



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 : Komputasi Cerdas pada Sistem Tenaga Listrik / <i>Intelligent Computing in Electrical Power System</i>
2	Course Code : EE235215
3	Kredit / Credits : 3 SKS
4	Semester / Semester : 1

Deskripsi Mata Kuliah / Course Description

MK ini membuka wawasan mahasiswa mengenai pentingnya peran komputasi cerdas pada Sistem Tenaga Listrik modern. Mahasiswa diharapkan memahami dasar, inspirasi, perkembangan, hingga aplikasi komputasi cerdas secara konvensional dan modern.

This MK opens students' insight into the importance of the role of intelligent computing in modern Electric Power Systems. Students are expected to understand the basics, inspiration, development, and applications of intelligent computing conventionally and modernly.

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-03) Mampu mengelola pembelajaran diri sendiri, dan mengembangkan diri sebagai pribadi pembelajar sepanjang hayat untuk bersaing di tingkat nasional, maupun internasional, dalam rangka berkontribusi nyata untuk menyelesaikan masalah dengan memperhatikan prinsip keberlanjutan.

(PLO-03) Able to manage self-learning, and develop oneself as a lifelong learner to compete at national and international levels, in order to make a real contribution to solving problems while paying attention to the principle of sustainability.

3. (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.

Capaian Pembelajaran Mata Kuliah / Course Learning Outcomes

1. Mahasiswa memahami Dasar dan Inspirasi Komputasi cerdas /*Students understand the Basics and Inspiration of Intelligent Computing.*
2. Mahasiswa memahami Perkembangan Teknik dan Ragam Komputasi Cerdas /*Students understand the development of intelligent computing techniques and varieties.*
3. Mahasiswa memahami Dasar Sistem Pengendalian Cerdas pada Sistem Tenaga Listrik /*Students understand the Basics of Intelligent Control Systems in Electrical Power Systems.*
4. Mahasiswa memahami Pengendali Logika Samar (Fuzzy Logic Controller - FLC) pada Sistem Tenaga Listrik /*Students understand Fuzzy Logic Controllers (FLC) in Electrical Power Systems.*
5. Mahasiswa memahami Penggunaan Genetic Algorithm (GA) dan Particle Swarm Optimization (PSO) untuk Optimisasi Kasus Pengoperasian dan Kontrol Sistem Tenaga /*Students understand the Use of Genetic Algorithm (GA) and Particle Swarm Optimization (PSO) for Optimization of Power System Operation and Control Cases.*
6. Mahasiswa memahami Pengendalian Hibrida Cerdas untuk Sistem Tenaga dan Energi Listrik /*Students understand Intelligent Hybrid Control for Electrical Power and Energy Systems.*
7. Mahasiswa memahami Penjadwalan Pembangkitan, Peramalan Beban, dan Rekonfigurasi dengan Komputasi Cerdas /*Students understand Generation Scheduling, Load Forecasting, and Reconfiguration with Intelligent Computing.*

Pokok Bahasan / Contents

1. Dasar dan Inspirasi Komputasi cerdas /*The Basics and Inspirations of Intelligent Computing*
2. Perkembangan Teknik dan Ragam Komputasi Cerdas /*The Development of Intelligent Computing Techniques and Varieties*
3. Dasar Sistem Pengendalian Cerdas pada Sistem Tenaga Listrik /*Basics of Intelligent Control Systems in Electric Power Systems*
4. Pengendali Logika Samar (Fuzzy Logic Controller - FLC) pada Sistem Tenaga Listrik /*Fuzzy Logic Controller (FLC) in Electric Power System*
5. Penggunaan Genetic Algorithm (GA) dan Particle Swarm Optimization (PSO) untuk Optimisasi Kasus Pengoperasian dan Kontrol Sistem Tenaga /*The Use of Genetic Algorithm (GA) and Particle Swarm Optimization (PSO) for Optimization of Power System Operation and Control Cases*

6. Pengendalian Hibrida Cerdas untuk Sistem Tenaga dan Energi Listrik /*Intelligent Hybrid Control for Power and Electrical Energy Systems*
7. Penjadwalan Pembangkitan, Peramalan Beban, dan Rekonfigurasi dengan Komputasi Cerdas /*Generation Scheduling, Load Forecasting, and Reconfiguration with Intelligent Computing*

Prasyarat / Pre-requisite

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Pustaka / Reference

Utama / Primary:

1. Imam Robandi, Artificial Intelligence, Penerbit Andi, Yogyakarta, 2019.

Pendukung / Supporting:

1. Stuart Russel & Peter Norvig, Artificial Intelligence: A Modern Approach 4th, Pearson Publisher; 2020
2. Tom Taulli, Artificial Intelligence Basics: A Non Technical Introduction, 1st ed., Apress Publisher, 2019
3. Seyedali Mirjalili, Evolutionary Algorithms and Neural Networks Theory and Applications, Brisbane Springer, 2019
4. Pandian Vasant, Intelligent Computing & Optimization, Springer, 2018
5. Seyedali Mirjalili, Nature-Inspired Optimizers Theories, Literature Reviews and Applications, Springer, 2020
6. Andries P. Engelbrecht, Computational Intelligence, Wiley, 2007
7. James M. Keller, et al., Fundamental of Computational Intelligence, IEEE Press, 2016