

ABOUT COURSE

Why the course on Semiconductors in Design and Development of MEMS?

Miniaturization and capability to have higher performance with lower cost are basic characteristics of MEMS technology that make it especially attractive and beneficial in diverse applications. For these reasons MEMS components are inevitable in the future devices. Semiconductors are one of the promising materials used to deploy various required characteristics in MEMS. This program would enable participants to understand and learn semiconductors and its processing for design of MEMS. Unique part of this course is blend of characterization and fabrication methodologies pertaining to MEMS through practical exposures.

COURSE OBJECTIVES

The objective of this course is

- To provide architecture of Micro-electromechanical Systems (MEMS)
- To impart knowledge about various materials useful for MEMS
- To provide design principles of MEMS particularly using semiconducting materials.
- To provide understanding of fabrication and characterization of silicon based MEMS

COURSE OUTCOMES

After successful completion of course participant will be able to

- Select the appropriate material for functional MEMS
- Design the silicon based MEMS for the end use application
- Articulate manufacturing and assembly process plan for the designed MEMS.
- Investigate and select characterization techniques for the developed MEMS.

SIGNIFICANCE OF COURSE

This course will provide more insight to the participants for using/developing/researching semiconductor based MEMS devices in their respective organizations for several innovative practical solutions.

REGISTRATION PROCESS

- Participant shall register for the course as per the specified process of AICTE Training and Learning (ATAL) Academy.
- Visit <https://www.aicte-india.org/atal> for registration
- Refer ATAL scheme document for assessment criteria to receive certificate and distinction

RESOURCE PERSONS

The program will be conducted by eminent speakers from industry and academia.

COURSE SCHEDULE

Duration : 08th – 13th January 2024
Timing : 09:00 am to 5:30 pm
Mode : Face to Face (Offline)

WHO SHOULD ATTEND THE COURSE

This course is useful for engineers of different disciplines aspiring towards knowledge of semiconductors in design and development of MEMS for various applications ranging from automobile, biomedical etc. The course will be most beneficial for:

- Engineering post-graduates (M.E./M. Tech. in Mechanical, Production, Automobile, Aerospace, Bio-medical, Electrical, Electronics, Chemical Engineering)
- Professionals in Design, Manufacturing industry Faculty members from academic and research institutions
- PhD scholars

CONTACT FOR MORE INFORMATION

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All India Council for Technical Education
(AICTE) Training and Learning (ATAL)
Academy

Sponsored One Week offline
Faculty Development Program

on

“SEMICONDUCTORS IN DESIGN AND
DEVELOPMENT OF MICRO-
ELECTROMECHANICAL SYSTEMS

08th - 13th January 2024



Coordinator
Dr. Kiran S. Bhole
Dean (R&D) and
Associate Professor

Mechanical Engineering Department

Organized By
Mechanical Engineering Department
Bharatiya Vidya Bhavan's
Sardar Patel College of Engineering

(Government Aided Autonomous Institution Affiliated to University of

Mumbai)

Telephone: 91-22-262 32 192 / 262 89 777
Fax: 91-22-262 37 819 |

URL : www.spce.ac.in

ABOUT THE INSTITUTE



Sardar Patel College of Engineering (SPCE) under the management of the Bhartiya Vidya Bhavan, was founded by Kulapati Dr. K. M. Munshi. It was established to meet the growing demand for engineering talent.

The foundation stone of the college was laid on 17th September 1961 by Shri. Y. B. Chavan (the then Chief Minister of Maharashtra who later became the Defence Minister of India).

The college was inaugurated by the first Prime Minister of Independent India, Pandit Jawaharlal Nehru in 1962. The college is dedicated to Sardar Vallabhbhai Patel, an eminent nation builder of independent India.

SPCE has celebrated its diamond jubilee in the year 2022 by organizing AICTE, SERB and CSIR sponsored Sardar Patel International Conference on Industry 4.0 - Nascent Technologies and Sustainability for 'Make in India' Initiative 2022 (SPICON-2022).

The college is autonomous and affiliated to the University of Mumbai for the full-time degree, post graduate, and research programs. The institute has set high standards for aspiring engineering students and also meets the need of quality education in the challenging world of business.

Over the last 60 years the college has gained an excellent reputation in the field of Technical Education.

MECHANICAL ENGINEERING DEPARTMENT

Mechanical Engineering Department of Sardar Patel College of Engineering commenced in 1962. The Department offers one undergraduate program (B. Tech in Mechanical Engineering), two postgraduate programs (M. Tech. in Thermal Engineering and M. Tech. in Machine Design) and a Ph.D. program.

The B. Tech. (Mechanical Engineering) program is awarded accreditation (tier-I) by NBA up to 30th June 2025.

The department has several sponsored projects from Science and Engineering Research Board (SERB) in the field of micro-machining and micro fabrication.

The department has modern infrastructure with well-equipped laboratories and computational facilities with up-to-date hardware and software resources. The well qualified and experienced faculty of the department imparts knowledge to the students in the fundamental and applied aspects of Mechanical Engineering courses by adopting conventional as well as the latest teaching and assessment tools. The department also uses DST NIDHI prayas and AICTE IDEA lab to convert ideas into prototype and further to the product development.

OBJECTIVES OF AICTE ATAL ACADEMY

- To set up an Academy which will plan and help in imparting quality technical education in the country
- To support technical institutions in fostering research & innovation and entrepreneurship through training
- To stress upon empowering technical teachers & technicians using Information & Communication Technology
- To utilize SWAYAM platform and other resource for the delivery of trainings
- To provide a variety of opportunities for training and exchange of experiences such as workshops, Orientations, learning communities, peer mentoring and other faculty development programs.
- To support policy makers for incorporating training as per requirements

PATRON



Dr. Sesha Iyer
Chairman, BoG, Sardar Patel College of Engineering



Dr. M. M. Murudi
Principal In-charge, Sardar Patel College of Engineering

ORGANIZING COMMITTEE

Dr. M. M. Murudi	Principal In-Charge
Dr. Anupa Sabnis	Dean Academics
Dr. R. S. Maurya	Head of Mechanical Engineering Department
Dr. Kiran S. Bhole	Course Coordinator
Dr. B. N. Bhasme	Course Co-Coordinator

CONTENTS

- Introduction and Evolution of MEMS
- Semiconductors as promising material for MEMS and their preparation
- Designing MEMS
- Fabrication Processes for MEMS
- Silicon Micromachining : Surface
- Silicon Micromachining : Bulk
- Laser based micromachining on semiconductors
- 3D Micro fabrication (Additive Manufacturing)
- Characterization tools for MEMS and micro structures
- Visit to MEMS and Nanofabrication Laboratory at IIT Bombay
- Visit to DST NIDHI Prayas, AICTE IDEA laboratory and SERB supported experimental setups in host institute



**Bharatiya Vidya Bhavan's
SARDAR PATEL COLLEGE OF ENGINEERING
DEPARTMENT OF MECHANICAL ENGINEERING**



**AICTE'S TRAINING AND LEARNING ACADEMY (ATAL) Sponsored
One Week Faculty Development Program (FDP)**

on

**'SEMICONDUCTORS IN DESIGN AND DEVELOPMENT OF MICRO-ELECTRO MECHANICAL SYSTEMS'
(08th -13th January 2024)**

Program Schedule

Face to Face Mode (Offline) (09:30 am- 5:30 pm)

08/01/2024	09/01/2024	10/01/2024	11/01/2024	12/01/2024	13/01/2024
9:00 – 9:30 Inauguration					
09:30-12:00 Session 1 Dr. Rudra Pratap (IISc Bangalore). Role of Semiconductors in MEMS	9:30 – 12:00 Session 3 Dr. Prasanna S. Gandhi (IIT Bombay) Novel Techniques for Ordered Microfractal Type Structures	9:30 – 12:00 Session 5 Dr. Arnab Bhattacharya (TIFR Mumbai) Metalorganic vapour-phase epitaxy of semipolar III- nitride semiconductors	9:30 – 12:00 Session 7 Dr. Nidhi Maheshwari Head-Biosensor (R&D and Product Development) My Lab Discovery Solutions Pvt. Ltd. Design of Silicon based MEMS Biosensors	9:30 – 01:00 Industrial Visit at INUP IIT Bombay, SAIF IIT Bombay and CEN IIT Bombay	9:30 – 12:00 Session 10 Dr. N. C. Shivprakash (IISc Bangalore) (National Education Policy (NEP) 2020 Implementation)

12:00 – 1:00 Article Discussion	12:00 – 1:00 Article Discussion	12:00 – 1:00 Article Discussion	12:00 – 1:00 Article Discussion		12:00 – 1:00 Reflection Journal
1:00 – 2:00 Lunch	1:00 – 2:00 Lunch	1:00 – 2:00 Lunch	1:00 – 2:00 Lunch	1:00 – 2:00 Lunch	1:00 – 2:00 Lunch
2:00 – 4:30 Session 2 Prof. G. K. Ananthuresh (IISc Bangalore). Design of Compliant MEMS	2:00 – 4:30 Session 4 Dr. Placid Ferreira (University of Illinois Urbana Champaign, USA) Dual Coil Patterned Ultra-Thin Silicon Films	2:00 – 4:30 Session 6 Dr. Nitin Kale, (Co-founder and Chief Technology Officer Nanosniff Technologies) MEMS Instrumentation	2:00 – 4:30 Session 8 Dr. Pradeep Dixit (IIT Bombay) Design for Packaging Semiconductor based MEMS	2:00 – 4:30 Session 9 Dr. K. Nageswari (IIT Bombay) Characterization Tools and Techniques for MEMS and About INUP i2i	2:00 – 4:00 MCQ, Feedback & Interactions
4:30 – 5:30 Practical sessions/Labs (Hands on Experimental Setup for Microfabrication Developed from SERB Projects)	4:30 – 5:30 Practical sessions/Labs (Hands on Experimental Setup for Microfabrication Developed from SERB Projects)	4:30 – 5:30 Practical sessions/Labs (Hands on Experimental Setup for Microfabrication Developed from SERB Projects)	4:30 – 5:30 Practical sessions/Labs (Hands on Laboratory facility in DST NIDHI Prayas and AICTE IDEA LAB)	4:30 – 5:30 Practical sessions/Labs (Hands on Laboratory facility in DST NIDHI Prayas and AICTE IDEA LAB)	4:00 – 5:00 Valedictory Session