

<b>Mata Kuliah</b> <b>Course</b>	Nama MK <i>Name</i>	: Jaringan dan Rekayasa Trafik <i>: Networks and Traffic Engineering</i>
	Kode MK <i>Code</i>	: EE184533
	Kredit <i>Credit</i>	: 4 sks
	Semester <i>Semester</i>	: V (Wajib) <i>: V (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 = 200 min/week</i> <i>Self learning : 4 x 60 = 240 min/week</i>
	Tingkatan <i>Module</i> <i>Level</i>	: Sarjana (S1) <i>: Undergraduate</i>
	Penanggung Jawab <i>PIC</i>	: Ir. Gatot Kusrahardjo, MT
	Pengajar <i>Lecturer</i>	: Ir. Gatot Kusrahardjo, MT : Dr. Ir. Suwadi, MT
	Bahasa <i>Language</i>	: Bahasa Indonesia dan Bahasa Inggris <i>: Bahasa Indonesia and English</i>
	Persyaratan dan Peraturan <i>Requirement</i> <i>and</i> <i>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*

Jaringan dan Rekayasa Trafik membahas tentang jaringan yang meliputi evolusi teknologi jaringan telekomunikasi, sistem transmisi, sistem switching, switching time-division, kontrol sistem switching, pensinyalan, dan paket switching. Rekayasa trafik telekomunikasi membahas karakterisasi trafik, model matematik trafik, sistem rugi (Erlang B) dan sistem antrian (Erlang C), peramalan demand dan trafik rekayasa jaringan telekomunikasi.

*Network and Traffic Engineering discusses networks which include the evolution of telecommunications network technology, transmission systems, switching systems, time-division switching, system switching control, signaling, and packet switching. Telecommunications traffic engineering discusses traffic characterization, traffic mathematical models, loss systems (Erlang B) and queuing systems (Erlang C), forecasting telecommunications network engineering demand and traffic.*

### CPL Prodi yang Dibebankan

#### *Learning Outcomes*

(CPL-03) Mampu mendesain komponen, sistem, dan proses yang logis dan realistis sesuai dengan spesifikasi yang ditentukan dengan mempertimbangkan aspek keselamatan, sosial, budaya, lingkungan, dan ekonomi

*(PLO-03) Capable to design logical and realistic components, systems and processes in accordance with specified specifications by considering safety, social, cultural, environmental and economic aspects*

(CPL-05) Mampu mengidentifikasi, memformulasikan dan menyelesaikan permasalahan dibidang teknik elektro

*(PLO-05) Capable to identify, formulate and solve problems in the field of electrical engineering*

(CPL-10) Mampu mengetahui dan menyikapi perkembangan terkini dibidang ilmu pengetahuan dan teknologi dengan mengedepankan nilai-nilai universal

*(PLO-10) Capable to know and respond to the latest developments in science and technology by promoting universal values*

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### **Capaian Pembelajaran Mata Kuliah**

#### **Course Learning Outcomes**

(CPMK-01) Menguasai konsep dasar jaringan, perkembangan jaringan telefoni dan rekayasa trafik telekomunikasi serta mampu merencanakan kapasitas sistem pada kasus jaringan telekomunikasi.

*(CLO-01) Mastering the basic concepts of networks, the development of telephony networks and telecommunications traffic engineering and able to plan system capacities in the case of telecommunications networks.*

(CPMK-02) Mampu menganalisis dasar jaringan, perkembangan jaringan telefoni dan rekayasa trafik telekomunikasi serta mampu merencanakan kapasitas sistem pada kasus jaringan telekomunikasi.

*(CLO-02) Able to analyze the basis of the network, the development of telephone networks and telecommunications traffic engineering and be able to plan system capacity in the case of telecommunications networks.*

(CPMK-03) Mampu menggunakan software Matlab untuk melakukan pembangkitan model matematik trafik dan membuat model simulasi sistem rugi dan sistem antrian.

*(CLO-03) Able to use Matlab software to generate traffic mathematical models and create system loss simulation models and queuing systems.*

(CPMK-04) Menunjukkan sikap bertanggung jawab atas pekerjaan di bidang keahliannya secara mandiri.

*(CLO-04) Demonstrating attitude of responsibility on work in his/her field of expertise independently.*

(CPMK-05) Bekerja sama untuk dapat memanfaatkan semaksimal mungkin potensi yang dimiliki.

*(CPMK-05) Working together to be able to make the most of their potential.*

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### **Topik/Pokok Bahasan**

#### **Main Subjects**

1. Perkembangan telekomunikasi  
*Development of telecommunications*
2. Transmisi telekomunikasi  
*Telecommunication transmission*
3. Evolusi sistem switching  
*Evolution of switching systems*
4. Sistem switching  
*Switching system*
5. Switching time-division  
*Switching time-division*
6. Kontrol sistem switching  
*Control switching systems*
7. Pensinyalan  
*Signaling*
8. Paket switching  
*Switching packages*
9. Konsep jaringan  
*Network concept*
10. Konsep dasar besaran dan satuan trafik telekomunikasi  
*Basic concept of quantity and unit of telecommunications traffic*
11. Model matematik trafik telekomunikasi.  
*Mathematical model of telecommunications traffic.*
12. Sistem rugi (loss system), Erlang-B.  
*Loss system, Erlang-B*
13. Sistem antrian (queueing system) tak hingga, Erlang-C  
*Unlimited queueing system, Erlang-C*
14. Sistem antrian berhingga.  
*Finite queue system.*
15. Peramalan Trafik dan peramalan demand  
*Traffic forecasting and demand forecasting*

#### **Pustaka**

#### **Reference(s)**

- [1] Thiagarajan Viswanathan, Telecommunication Switching System and Network, Prentice-Hall, 1992
- [2] Gilbert Held, S. Ravi Jagannathan, Practical Network Design Techniques, Second Edition, CRC Press, 2004
- [3] Tarmo Anttalainen, Introduction to Telecommunication Network Engineering 2ed, Artech House, 2003
- [4] Kesidis, G., "An introduction to Communication Network Analysis", Wiley, 2007.
- [5] Iversen, Villy Bæk, "Teletraffic Engineering and Network Planning", Technical University of Denmark, Fotonic, 2015.
- [6] T. S. Rappaport, "Wireless Communications: Principles and Practice", second edition, Prentice Hall, 2002

#### **Prasyarat**

#### **Prerequisite(s)**

- EE184405 Probabilitas, Statistik dan Proses Stokastik  
*EE184405 Probability, Statistics, and Stochastic Processes*
- EE184302 Dasar Sistem dan Jaringan Telekomunikasi  
*EE184302 Introduction to Telecommunication Systems and Networks*



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