan investigasi terhadap permasalahan instrumentasi industri, mencari, memilih data yang relevan dari literatur, merancang dan melakukan eksperimen untuk memberikan kesimpulan yang valid (CPL 8)

Silabus Mata Kuliah
Program Studi Sarjana Terapan Teknologi Rekayasa Instrumentasi

- Mampu memilih, menggunakan dan menerapkan teknik dan sumber daya yang tepat termasuk penggunaan piranti keras maupun lunak yang mutakhir untuk memberikan solusi atas permasalahan di bidang rekayasa Instrumentasi (CPL 9)

CAPAIAN PEMBELAJARAN MATA KULIAH

- Mampu memahami konsep dasar Sistem Kontrol Terdistribusi
- Mampu memahami penggunaan sistem kontrol terdistribusi pada teknologi instrumentasi
- Mampu memahami dan mengaplikasikan *tools* dan simulator DCS dengan benar.
- Mampu menggunakan *datasheet* pada kontroller dengan baik sehingga dapat menentukan spesifikasi dari divais dengan benar.
- Mampu mengaplikasikan penggunaan protokol komunikasi standar industri pada sebuah sistem kontrol.
- Mampu memahami dan mengaplikasikan pengembangan sistem kontrol terdistribusi pada sistem instrumentasi saat ini

POKOK BAHASAN

1. Pengantar Sistem Kontrol Terdistribusi
2. Engineering Design Process for Control System 1 - QFD approach of concept
3. Engineering Design Process for Control System 2 - QFD Tools
4. Arsitektur dan Topologi DCS
5. DCS adopted standard 1 - Safety
6. DCS adopted standard 2 - EMC (Electromagnetic Compatibility)
7. DCS adopted standard 3 - Hazardous Location Equipment
8. DCS adopted standard 4 - Food and Drug Administration (FDA)
9. DCS adopted standard 5 - Marine
10. DCS adopted standard 6 - Network & Security
11. Complementary Standards for DCS
12. Pengantar Open Platform Communication (OPC)

PRASYARAT

Pemrograman mikrokontroler
Teknik Otomasi

PUSTAKA

Buku:

1. Zoitl, Alois, Strasser Thomas, “*Distributed Control Application: Guidelines, Design Pattern, Application Examples with the IEC 61499*”, CRC Press, 2016
2. McMillan, Gregory K. Considine, Douglas M, “*Process/Industrial Instruments And Controls Handbook*”, McGraw-Hill, 1999.

COURSE	Course Name : Distributed Control System
	Course Code : VI231522
	Credit : 3 sks
	Semester : V

DESCRIPTION OF COURSE

The distributed control system course is included in the Instrumentation class in the Instrumentation Engineering Department of FV - ITS. This course discusses about the distributed control system based on IEC 61499 standard that the standard is development of *programmable controller*. This course discusses about the architecture of distributed control system, the distributed control system programs, and the standard communication protocol in industry. This course also provides students with skills in programming and simulating a simple distributed control system design using tools and simulators.

LEARNING OUTCOMES

- Able to apply knowledge of mathematics, natural sciences, the basics of measurement instrumentation, control and security for procedures, processes, systems and technical methodologies applied in an industrial process (CPL 5)
- Able to identify, formulate, research literature and analyze technical problems in the field of Instrumentation technology to reach conclusions that can be proven by using analytical tools according to standard instrumentation engineering disciplines (CPL 6)
- 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)
- Able to investigate industrial instrumentation problems, search, select relevant data from literature, design and conduct experiments to provide valid conclusions (CPL 8)

- Able to select, use and apply the right techniques and resources including the use of the latest hardware and software to provide solutions to problems in the field of Instrumentation engineering (CPL 9)

COURSE LEARNING OUTCOME

- Students are able to understand the basic principle of distributed control system
- Students are able to understand the use of distributed control system in instrumentation industrial
- Students are able to understand and apply the tools and simulator DCS correctly
- Students are able to use datasheet in controller correctly to determine the specifications from the device correctly
- Students are able to apply the use of the standard communication protocol in the control system
- Students are able to understand and apply the distributed control system development in instrumentation system

MAIN SUBJECT

- Introduction to Distributed Control Systems
- Engineering Design Process for Control System 1 - QFD approach of concept
- Engineering Design Process for Control System 2 - QFD Tools
- DCS Architecture and Topology
- DCS adopted standard 1 - Safety
- DCS adopted standard 2 - EMC (Electromagnetic Compatibility)
- DCS adopted standard 3 - Hazardous Location Equipment
- DCS adopted standard 4 - Food and Drug Administration (FDA)
- DCS adopted standard 5 - Marine
- DCS adopted standard 6 - Network & Security
- Complementary Standards for DCS
- Introduction to Open Platform Communication (OPC)

PREREQUISITES

Microcontroller programming
Automation Technique

REFERENCE

Book:

1. Zoitl, Alois, Strasser Thomas, “*Distributed Control Application: Guidelines, Design Pattern, Application Examples with the IEC 61499*”, CRC Press, 2016
2. McMillan, Gregory K. Considine, Douglas M, “*Process/Industrial Instruments And Controls Handbook*”, McGraw-Hill, 1999.