INSTITUT TEKNOLOGI SEPULUH NOPEMBER (ITS)
FAKULTAS TEKNOLOGI ELEKTRO DAN INFORMATIKA CERDAS
DEPARTEMEN TEKNIK ELEKTRO
Program Studi Magister (S2) Teknik Elektro

1	**Nama Mata Kuliah / *Course Name***	:	Sistem Proteksi, Kontrol Supervisory dan Akuisisi Data / *Protection System, Supervisory Control and Data Acquisition*
2	**Course Code**	:	EE235173
3	**Kredit / *Credits***	:	3 SKS
4	**Semester / *Semester***	:	Pilihan / *Compulsory Course*

Deskripsi Mata Kuliah / *Course Description*

Matakuliah ini mempelajari prinsip kerja dan peralatan pendukung pada sistem pengaman tenaga listrik, mempelajari konsep pengaman pada sistem transmisi, distribusi serta pembangkit tenaga listrik. Selain itu, mata kuliah ini juga memperlajari mengenai distributed control system dan perangkat otomasi beserta pemanfaatannya meliputi, aplikasi PLC/DCS dan instruksi lanjut dari PLC/DCS, konfigurasi sistem hardware yang mengandung PLC/DCS, dan integrasi sistem dalam PLC/DCS, hmi untuk monitoring dan pengendalian, standard protokol komunikasi data, SCADA.

This course studies the working principles and supporting equipment in the electrical power safety system, studying the concept of safety in the transmission system, distribution and power generation. In addition, this course also studies distributed control systems and automation devices and their utilization including, PLC/DCS applications and advanced instructions from PLC/DCS, hardware system configuration containing PLC/DCS, and system integration in PLC/DCS, HMI for monitoring and control, standard data communication protocols, SCADA.

Capaian Pembelajaran Lulusan (CPL) Yang Dibebankan Mata Kuliah / *Program Learning Outcomes Charged to The Course*

1. (CPL-02) Mampu mengembangkan dan memecahkan permasalahan ipteks dalam bidang keilmuannya melalui riset dengan pendekatan inter atau multidisiplin hingga menghasilkan karya inovatif dan teruji, serta mendapat pengakuan nasional dan internasional.

   (PLO-02) Able to develop and solve science and technology problems in their scientific fields through research with an inter or multidisciplinary approach to produce innovative and tested work, and receive national and international recognition.

2. (CPL-04) Mampu menguasai konsep, prinsip keilmuan secara komprehensif, prinsip rekayasa, dan pengetahuan faktual tentang Teknologi Informasi untuk

mengembangkan prosedur dan strategi yang diperlukan pada analisis dan perancangan sistem terkait bidang Teknik Elektro.

(PLO-04) Able to master concepts, scientific principles comprehensively, engineering principles, and factual knowledge about Information Technology to develop procedures and strategies required in the analysis and design of systems related to the field of Electrical Engineering.

3. (CPL-08) Mampu mengambil keputusan dalam konteks menyelesaikan masalah pengembangan ilmu pengetahuan dan teknologi yang memperhatikan dan menerapkan nilai humaniora berdasarkan kajian analisis atau eksperimental terhadap informasi dan data.

   (PLO-08) Able to make decisions in the context of solving problems in the development of science and technology that pay attention to and apply humanities values based on analytical or experimental studies of information and data.

Capaian Pembelajaran Mata Kuliah / *Course Learning Outcomes*

1. Mampu menjelaskan konsep dasar Sistem Pengaman tenaga listrik serta komponen pendukungnya /*Able to explain the basic concepts of electrical power safety systems and their supporting components.*
2. Mampu menjelaskan relay pengaman pada sistem transmisi dan distribusi tenaga listrik /*Able to explain safety relays in electric power transmission and distribution systems.*
3. Mampu menjelaskan relay pengaman pada sistem pembangkit tenaga listrik /*Able to explain safety relays in power generation systems.*
4. Mampu menjelaskan konsep dasar distributed control system dan perangkat otomasi industri beserta pemanfaatannya /*Able to explain the basic concepts of distributed control systems and industrial automation devices and their uses.*
5. Mampu menjelaskan aplikasi DCS/PLC dan memahami instruksi lanjut dari DCS/PLC /*Able to explain DCS/PLC applications and understand advanced instructions from DCS/PLC*.
6. Mampu melakukan konfigurasi sistem hardware yang mengandung DCS/PLC /*Able to configure hardware systems containing DCS/PLC.*

Pokok Bahasan / *Contents*

1. Konsep sistem pengaman tenaga listrik /*Electrical power safety system concept*
2. Peralatan pengaman transmisi dan distribusi tenaga listrik /*Electrical power transmission and distribution safety equipment*
3. Peralatan pengaman sistem pembangkit tenaga listrik /*Power generation system safety equipment*
4. Konsep distributed control system /*The concept of distributed control systems*
5. Aplikasi PLC, SCADA di industri /*PLC, SCADA applications in industry*
6. Paket dasar DCS dan integrasinya /*DCS basic package and its integration*

Prasyarat / *Pre-requisite*

Dasar Sistem Pengaturan / *Basic Control System*

Pustaka / *Reference*

Utama / *Primary*:

1. M. Titarenko & I.Noskov, Protective Relaying in Electric Power System,
2. Siemens Power Engineering Guide · Transmission and Distribution · 4th Edition
3. William S Levine. The control Handbook CRC Press March 1916
4. MP Lukae Distributed Control Systems: Thein Evaluation &Design Van Nostrant Reinhold Company 1986

Pendukung / *Supporting*:

5. Instruments Engineers Handbook Vol-II, Process Control 3rd Edition 1995, “Bela G, LIPTAK”, Chilton
6. Distributed computer control for Industrial Automation, “Popovic and Bhatkar”, Dekker.
7. Computer-based Industrial Controls, “Krishan Kant”, PHI.
8. Applications of computers in Process Control, “Considine”.
9. Modern Control Techniques for the process industries, “T.HTsai , J.W Lane”, Mareeet Dekkar, N.Y 1986.
10. Digital Control System, “Iserman”.
11. Programmable logic controller, “J.D.Otter”, (PHI).
12. Industrial Programmable controller, “Huges”, (ISA).