

**Course: Minor  
Computer Instrumentation**

<b>Semester: II</b>	<b>Credits: 2</b>	<b>Subject Code: BSMINELE22302</b>	<b>Lectures: 30</b>
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**Course Outcomes:**

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At the end of this course, the learner will be able to:

- CO1- Recall the basic knowledge of semiconductor devices and their working and use of signal conditioning circuits in a system.
- CO2 - Explain the working principle of sensors and transducers and their classification, Identify and apply the knowledge of sensors in smart instrumentation system
- CO3 - Classify different types of ADC and DAC, apply the knowledge of conversion of digital to analog and vice-versa
- CO4- Apply the knowledge above to understand an instrumentation system.

<b>Unit 1: Basic semiconductor devices and Signal conditioners</b>	15
<ul style="list-style-type: none"> <li>● Introduction to semiconductor: Intrinsic and extrinsic semiconductor P and N-type semiconductor, the study of PN junction diode and its characteristics, LED, Photodiode and optocoupler.</li> <li>● Introduction to signal conditioning - Transistor and its types, concept of amplifier Introduction to MOSFET, Operational amplifier - basic parameters differential and common mode gain, CMRR, the concept of negative feedback, Op-amp as an inverting amplifier, Applications of the Op-amp as an adder, subtractor, and comparator</li> </ul>	

<b>Unit 2: Introduction to Sensors and Data Converters</b>	15
<ul style="list-style-type: none"> <li>● Definition of sensors and transducers. Classification of sensors: Active and passive sensors. Working principle and application of -Temperature sensors (LM-35, ThermistorAD590), optical sensor (LDR), Passive Infrared sensors (PIR), Accelerometer sensors, tilt sensors, touch screen sensors (Capacitive type), ultrasonic sensors, Motion Sensors.</li> <li>● Data Converters - Need of DAC and ADC and its parameters, R-2R ladder network DAC, Flash ADC</li> <li>● Block diagram of smart instrumentation systems</li> </ul>	

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**Reference Books:**

- Bernard Grob, *Basic Electronics* McGraw Hill Publication, 8th Revised Edition, 2010
- D. Patranabis *Sensors and Transducers* PHI publication, 2nd Edition
- Prof A.D. Shaligram *Sensors and Transducers*
- Ramakant Gaykwad, *Op Amp and Linear Integrated Circuits*
- V.K. Mehta, *Principles of Electronics*, Chand and Co.

**Websites:**

- <http://www.electronicsforu.com/newelectronics/default.asp>
- <https://www.instructables.com/id/Basic-Electronics/>
- <https://www.instructables.com/id/Basic-Electronics/>
- <https://electronicsforu.com/>
- <https://www.howstuffworks.com/>
- <https://www.instructables.com>
- <https://nptel.ac.in/courses/122/106/122106025/>
- <https://nptel.ac.in/courses/117/103/117103063/>



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Chairperson (HoD)	Swatee Sarwate, Asst. Prof,		
Faculty	Anitha Menon, Asst. Prof,		
Subject Expert (Outside SPPU)	Dr.Sangeeta Kale, Professor		
Subject Expert (Outside SPPU)	Dr. Rajshree Jain		
VC Nominee (SPPU)	Dr. Pravin Yawale –		
Industry Expert	Dr. Umesh N. Hivarkar		
Alumni	Ms. Purna Polekar -		

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