



INSTITUT TEKNOLOGI SEPULUH NOPEMBER (ITS)  
FAKULTAS TEKNOLOGI ELEKTRO DAN INFORMATIKA CERDAS  
DEPARTEMEN TEKNIK ELEKTRO  
Program Studi Sarjana (S1) Teknik Elektro

*INSTITUT TEKNOLOGI SEPULUH NOPEMBER (ITS)  
FACULTY OF INTELLIGENT ELECTRICAL & INFORMATICS TECHNOLOGY  
DEPARTMENT OF ELECTRICAL ENGINEERING  
Bachelor Degree Program in Electrical Engineering*

1	<b>Nama Mata Kuliah / Course Name</b> : Pengoperasian Sistem Tenaga Listrik / <i>Power System Operation</i>
2	<b>Kode Mata Kuliah / Course Code</b> : EE234720
3	<b>Kredit / Credits</b> : 3 SKS
4	<b>Semester / Semester</b> : 0

#### **Deskripsi Mata Kuliah / Course Description**

Mata kuliah operasi optimum sistem tenaga listrik merupakan mata kuliah yang membahas pembebanan (economic dispatch) dan penjadualan pembangkit (unit commitment) dalam sistem terinterkoneksi. Selain itu, integrasi pembangkit berbasis energi terbarukan juga dikenalkan dalam mata kuliah ini. Beberapa metode optimasi seperti quadratic programming dan mixed integer linier programming digunakan untuk proses optimasi dengan menggunakan software matlab. / *The Optimal Operation of Electric Power Systems course covers economic dispatch and unit commitment in interconnected power systems. Additionally, the integration of renewable energy-based generation is introduced in this course. Several optimization methods, such as quadratic programming and mixed-integer linear programming, are employed for the optimization process using MATLAB software.*

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

CPL 3 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 mengimplementasikan teknologi informasi dan komunikasi dan memperhatikan prinsip keberlanjutan serta memahami kewirausahaan berbasis teknologi / *Able to manage one's own learning and continually self-develop as a lifelong learner to compete at the national and international levels, with the goal of making a tangible contribution to problem-solving by implementing*

*information and communication technology and considering sustainability principles, as well as understanding technology-based entrepreneurship.*

CPL 6 Mampu mengkaji dan memanfaatkan matematika, ilmu pengetahuan alam dan teknologi serta mengidentifikasi, memformulasikan dan menyelesaikan permasalahan di bidang teknik elektro / *Able to evaluate and utilize mathematics, natural sciences, and technology, as well as identify, formulate, and solve problems in the field of electrical engineering.*

#### **Capaian Pembelajaran Mata Kuliah / Course Learning Outcomes**

1. Mampu menjelaskan konsep Sistem Tenaga Listrik Skala Besar / *Able to explain the concept of Large-Scale Power Systems.*
2. Mampu membuat kurva biaya pembangkitan / *Able to create a cost curve for power generation.*
3. Mampu menghitung pembebanan pembangkit (economic dispatch) / *Able to calculate the economic dispatch of power generation.*
4. Mampu menghitung penjadwalan pembangkit (unit commitment) / *Able to calculate the unit commitment for power generation scheduling.*

#### **Pokok Bahasan / Contents**

1. Pengenalan operasi sistem tenaga listrik. Overview Sistem interkoneksi Jawa Bali / *Introduction to the Operation of Power Systems. Overview of the Java-Bali Interconnection System*
2. Kurva heat rate, harga bahan bakar, kandungan kalori dalam bahan bakar, kurva karakteristik wind power / *Heat Rate Curve, Fuel Price, Fuel Calorific Value, Wind Power Characteristic Curve*
3. Economic dispatch tanpa mempertimbangkan rugi-rugi saluran transmisi menggunakan persamaan Lagrange / *Economic Dispatch without Considering Transmission Line Losses Using Lagrange Equation*
4. Economic dispatch dengan metode iterasi lambda / *Economic Dispatch with Lambda Iteration Method*
5. Economic dispatch dengan metode base point dan participation factor / *Economic Dispatch with Base Point and Participation Factor Method*
6. Economic dispatch mempertimbangkan rugi-rugi saluran transmisi / *Economic Dispatch Considering Transmission Line Losses*
7. Dynamic economic dispatch menggunakan metode quadratic programming / *Dynamic Economic Dispatch Using Quadratic Programming Method*
8. Economic dispatch menggunakan metode metaheuristic / *Economic Dispatch Using Metaheuristic Methods*
9. Unit commitment tanpa mempertimbangkan spinning reserve / *Unit Commitment without Considering Spinning Reserve*

#### **Prasyarat / Pre-requisite**

Analisis Sistem Tenaga / *Power System Analysis*

#### **Pustaka / Reference**

1. Allen J. Wood, Bruce F. Wollenberg, Power Generation, Operation and Control, 2014

2. Hadi Saadat, Power System Analysis, 2016