

Silabus Mata Kuliah
Program Studi Sarjana Terapan Teknologi Rekayasa Instrumentasi

MATA KULIAH	Nama Mata Kuliah : Tek. Sensor & Transduser
	Kode MK : VI190417
	Kredit : 3 SKS
	Semester : IV

DESKRIPSI MATA KULIAH

Matakuliah Teknologi Sensor dan Transduser ini termasuk dalam rumpun mata kuliah Instrumentasi di PS S. Tr. TRI – ITS. Matakuliah ini membahas tentang prinsip dan mekanisme pengukuran besaran fisis menggunakan sensor, jenis-jenis transduser, karakteristik statik dan dinamik, klasifikasi sensor, aktuator, akuisisi data dan pengondisian sinyal.

CAPAIAN PEMBELAJARAN LULUSAN YANG DIBEKANKAN MATA KULIAH

- Menguasai konsep matematika, ilmu pengetahuan dasar dan keteknikan (P1)
- Menguasai isu terkini dari perkembangan teknologi instrumentasi dunia industri (P3)
- Menguasai konsep sistem instrumentasi, teknik instrumentasi serta penerapannya di bidang industri (P4)
- Mencatat hasil pengukuran atas besaran besaran fisis dalam eksperimen dan system (KK1)
- Menganalisis dan menginterpretasikan data hasil pengukuran berbagai jenis objek pengukuran (KK2)
- Menentukan sensor, sistem, komponen atau proses instrumentasi (pengukuran dan atau kontrol) yang sesuai dengan kebutuhan (secara objektif), dengan pertimbangan realis meliputi ekonomi, lingkungan, etika, kesehatan dan keselamatan, proses produksi dan keberlanjutan. (KK3)
- Mensintesa (mewujudkan/merancang bangun) sebuah rancangan instrumen atau pengukuran dan sistem kontrol, meliputi pemilihan komponen yang tepat (KK4)

- Menguji kinerja dan menganalisa sebuah sistem Instrumentasi (KK5)
- Membuat perangkat lunak dan menerapkan perangkat keras sesuai dengan standar keteknikan yang tepat pada sistem kontrol instrumentasi, (KK7)

CAPAIAN PEMBELAJARAN MATA KULIAH

- Mahasiswa mampu memahami elemen sensor dan transduser yang biasa diterapkan pada dunia industri.
- Mahasiswa mampu mengidentifikasi karakteristik statik dan dinamik dari elemen sensor.
- Mahasiswa mampu menjelaskan prinsip kerja sensor dan transduser secara komprehensif.
- Mahasiswa mampu mengklasifikasikan jenis-jenis sensor sesuai dengan penggunaannya.

POKOK BAHASAN

- Karakteristik statik sensor
- Elemen pengondisian sinyal
- Elemen pemrosesan sinyal
- Elemen penampilan data
- Akuisisi data
- Aktuator
- Elemen-elemen pengindera (*sensing elements*) :
 - Elemen resistif
 - Elemen kapasitif
 - Elemen induktif
 - Elemen elektromagnetik
 - Elemen *thermoelectric*
 - Elemen *piezoelectric*
 - Elemen *piezoresistive*
 - Elemen berbasis elektrokimia
 - Elemen berbasis *Hall effect*

PRASYARAT

- Teknik Pengukuran
- Teknik Kalibrasi

PUSTAKA

Buku:

1. Pallas-Areny, R., Webster, John G., 1991, Sensors and Signal Conditioning, John Wiley & Sons, Inc., New York.
2. Fraden, J., 2004, Handbook Of Modern Sensors : Physics, Designs, and Applications, 3/ed, Springer Science + Business Media, LLC, New York

Silabus Mata Kuliah
Program Studi Sarjana Terapan Teknologi Rekayasa Instrumentasi

COURSE	Course Name : Sensor and Transducer Technology
	Course Code : VI190417
	Credit : 3 sks
	Semester : IV

DESCRIPTION OF COURSE

This course is included in the Instrumentation course category at PS S. Tr. TRI - ITS. This course discusses the principles and mechanisms of measuring physical quantities using sensors, types of transducers, static and dynamic characteristics, sensor classification, actuators, data acquisition and signal conditioning.

LEARNING OUTCOMES

- Understanding the concept of mathematics, science, and engineering (P1)
- Understanding contemporary issues of development of technology in industrial field (P3)
- Understanding the concepts of instrumentation systems, instrumentation techniques and their application in industry (P4)
- Record measurement results on physical quantities in experiments and systems (KK1)
- Analyzing and interpreting data of various measurement objectives (KK2)
- Designing instrument and measuring instrument including sensors selection, a system, component, or process instrumentation/ measurement and/or control to meet desired needs of various tasks/objectives, within realistic constraints such as economic, environmental, ethical, health and safety, manufacturability, and sustainability. (KK3)
- Synthesizing [realize/construction/ manufacturing] of a given design instrument or measurement and control system, including necessary components selection. (KK4)

- Conducting a performance test and analysis of a realized instrument/system (KK5)
- Utilizing the techniques, skills, modern engineering tools (hardware & software) and engineering standards necessary for engineering practice of instrumentation, measurement and control system (KK7)

COURSE LEARNING OUTCOME

- Students are able to understand the sensor and transducer elements commonly used in the industrial world.
- Students are able to identify the static and dynamic characteristics of the sensor element.
- Students are able to explain the working principle of sensors and transducers comprehensively.
- Students are able to classify the types of sensors according to their use.

MAIN SUBJECT

- Static sensor characteristics
- Signal conditioning elements
- Data viewer element
- Data acquisition
- Actuators
- Sensing elements:
 - Resistive elements
 - Capacitive elements
 - Inductive elements
 - Electromagnetic elements
 - Thermoelectric elements
 - Piezoelectric elements
 - Piezoresistive element
 - Electrochemical based elements
 - Hall based elements

PREREQUISITES

- Measurement Techniques
- Calibration Techniques

REFERENCE

Book:

1. Pallas-Areny, R., Webster, John G., 1991, Sensors and Signal Conditioning, John Wiley & Sons, Inc., New York.
2. Fraden, J., 2004, Handbook Of Modern Sensors : Physics, Designs, and Applications, 3/ed, Springer Science + Business Media, LLC, New York