



## Course Coordinators

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# Brochure/Flyer

## AICTE Training And Learning (ATAL) Academy

Online Faculty Development Program on

Neuronal Dynamics and Neuromorphic Computing

October 19-23, 2020



**About IIT Patna (Institute Details):** IIT Patna is an institute of National importance by an Act of the Indian Parliament in 2008. It is ranked 108 among BRICS nations by the QS World University Rankings of 2018. It is ranked 22 among engineering colleges in India by the NIRF 2019.

IIT Patna has ten departments: These are Computer Science & Engineering, Electrical Engineering, Mechanical Engineering, Chemical and Biochemical Engineering, Civil & Environmental Engineering, Materials Science & Engineering, Chemistry, Physics, Mathematics and Humanities & Social Science departments.

IIT Patna's permanent campus fully residential is located at Bihta, 35 km from Patna and 20 km from Ara, at a 501 acres site. The nearest railway station is Bihta, 2 km from the campus. IIT Patna has good road connectivity to and from Patna and Ara. Regular bus services have been provided by the Govt. of Bihar from Gandhi Maidan, Patna to IIT Patna campus. The nearest airport to reach IIT Patna campus is Jai Prakash Narayan Domestic Airport, Patna, which is located 5 km southwest of Patna.

**About EE Department:** The Department of Electrical Engineering (EE) has been evolving since the inception of IIT Patna in the year 2008. The major objective of the department is to impart high quality education and research. The department offers B. Tech in Electrical and Electronics Engineering, and M. Tech in Communication System Engineering, and VLSI and Embedded Systems. Ph.D. program in various specialized areas of Electrical Engineering. EE Department is executing research projects sponsored by external funding agencies.

**About CSE Department:** A journey to the global academic summit that touches every aspect of national life in its wake is the primary goal of the department of CSE. The department came into existence in 2008 with miniscule faculty strength and minute undergraduate student body. This inadequacy was no deterrent to its bold decision to start the doctoral program right away. The department has not looked back since then. It has witnessed a manifold raise in the size of the vibrant student body. Presently, all efforts are geared towards making this the first choice of aspiring undergraduates. This is being groomed to be the favored destination for research scholars brimming with ideas.



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### Contact Details Coordinator

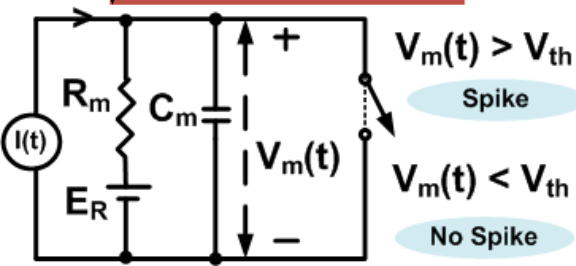
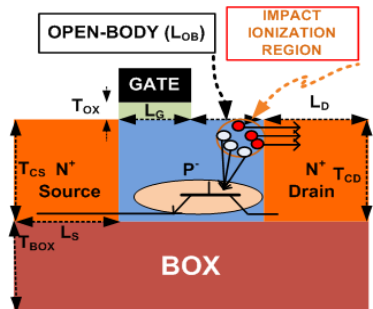
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**Who Can Attend?** The course is intended to future researchers (UG/PG students) and faculty members having general introductory background of VLSI, Digital Electronics, Microelectronics, Semiconductor Devices, and circuits.



Dates	10:00 AM to 11:30 AM	11:30 AM to 12:00 PM	12:00 PM to 1:30 PM	1:30 PM to 2:30 PM	2:30 PM to 4:00 PM	4:15 PM to 4:45 PM
Day # 1	Registration and Inauguration	High Tea	Session 1 Introduction to neuroscience and neurons	Lunch	Session 2 Mathematics of Neuron and Synapse	Tea
Day # 2	Session 3 RC Models of Neuron and Synapse	Tea	Session 4 IF and LIF Models	Lunch	Session 5 Hands-on Session: Simulation Lab	Tea
Day # 3	Session 6 Basic Building blocks for Silicon Neurons	Tea	Session 7 Supervised and Unsupervised Learning	Lunch	Session 8 Hands-on Session: Simulation Lab	Tea
Day # 4	Session 9 ANN and SNN	Tea	Session 10 Electronics for ANN and SNN	Lunch	Session 11 Hands-on Session: Simulation Lab	Tea
Day # 5	Session 12 Part-I Analog and Digital Electronics for ANN and SNN	Tea	Session 13 Part-II Analog and Digital Electronics for ANN and SNN	Lunch	Session 14 Application in ANN and SNN	Valediction

**About Course:** This course aims to provide theoretical and computational aspects of neuroscience and how the same can be extended for modern digital computing which can be highly energy efficient. The concept of single Silicon neuron and its theoretical modeling for the development of basic computation building blocks. Transferring aspects of structure and function from biological substrates to electronic circuits.

### Course Description:

**Neuronal Dynamics:** Overview of neuroscience, neurons and synapses. First order resistive-capacitive (RC) models for passive membrane and neuron. Integrate-and-fire and Leaky-integrate fire (LIF) models. Realizing LIF behavior through Silicon neuron.

**Neuromorphic Computing:** Concepts and overview of brain inspired computing, supervised and unsupervised learning. Artificial neural network (ANN), third generation spiking neural network (SNN).

Hardware implementation and realization of ANN and SNN. Application of neuromorphic computing for recognition and decision making for machine learning (ML).