

Mata Kuliah Course	Nama MK <i>Name</i>	: Probabilitas Statistik dan Proses Stokastik : <i>Probability, Statistics, and Stochastic Processes</i>
	Kode MK <i>Code</i>	: EE184405
	Kredit <i>Credits</i>	: 4 sks
	Semester <i>Semester</i>	: IV (Wajib) : <i>IV (Compulsory)</i>
	Beban Belajar <i>Workload</i>	: Kuliah : 4 x 50 = 200 menit/minggu : Latihan/tugas : 4 x 60 = 240 menit/minggu : Belajar mandiri : 4 x 60 = 240 menit/minggu : <i>Lectures : 4 x 50 = 200 min/week</i> : <i>Exercises/Assignments : 4 x 60 = 240 min/week</i> : <i>Self learning : 4 x 60 = 240 min/week</i>
	Tingkatan <i>Module Level</i>	: Sarjana (S1) : <i>Undergraduate</i>
	Penanggung Jawab <i>PIC</i>	: Ir. Ali Fatoni, MT
	Pengajar <i>Lecturer</i>	: Ir. Ali Fatoni, MT : Yusuf Bilfaqih, ST, MT : Zulkifli Hidayat, ST, M.Sc : Dr.Trihastuti Agustinah, ST, MT
	Bahasa <i>Language</i>	: Bahasa Indonesia dan Bahasa Inggris : <i>Bahasa Indonesia and English</i>
	Persyaratan dan Peraturan <i>Requirement and Regulation</i>	: Setiap mahasiswa harus menghadiri setidaknya 75% dari jumlah perkuliahan untuk dapat mengikuti ujian : <i>A student must have attended at least 75% of the lectures to sit in the exams</i>

Deskripsi Mata Kuliah

Description of Course

Pada mata kuliah ini mahasiswa akan mempelajari prinsip dan metode statistik dan proses stokastik beserta aplikasinya di bidang teknik elektro. Pada bagian pertama dijelaskan mengenai deskripsi visual dan kualitatif data, probabilitas, variabel acak diskrit dan kontinyu, distribusi probabilitas, distribusi gabungan, pencuplikan acak, estimasi parameter, interval statistik, uji hipotesa, dan regresi linier. Selain itu akan dibahas desain eksperimen dan analisa data hasil pengukuran. Sedangkan pada bagian kedua dijelaskan tentang konsep proses stokastik, analisa sistem linier kontinyu dan diskrit dengan bantuan konsep probabilitas dan proses stokastik baik dalam domain waktu dan frekuensi serta proses Markov.

In this course students will learn the principles and methods of statistics and stochastic processes and their applications in electrical engineering. First part describes the visual and qualitative descriptions of data, probabilities, discrete and continuous random variables, probability distributions, combined distributions, random sampling, parameter estimation, statistical intervals, hypothesis testing, and linear regression. In addition, an experimental design and analysis of measurement data will be

discussed. Whereas in the second part explained the concept of stochastic processes, continuous and discrete linear system analysis with the help of the concept of probability and stochastic processes both in the time and frequency domains and the Markov process.

CPL Prodi yang Dibebankan

Learning Outcomes

(CPL-01) Mampu menerapkan ilmu pengetahuan alam dan matematika pada bidang teknik elektro
(PLO-1) Capable to apply knowledge of natural sciences and mathematics to solve electrical engineering problem

(CPL-11) Mampu menerapkan metode, ICT, dan perangkat modern dalam penyelesaian permasalahan dibidang teknik elektro

(PLO-11) Capable to apply methods, ICT, and modern devices in solving problems in the field of electrical engineering

Capaian Pembelajaran Mata Kuliah

Course Learning Outcomes

(CPMK-01) Menguasai konsep dan prinsip statistik dan penerapannya untuk analisis dan perancangan pada sistem tenaga listrik, sistem pengaturan, telekomunikasi multimedia, atau elektronika

(CLO-01) Mastering concepts and principles of statistics and their application to analysis and design electric power systems, control systems, multimedia telecommunications, or electronics.

(CPMK-02) Konsep probabilitas, konsep variabel acak, konsep proses acak dalam sistem elektrik, karakteristik sistem LTI baik kontinyu maupun diskrit jika diberi masukan proses acak, serta konsep proses Markov

(CLO-02) Mastering the concept of probability, the concept of random variables, the concept of random processes in electrical systems, the characteristics of the LTI system both continuous and discrete if given random process input, as well as the concept of the Markov process

(CPMK-03) Mampu mendesain eksperimen dengan prinsip statistik dan menganalisa data hasil pengukuran secara statistik.

(CLO-03) Able to design experiments with statistical principles and analyze measurement data statistically.

(CPMK-04) Mampu memodelkan fenomena acak dalam sistem elektrik, melakukan analisis sistem waktu-diskrit dan waktu-kontinyu dengan bantuan model probabilitas dan stokastik serta mampu menggunakan konsep Markov chain waktu kontinyu maupun diskrit.

(CLO-04) Able to model random phenomena in electrical systems, conduct discrete-time and continuous-time system analysis with the help of probability and stochastic models and be able to use continuous and discrete Markov chain concepts.

(CPMK-05) Mampu menggunakan perangkat lunak, misal: Excel, R, Matlab, dll untuk melakukan analisa statistik dan proses stokastik.

(CLO-05) Able to use software, for example: Excel, Matlab, etc. to perform statistical analysis and stochastic processes.

(CPMK-06) Menunjukkan sikap bertanggungjawab atas pekerjaan di bidang keahliannya secara mandiri.

(CLO-06) *Demonstrate an attitude of responsibility for work in his area of expertise independently.*

Topik/Pokok Bahasan

Main Subjects

1. Pengantar dan aplikasi statistik di teknik elektro
Introduction and application of statistics in electrical engineering
2. Representasi statistik deskriptif data dengan teknik numerik dan grafis: histogram, pie chart. Lokasi, sebaran dan variabilitas.
Descriptive statistical representation of data with numerical and graphical techniques: histograms, pie charts. Location, distribution and variability.
3. Konsep-konsep dasar dari probabilitas, probabilitas bersyarat, variabel acak, distribusi probabilitas, distribusi gabungan.
Basic concepts of probability, conditional probabilities, random variables, probability distributions, combined distributions.
4. Estimasi parameter, distribusi sampling, dan teorema batas tengah, Interval keyakinan pada parameter untuk satu sampel
Parameter estimation, sampling distribution, and middle limit theorem, confidence interval for parameters for one sample
5. Uji hipotesa
Hypothesis test
6. Regresi linier: asumsi model. Metode least-squares
Linear regression: assumption of the model. The least-squares method
7. Desain eksperimen dan analisa statistik pada permasalahan di teknik elektro
Experimental design and statistical analysis of problems in electrical engineering
8. Proses Acak
Random Process
9. Respon Linier Time Invarian (LTI) dengan Input Acak
Linear Time Invariant (LTI) response with Random Input
10. Markov Chain
Markov Chain

Pembelajaran dan ujian

Study and examination

- Latihan di kelas
In-class exercises
- Tugas 1, 2, 3
Assignment 1, 2, 3
- Ujian tengah semester
Mid-term examination
- Ujian akhir semester
Final examination

Pustaka

Reference(s)

- [1] William M. Mendenhall & Terry L. Sincich, "Statistics for Engineering and the Sciences," 6th ed., CRC Press, 2016.
- [2] Jay L. Devore, "Probability and Statistics for Engineering and the Sciences," 9th ed., Cengage Learning, 2016.
- [3] Richard A. Johnson, "Probability and Statistics for Engineers," 9th ed., Pearson, 2018.



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- [4] Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, & Keying Ye, "Probability and Statistics for Engineers and Statistics," 9th ed., Prentice Hall, 2012.
- [5] Roy D. Yates & David J. Goodman, "Probability and Stochastic Processes, A Friendly Introduction for Electrical and Computer Engineers", 3rd ed, John Wiley.
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Prasyarat***Prerequisite(s)***

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