



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

1	Nama Mata Kuliah / Course Name : Teknologi Internet of Things / Teknologi Internet of Things
2	Kode Mata Kuliah / Course Code : EE234504
3	Kredit / Credits : 2 SKS
4	Semester / Semester : 5

Deskripsi Mata Kuliah / Course Description

Materi yang dibahas dalam mata kuliah ini meliputi pengenalan sensor, peran jaringan sensor dan teknologi IoT, serta contoh-contoh aplikasi IoT di berbagai bidang. Tidak hanya konsep teknologi yang dipakai, mata kuliah ini juga mengkaji tentang infrastruktur pendukung yang diperlukan untuk mewujudkan aplikasi IoT, baik berupa jaringan LPWAN maupun dashboard/platform cloud yang bisa dimanfaatkan. Selain itu juga membahas berbagai tantangan & konsekuensi logis yang harus dihadapi saat sistem IoT tersebut disambungkan dengan jaringan lain. Dan, setelah memahami seluk beluk jaringan sensor dan teknologi IoT, diharapkan peserta mampu mendesain sendiri proyek IoT perdananya, mengetahui cara kerjanya, mampu mengidentifikasi komponen/divais yang diperlukan untuk membangun sistem tersebut dan memahami bagaimana cara merealisasikannya.

The material covered in this course includes an introduction to sensors, the role of sensor networks and IoT technology, as well as examples of IoT applications in various fields. This course not only covers the technology concepts used but also examines the supporting infrastructure needed to realize IoT applications, including LPWAN networks and cloud-based dashboards/platforms that can be utilized. Additionally, it discusses various challenges and logical consequences that must be faced when the IoT system is connected to other networks. After understanding the ins and outs of sensor networks and IoT technology, participants are expected to be able to design their first IoT project, understand how it works, identify the components/devices needed to build the system, and understand how to implement it.

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

1. (CPL-02) Mampu mengkaji dan memanfaatkan ilmu pengetahuan dan teknologi dalam rangka mengaplikasikannya pada bidang Teknik Elektro, serta mampu mengambil keputusan secara tepat dari hasil kerja sendiri maupun kerja kelompok dalam bentuk laporan tugas akhir atau bentuk kegiatan pembelajaran lain yang luarannya setara dengan tugas akhir melalui pemikiran logis, kritis, sistematis dan inovatif

(PLO-02) Be able to study and utilize science and technology in order to apply it to the field (study program expertise), and able to make appropriate decisions from the results of their own work or group work in the form of a final project report or other forms of learning activities whose output is equivalent to a final project through logical, critical, systematic, and innovative thinking.*

2. (CPL-07) Mampu mengidentifikasi, memformulasikan, menganalisis, dan menyelesaikan permasalahan kompleks di bidang teknik telekomunikasi.
(PLO-07) Able to identify, formulate, analyze, and solve the complex problems in the field of Telecommunication Engineering

3. (CPL-08) Mampu mengetahui dan mengaplikasi metode dan keahlian sesuai perkembangan terkini di bidang ilmu pengetahuan dan teknologi untuk menyelesaikan permasalahan di bidang Teknik Telekomunikasi dengan mengedepankan nilai-nilai universal
(PLO-08) Able to know and apply methods, skills according to the latest developments in the field of science and technology to solve electrical engineering problems by prioritizing universal values

Capaian Pembelajaran Mata Kuliah / Course Learning Outcomes

1. Mampu menjelaskan peran sensor dan WSN dalam teknologi IoT, serta contoh-contoh aplikasinya. / *Able to explain the role of sensors and WSN in IoT technology, as well as examples of their applications.*
2. Mampu memahami standar konfigurasi IoT, model-model protokol layernya dan elemen-elemen sistem yang diperlukan. / *Able to understand the IoT configuration standards, its protocol layer models, and the necessary system elements*
3. Mampu mengenali embedded-divais, jaringan LPWAN dan Dashboard/ Platform IoT Cloud, sebagai infrastruktur pendukung IoT. / *Able to recognize embedded devices, LPWAN networks, and IoT Cloud Dashboard/Platforms as supporting infrastructure for IoT.*
4. Mampu mengenali berbagai jaringan pendukung IoT dan Dashboard/Platform yang bisa dipakai sebagai IoT-Cloud. / *Able to identify various supporting networks for IoT and Dashboard/Platforms that can be used as IoT-Cloud*
5. Mampu mengenali jenis-jenis produk keluarga ARDUINO sebagai divais pendukung untuk implementasi IoT. / *Able to identify the types of ARDUINO family products as supporting devices for IoT implementation.*
6. Mampu membuat contoh desain IoT sederhana dan memahami cara merealisasikannya. / *Able to create a simple IoT design example and understand how to implement it.*

Pokok Bahasan / Contents

1. Sensor, Wireless Sensor Networks (WSN) dan manfaatnya. / *Sensors, Wireless Sensor Networks (WSN) and their benefits.*
2. Arsitektur WSN & Protokol-Protokolnya. / *WSN Architecture & its Protocols.*
3. Internet of Things (IoT) dan contoh-contoh aplikasinya / *Internet of Things (IoT) and examples of its applications.*

4. Standar Internet of Things (IoT). / *Internet of Things (IoT) Standards.*
5. Model-Model Struktur Implementasi IoT / *IoT Implementation Structure Models.*
6. Mengenal Komponen IoT di Pasaran. / *Getting to know IoT Components on the market.*
7. Dashboard & Platform Sebagai Cloud IoT. / *Dashboard & Platform as IoT Cloud.*
8. Jaringan LPWAN di Indonesia. / *LPWAN Networks in Indonesia*
9. Mengenal Keluarga ARDUINO untuk Desain IoT bagi Pemula / *Introducing the ARDUINO Family for Beginner IoT Design.*
10. Mendesain IoT sederhana dan realisasinya / *Designing and Implementing Simple IoT.*

Prasyarat / Pre-requisite

Rangkaian Elektronika, Rangkaian Digital / *Electronic Circuits, Digital System*

Pustaka / Reference

Utama / Primary :

1. Walteneus Dargie, Christian Poellabauer, "FUNDAMENTALS OF WIRELESS SENSOR NETWORKS: THEORY AND PRACTICE", John Wiley and Sons, 2010.
2. B.K. Tripath, J. Anuradha, "Internet of things (IoT): Technologies, Applications, Challenges, and Solutions", CRC Press, Taylor & Francis Group, 2018.
3. S. Cirani, G. Ferrari, M. Picone, L. Veltri, "Internet of Things: Architectures, Protocols and Standards", 1-st edition, John Wiley & Sons Ltd, 2019

Pendukung / Support :

1. K. Sohraby, D. Minoli & T. Znati, "WIRELESS SENSOR NETWORKS: Technology, Protocols, and Applications", John Wiley & Sons, Inc. 2007.
2. C. X. Mavromoustakis, G. Matorakis & J.M. Batalla, "Internet of Things (IoT) in 5G Mobile Technologies", Springer International Publishing Switzerland, 2016.
3. Fei Hu, "Security and Privacy in Internet of Things (IoTs)", CRC Press (Taylor & Francis Group), 2016. Gerd Keiser, "Optical Fiber Communications 4th", Tata McGraw-Hill. Publishing Company Limited, New Delhi, 2008.