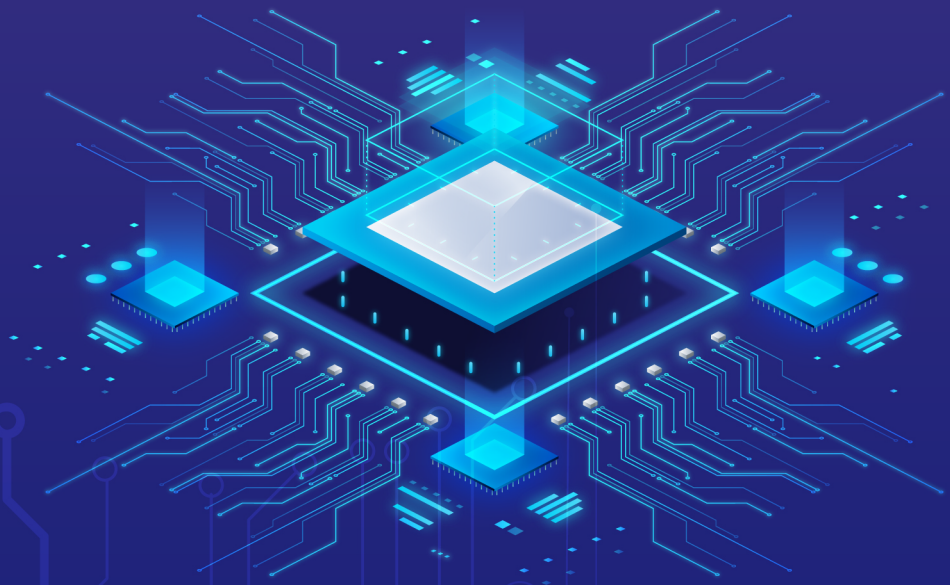
India Semiconductor Workforce Development Program

Shaping the Global Semiconductor Landscape: India Leads with Innovation and Expertise. Collaborate, Innovate, and Transform with the India Semiconductor Workforce Development Program.



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About this Program

The India Semiconductor Workforce Development Program: A Global Vanguard

In today's swiftly evolving tech landscape, semiconductors emerge as the cornerstone not merely of digital devices but of revolutionary technologies that are reshaping our world. They are essential for the development and deployment of innovations that push the boundaries of what technology can achieve. In light of this critical role, a landmark collaboration between the prestigious Indian Institute of Science (IISc), Synopsys Inc., USA, and Samsung Semiconductor India Research (SSIR) has given rise to the India Semiconductor Workforce Development Program (ISWDP). This initiative stands as a testament to the strategic importance of fostering a skilled workforce that can keep pace with global semiconductor demands. This partnership also opens doors to industry-sponsored fellowships. The merit-based fellowships offered by Samsung are designed to recognize and reward exceptional talent among participants, making the program even more attractive. But why is this program pivotal, and how does it extend its relevance beyond the borders of India to the global stage? Visit ISWDP (https://iisc-iswdp.org/about.php) to discover more about our mission and vision.

01 What is the India Semiconductor Workforce Development Program (ISWDP)?

The India Semiconductor Workforce Development Program (ISWDP) is a unique and comprehensive initiative tailored to bridge the process technology and device design skill gap in the swiftly expanding semiconductor sector. It's a meticulously designed course, covering the foundations, diving deep into the nuances of device/technology development skills, and offering a hands-on approach through a microelectronics lab experience. Beyond the core curriculum, the program provides an unparalleled practical experience, offering students and industry professionals the chance to work on state-of-the-art research and development tools that are used by the semiconductor industry for semiconductor device and technology development.

Furthermore, ISWDP also bridges the gap between academic theories and real-world applications. The curriculum is crafted to overwhelm and fascinate participants to pursue a career in semiconductors, to think beyond textbooks, and to understand the intricacies involved in the development of semiconductor technology. The live virtual program comprises four levels, i.e., Level 1, Level 2, Advance, and Custom. Launched in March 2024, the program runs 4 cohorts throughout the year (view the schedule here: https://iisc-iswdp.org/schedule.php). The program has successfully completed three cohorts with over 1500 participants from both industry and academia. To read what our participants have to say, click here or scan the QR Code.

Scan to Know More

02 Our Vision

The India Semiconductor Workforce Development Program (ISWDP) aims to position India at the forefront of the global semiconductor industry. Our vision extends beyond technological advancement; we aspire to spark a national enthusiasm for semiconductors, paralleling the excitement surrounding fields like artificial intelligence and computer science. Through ISWDP, we are committed to transforming education by seamlessly integrating academic knowledge with real-world industry demands. This approach not only enriches learning but also prepares a new generation of engineers and technologists to lead and innovate within the global semiconductor landscape.

We are dedicated to creating educational experiences that are not just informative but truly transformative, enabling students and professionals to grasp the intricacies of semiconductor technologies and their applications. Our program is crafted to inspire curiosity and drive innovation, ensuring that participants are well-equipped to contribute to and lead in the rapidly evolving tech world.

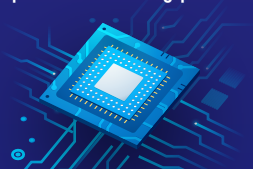
For a deeper understanding of our ambitious vision and the strategic expansion plans set to unfold over the next few years, we invite you to read the detailed interview published by Electronics For You: https://www.electronicsforu.com/technology-trends/interviews/we-intend-to-expose-5000-people-to-chip-design-development-manufacturing-processes-in-three-years.

03 Our Objectives

The India Semiconductor Workforce Development Program is strategically designed to achieve critical goals that support both the growth of India's semiconductor industry and the global technological landscape:

- Developing Skilled Professionals: At the core of our mission is the commitment to cultivate a robust pipeline of skilled and highly inspired professionals. Through innovative education that blends rigorous academic coursework with practical, hands-on training, and active industry collaboration, we aim to equip participants with the advanced skills necessary to drive forward India's semiconductor industry. Our comprehensive approach ensures that graduates are not only knowledgeable but also capable of contributing to and leading in a highly competitive field.

- Cultivating Future Leaders: We are dedicated to inspiring and preparing the next generation for a future in semiconductors—this includes students, faculty, engineers, and professionals. Our program is designed to foster expertise, encourage innovation, and develop the skills necessary for global leadership. By exposing participants to the frontiers of semiconductor technology and its applications, we aim to ignite a lifelong passion for this dynamic field, setting them on a path to becoming pioneers of technological advancement.



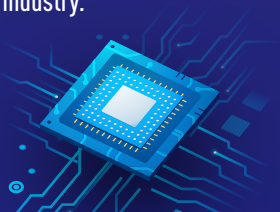
- Bridging Talent Gaps: A key objective of ISWDP is to serve as a bridge between industry demands and academic output. Having closely worked with semiconductor fabs and various development centers, we have identified the specific skills and capabilities required by the industry. Our program is tailored to prepare individuals who not only meet these requirements but are also primed for further training and specialization.

Together, these objectives underscore our dedication to enriching the semiconductor ecosystem with talented individuals who are prepared to innovate, lead, and excel at a global level.

04 Role of ISWDP in Mitigating the Global Semiconductor Shortage by Boosting India's Presence

Semiconductors are the cornerstone of modern technology, indispensable across sectors from consumer electronics to national defense systems. In recent years, the global demand for skilled semiconductor professionals has surged as technology becomes increasingly integral to our lives and industries. This escalating demand, coupled with India's proactive strides in semiconductor fabrication and manufacturing, underscores the critical need for initiatives like the India Semiconductor Workforce Development Program (ISWDP). It's worth highlighting that the ISWDP isn't merely a reactionary measure to the current global semiconductor workforce shortage; it's a forward-thinking solution that prepares India to meet both current and future challenges in the semiconductor sector. By 2030, the program is poised to significantly bolster the pool of skilled professionals, ready to address and propel the global semiconductor landscape.

Leveraging the Indian Institute of Science's (IISc) century-long legacy of academic excellence and its distinction as an Institute of Eminence, the ISWDP is uniquely positioned to nurture exceptional talent. This talent development is aligned with the needs of semiconductor fabs in India, reducing dependency on international imports and enhancing domestic capabilities. The program's curriculum is meticulously designed to provide undergraduate and postgraduate students with practical, hands-on training in semiconductor process and device design skills required in semiconductor product development. Moreover, The ISWDP is committed to doing more than just filling jobs or training engineers; it aims to cultivate the next generation of leaders who will drive India to a prominent position in the competitive global semiconductor industry. This commitment has gained renewed vigor following recognition and support from the Honorable Minister of Electronics and Information Technology, Government of India. With this endorsement, the ISWDP is more dedicated than ever to providing comprehensive training to students and professionals, ensuring they are well-prepared to meet the demands and challenges of the semiconductor industry.



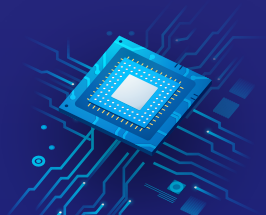
05 Benefits for Industries and Academic Institutions

The India Semiconductor Workforce Development Program (ISWDP) is a cornerstone for individuals and institutions aiming to excel in the semiconductor industry. It offers an avenue to delve deep into semiconductor technology, equipping participants with both foundational and advanced knowledge. This comprehensive program, supported by IISc and industry leaders such as Synopsys and Samsung Semiconductor India Research, offers a multifaceted approach to learning, blending academic rigor with practical industry insights. Whether you're a fresh graduate or an industry professional, the program offers something for everyone, ensuring a clear path to leadership in the semiconductor domain

A. For Students

The program won't just teach; it will inspire. It will encourage students to visualize the processes and to connect the dots between what they learn and how it applies in the industry. It gives practical experience in semiconductor design and process, preparing the students to tackle industry challenges immediately upon graduation. The program benefits students through:

- Hands-On Learning: Students engage with advanced computational tools like TCAD (Technology Computer-Aided Design), providing a real-world grasp of semiconductor design and process.
- Industry-Relevant Skills: The curriculum covers the entire gamut of semiconductor development, from fundamental concepts to complex device processes and device design techniques, ensuring that students are well-prepared for the industry.
- Real-World Application: The integration of theoretical knowledge with practical applications allows students to experience and solve real semiconductor problems.
- Internship Opportunities: Students can access merit-based internships in both virtual and physical formats, complete with certifications, enhancing their practical experience and industry relevance.
- Project Implementation: The program encourages students to propose and implement their projects, fostering creativity and problem-solving skills.
- Samsung Fellowships: The merit-based fellowships offered by Samsung Semiconductor India Research are designed to recognize and reward exceptional talent among participants. The fellowship, which is divided into the following four grades, will be mentioned in the participation certificate.
    - Grade I: 100% Fee waiver on "Level 1, Level 2 and Advanced" together & 50% Fee waiver on "Level 2 Hands-on and Advanced Hands-on" together. This comes as a bundle package.
    - Grade II: 75% Fee waiver on "Level 1, Level 2 and Advanced" together & 50% Fee waiver on "Level 2 Hands-on and Advanced Hands-on" together. This comes as a bundle package.



- Grade III: 50% Fee waiver on "Level 1, Level 2 and Advanced" together & 50% Fee waiver on "Level 2 Hands-on and Advanced Hands-on" together. Here, the "Level 1, Level 2 and Advanced" training comes as a bundle package and is mandatory, whereas the "Level 2 Hands-on and Advanced Hands-on" training is optional and comes as a separate bundle package.
- Grade IV: 25% Fee waiver on "Level 1, Level 2 and Advanced" together & 50% Fee waiver on "Level 2 Hands-on and Advanced Hands-on" together. Here, the "Level 1, Level 2 and Advanced" training comes as a bundle package and is mandatory, whereas the "Level 2 Hands-on and Advanced Hands-on" training is optional and comes as a separate bundle package.

B. For Aspiring Professionals

For those already in the field or looking to enter, ISWDP, when participants credit all the offered levels, provides tools and experiences to deepen their expertise and advance their careers:

- Interactive Sessions: Led by experts, these sessions delve into the complexities of semiconductor processes, enhancing understanding and sparking curiosity.
- Problem-Solving Workshops: Participants tackle industry-relevant scenarios that hone their analytical and problem-solving skills, preparing them for real-world challenges.
- Exposure to Industry Practices: Our collaborations with leading technology companies enable participants a firsthand look at the semiconductor industry's practices, challenges, and innovations.
- Custom Modules: Thanks to growing industry interest, ISWDP offers custom modules on specialized topics like Fabrication, Characterization, and Packaging at no additional cost, ensuring that learning is continually updated and relevant.

C. For Academic Institutions

Academic institutions can reap numerous benefits by participating in ISWDP. The program offers substantial educational opportunities and unique advantages that enhance its curriculum and reputation for its generations of students. These include:

- Bulk Registrations: Institutions benefit from attractive discounts on bulk registrations, making advanced education more accessible to their students.
- New Technical Offerings: The program continuously expands its offerings, introducing Custom modules sponsored by prominent industry players starting from Cohort 3 in September 2024.
- Internship Opportunities: Institutions can facilitate merit-based internships for their students, providing valuable industry exposure and experience.
- Certificates of Appreciation: Institutions supporting and encouraging their students to pursue a career in semiconductors receive acknowledgment certificates from the program, enhancing their prestige and demonstrating their commitment to cutting-edge technological education.

D. A Boost for Industries

The global semiconductor shortage presents not only a workforce gap but also a broad supply chain and production challenge. By equipping a new generation of engineers with the necessary skills, ISWDP helps industries innovate faster, maintain higher quality standards, and find quicker solutions to complex problems, thereby enhancing the overall health and capacity of the semiconductor industry.

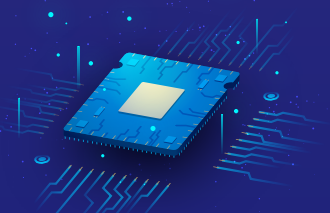
06 Impact on Society: Catalyzing Change through Semiconductor Excellence

The India Semiconductor Workforce Development Program (ISWDP) transcends the traditional boundaries of an educational initiative; it embodies a national movement poised to elevate India to a leading position in the global semiconductor landscape. This visionary program does more than impart technical knowledge—it inspires societal transformation and economic revitalization.

- Economic Growth: ISWDP will become a crucial pivot point for India's economic strategy. By nurturing a homegrown talent pool skilled in high-tech semiconductor production, the program would directly boost India's economic resilience. As these professionals enter the workforce, their expertise will enable the expansion of domestic semiconductor manufacturing capabilities, reducing the nation's dependency on semiconductor imports. This shift not only supports the local economy but also positions India as a critical player in the global supply chain, attracting foreign investment and fostering technological advancements.

- Innovation Ecosystem: The ripple effects of ISWDP will be profoundly felt within the innovation ecosystem. Graduates from the program will not just be skilled in semiconductor processes and design principles; they will also be inspired to eventually become pioneers of future technology. Trained to acquire cutting-edge knowledge and practical skills, the spark that we produce is expected to lead them toward taking charge of developing new technologies and innovative solutions. The contributions of these inspired graduates would be the key to addressing some of the most pressing global challenges, from sustainable energy solutions to advanced information technologies, thereby reinforcing India's status as a hub of technological innovation.

- National Security: Strengthening India's semiconductor capabilities has strategic implications beyond economics and innovation; it is pivotal to national security. In an era where technology underpins much of our defense infrastructure, having a robust, self-sufficient semiconductor industry safeguards India's technological sovereignty. This strategic autonomy is critical in maintaining security and gives the nation a competitive edge on the global stage.



07 Why Now? Seizing the Semiconductor Renaissance

The global semiconductor industry is currently experiencing a dynamic renaissance. These tiny yet powerful components are crucial in powering everything from our everyday smartphones to groundbreaking technologies like artificial intelligence and quantum computing. This surge in demand and utility marks the current decade, 2020-2030, as the "decade of semiconductors."

Strategic Timing for a Strategic Move: India stands at a pivotal moment in its technological evolution. With its strategic positioning and growing capabilities in the semiconductor sector, coupled with increasing demand from a diverse range of industries, India is on the cusp of becoming a global leader in this critical market. The timing could not be more opportune for such an initiative as the India Semiconductor Workforce Development Program (ISWDP).

Driving Factors for the Urgency of ISWDP

- Technological Advancements: As technologies evolve at an unprecedented rate, the dependency on semiconductors continues to escalate. This is not just in terms of quantity but also in the complexity and capability of semiconductor technology required to drive these innovations.
- Market Demand: The demand for more sophisticated semiconductor components is booming across various sectors, including telecommunications, automotive, healthcare, and consumer electronics. This demand is not just a temporary surge but a long-term trend that will shape the future of these industries.
- National Economic Strategy: : For India, developing a strong semiconductor industry is not just about meeting domestic or global demand. It's about establishing a strategic industry that can enhance economic stability, reduce dependence on imports, and position India as a hub of innovation and manufacturing in the global economy.
- Skilled Workforce Development: There is a critical need for skilled professionals who can not only understand the intricacies of semiconductor process and design but also innovate and improve upon existing technologies. ISWDP aims to fill this gap, ensuring that India has a ready pool of talented individuals to lead and support this burgeoning sector.

The Confluence of Opportunity and Need

The convergence of these factors makes the current moment uniquely suitable for a program like ISWDP. By capitalizing on this opportunity, India not only addresses immediate industry needs but also sets the foundation for sustained growth and leadership in the global semiconductor industry. Thus, the question is not just "Why now?" but rather "How swiftly can we move forward?" to make the most of this semiconductor renaissance.

08 Join Now (as a Participant)

Join us to start your journey in mastery, innovation, and global leadership as we together shape the future of technology and create a new legacy of Indian engineering excellence in semiconductors. Register now at: https://iswdp.registeryourseat.in/index.php

Scan to Know More

Scan to Register

09 Collaborate Now (as an Affiliate Member) - Benefits for Academic Institutions and Industry

ISWDP is a unique initiative in the country, offering an annual affiliate membership opportunity that promises long-term exposure and branding for your academic institution/company. Unlike fleeting conferences and workshops, ISWDP provides continuous visibility throughout the year, with multiple cohorts and levels under each cohort repeating four times annually. This program serves an educational cause while offering its sponsors and affiliate members a lasting impact. As an affiliate member of ISWDP, which is an academia-industry-driven certification program, presents an excellent opportunity for your institution/company to train its employees, showcase its brand, products, and developments, and efforts to a broad spectrum of stakeholders, including students, faculty, and industry peers. This affiliate membership provides a platform to gain visibility and recognition in both academic and industrial circles and promote your institution/company globally. The funds will enable the program to grow further allowing it to reach more participants and deliver even greater value. The affiliate members fall into the following 3 categories:

- Category A: Semiconductor/Chip Product Companies, Fabless Design Houses, Start-ups, Electronics Systems/Hardware Design and/or Manufacturing Firms, VLSI CAD Industry
- Category B: Semiconductor Test/Processing Equipment/Tool Manufacturers and Supply Chain Industry
- Category C: Leading Academic Institutions and Private/Deemed Universities

Write to us at iswdp.msdlab@iisc.ac.in to learn more about the mode of engagement, modalities, and Return on Investment.

India Semiconductor Workforce Development Program

Level-1 (Pre-requisites: Semiconductor Devices)

CONTENTS

- Basics of Technology CAD
- TCAD Tool Workflow
- Basic 2D Structure Creation
- Diode and MOSFET Simulation
- Device Analysis
- Look Inside the Device (See how it works)

TOOLS

- Sentaurus Device Editor
- Sentaurus Device
- Sentaurus Workbench
- Sentaurus Visual

DETAILS

Mini. Qual.: B.Tech. 2nd Year or B.Sc

Duration: 1 Week (10 Hrs)

Schedule: Once Every 3 Months

Learning: Live Virtual / Demo

Maximum-Participants: 1000

Fees (INR):
- Students: 2000 (+GST)
- Industry (INR): 20,000 (+GST)

Level-2 (Pre-requisites: Level-1)

CONTENTS

- Practical Device Structure Creation Through Scripts
- NMOS/PMOS/CMOS
- Advanced Device Simulation
- Realtime Device Analysis
- Physical Models
- Meshing Strategy
- Model Parameters

TOOLS

L1 + Script Editor

DETAILS

Mini. Qual.: B.Tech. 3rd Year or M.Sc 1st Year

Duration: 3 Weekends (15 Hrs)

Schedule: Once Every 3 Months

Learning: Live Virtual & Hands-On*

Maximum-Participants: 500

Fees (INR):
- Students: 3000 (+GST)*
- Additional Charge 4000*
- Industry (INR): 30,000 (+GST)

Advance (Pre-requisites: Level-2)

CONTENTS

- 2D Process Simulations
- 3D Device Simulations
- Process Development
- Mixed-mode Simulations
- Frequency Dependence, AC, and Thermal analysis

RF Device Simulations

Parameter Extraction

Calibration Basics

TOOLS

L1 + L2 + Sentaurus Process + Scripting in Sentaurus visual

DETAILS

Mini. Qual.: B.Tech 7th Semester or M.Sc 3rd Semester

Duration: 4 Weekends (20 Hrs)

Schedule: Once Every 3 Months

Learning: Live Virtual, Hands-On & Assignments*

Maximum-Participants: 250

Fees (INR):
- Students: 5000 (+GST)*
- Additional Charge 6000*
- Industry (INR): 60,000 (+GST)

Custom (Pre-requisites: Advanced)

CONTENTS
(One of the Following)

- 3D Process Simulations
- Reliability (HCI & NBTI)
- ESD Simulations
- Power MOSFETs
- GaN HEMTs (Power)
- GaN HEMTs (RF)
- Memory Devices
- FinFET & Nanosheet FETs
- Process Optimization Strategy

TOOLS

Advance + Content Specific Custom Modules

DETAILS

Mini. Qual: Industry Professional

Duration: 1 Week (30 Hrs)

Schedule: Once Every 3 Months

Learning: Live Virtual, Hands-On & Assignments & Project

Participants: 15 Per Module

Fees (INR):
- Students: Not Eligible
- Industry (INR): 50,000 (+GST Per Module)

India Semiconductor Workforce Development Program

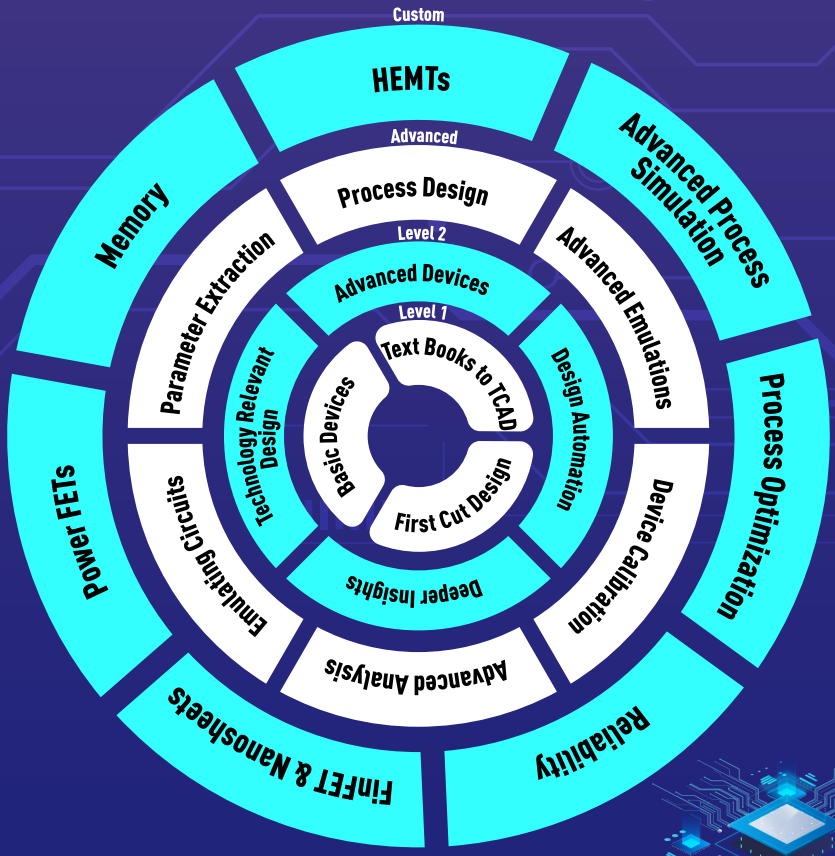
Level	Modules (Revised Nomenclature)	Detailed Content
Level-1 (Pre-requisites: Semiconductor Devices)	Text Books to TCAD	In this module, students will get to know how to draw basic device structures in TCAD and define doping profiles. This includes the following content 1. Steps to create a basic device strcuture from scratch using GUI? 2. Defining standard/idealized doping profiles 3. Creating standard mesh.
	First Cut Design	This modules deals with porting from building device structure to simulating device characteristics Students will learn, 1. How to carry out basic simulations for estimating output and transfer characteristics of the structure developed through GUI 2. How to generate family of curves.
	Basic Devices	At this level, the following two and three terminal device structures will be discussed 1. Diodes 2. BJTs 3. MOSFETs.
Level-2 (Pre-requisites: Level-1)	Technology Relevant Design	What to expect: 1. Replicating realistic device dimensions 2. Building realistic doping profiles 3. Enacpsulating gemometrical effects like overlaps Outcome: 1. Preparing realistic device structure and know the intricacies involved in defining doping profiles.
	Advanced Devices	At this level, we will be dealing with next level of sophistication in device structures, including the following: 1. Device structures to be created : pMOS and CMOS 2. Emulate process level variations in geometrical device structure creation tool 3. Creating a complete CMOS structure taking into account device isolation strategy.
	Design Automation	This module deals with the following: 1. Script based device structure creation 2. Learning to build the complete structure using critical design varibales 3. Creating multiple variants of the device structure based on variation in geometrical parameters with the help of scripts.
	Deeper Insights	On the device simulation front at this level, we will be advancing the understanding of simulation by including following steps: 1. Explanation of physical models used in estimating device behavior 2. Playing with physical models to understand their impact on electrical characteristics of the device.
Advance (Pre-requisites: Level-2)	Process Design	At this level, we move one more step closer to the real-world device structures with the help of following steps: 1. Process simulations to factor in impact of process variations 2. Complete layout based process flow emulation of practical device structures 3. Analyzing impact of process conditions on critical device features like doping profile, junction depths, etc. 4. Analyzing impact of anisotropic/isotropic etching 5. Learning advanced meshing to properly capture doping variations.
	Advanced Emulations	We take the structure creation to advanced level by including following steps: 1. Developing 3-D structures 2. Meshing strategy for 3-D structures 3. Defining doping profiles in 3-D structures 4. Capturing essential device topologies, curves, edges and cornerns in 3-D structures.
	Device Calibration	On the device characteristics simulation front, we introduce the most important step to make the analysis relevant for industrial/research purposes. This will be accomplished with the help of following sub-modules 1. Bringing structure as close as possible to real world scenario 2. Learning basics of calibration a. Outlining steps for calibration of silicon based devices b. Learning how to select physical model for calibration c. Identifying different operating regimes in the output and transfer curves d. Identifying critical parameters of device physics models affecting device behavior in these operating regimes.

India Semiconductor Workforce Development Program

Level	Modules (Revised Nomenclature)	Detailed Content
Advance (Pre-requisites: Level-2)	Advanced Analysis	Detailed device analysis to be carried out in the following operating regimes: 1. Carrying out Dc analysis 1a. Output characteristics. 1b. Transfer characteristics. 1c. Basic breakdown analysis. 2. AC analysis 3. RF analysis 4. Thermal analysis 4a. Learning how to position the thermodes 4b. Defining thermal boundary conditions and thermal resistances 4c. Determining temperature bsaed models to be accounted for thermal analysis of the device 4d. Analyzing heat distribution and critical areas for heat dissipation in the device 4e. Analysing I-V behavior under thermal considerations.
	Emulating Circuits	Leveling up on the simulation capabilities, this module will introduce the students to the following: 1. Introduction to mixed mode simulations to enable device analysis in circuit scenarios. Basic circuits, like, inverter will be covered 2. Analysing impact of circuit parasitics on device behavior 3. Analysing impact of device paramters on circuit performance.
	Parameter Extraction	Simulations generate huge volumes of data which increases exponentially with size of the design of experiments. Parameter extraction enables one to extract the most important and relevant parameters from the simulation output to enable quick visualisation and comparison. In this module, you will learn 1. To write scripts for automated data plotting 2. Introduction to important functions including functions for extracting threshold voltage, on resistance, on current, saturation current, and breakdown voltage 3. Introduction to building custom scripts for extracting custom parameters as per requirement.
Custom (Pre-requisites: Advanced)	HEMTs	"Industry Professionals will learn how to carry out simulations of HEMT devices. The module will comprise of following sub-modules: 1. Building up basic device structure 2. Carrying out calibration for DC and RF performance 3. Identification and explanation of different physical models necessary to simulate DC behavior 4. Analysis of the impact of epitaxial layer arrangement on the channel charge 5. Simulating the Id-Vd and IdVg behavior of the device 6. Enabling trap analysis in GaN HEMT device. Identification of critical parameters to be analyzed. 7. OFF-state breakdown analysis of the devices 8. Simulating the RF performance of the device.
	Advanced Process Simulation	To make the device structures industry relevant, this module will introduce following sub-modules: 1. Significance of 3D simulation 2. Virtualizing the manufacturing process 3. Switching From 2D to 3D 4. Defining 3D simulation domain 5. Process Flow 6. Efficient meshing strategy 7. Doping mechanism and Structure-modifying steps (etching, deposition, photo, and transform) 8. Visualization of devices in 3D,2D cutplanes and 1D cutlines 9. Mask-based process simulation with direct import of GDSII layouts, 2D vs 3D.
	Process Optimization	This module comprises of following sub-modules: 1. Deeper understanding of process parameters and models of ion implantation, diffusion, etching, and deposition 2. Correlating the process parameter-device structure-device performance 3. Process-aware Designing 4. Optimization of existing processes to allow performance prediction 5. Introducing parameter database browser 6. Changing parameters in the command file 7. Custom calibration.
	Reliability	This module comprises of following sub-modules: 1. Importance of predicting reliability 2. Physics of various reliability models, NBTI, TCAD Degradation models - NBTI model, Hot Carrier model, Trap degradation model, Device lifetime and simulation 3. Simulation Hands-on.

India Semiconductor Workforce Development Program

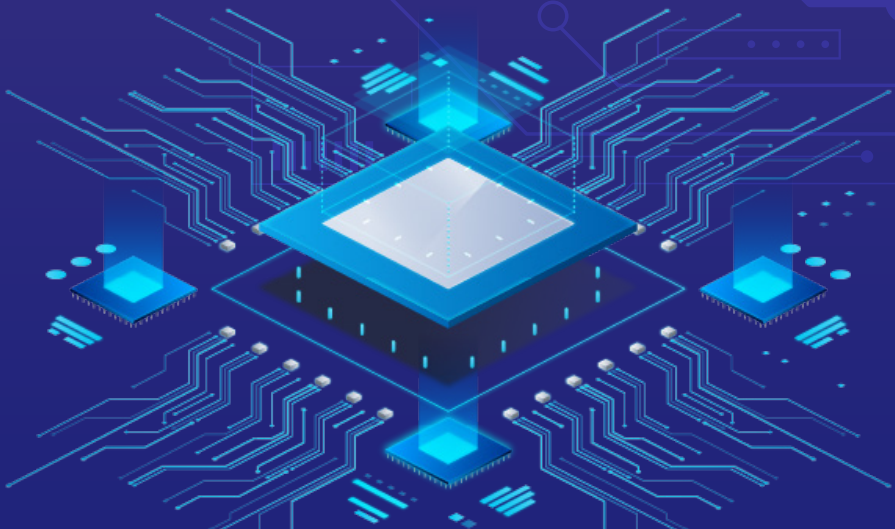
Level	Modules (Revised Nomenclature)	Detailed Content
Custom (Pre-requisites: Advanced)	FinFET & Nanosheets	This module comprises of following sub-modules: 1. Technology scaling roadmap 2. FinFET architecture 3. TCAD Simulation of Double Gate, Triple Gate FinFETs 4. Simulate various devices in FinFET Technology 5. Understand the effect of device variation on the device performance 6. Optimization guidelines 7. Beyond FinFET technologies – Vertically stacked Nanosheet Technology.
	Power FETs	This module comprises of following sub-modules: 1. Generating power MOSFET structures using process simulations 2. Steps to carry out analysis of power MOSFETs 3. Power MOSFET simulations in the presence of thermal effects 4. Breakdown analysis.
	Memory	This module comprises of following sub-modules: 1. Generating memory device structures in TCAD 2. Capturing the processes leading to memory effect in the device 3. Running transient simulations to understand the data storage time and date-retention capability 4. Carrying out device analysis to optimize the memory performance"



YEAR 2025 SCHEDULE

Cohort 4	Level 1	February 1, 2025 (orientation class: 5-7 PM) February 8-14, 2025 (Everyday 5-7 PM)
	Level 2	Tentatively starting from March 1, 2025 (All Saturdays and Sundays 5 - 8 PM)
	Advance	Tentatively starting from March 29, 2025 (All Saturdays and Sundays 5 - 8 PM)
	Custom	The commencement of classes is conditional upon the enrolment of 15 participants in each module. Once the modules are filled, classes will begin from the subsequent weekend.
Cohort 5	Level 1	Tentatively starting from June 1, 2025
	Level 2	Tentatively starting from June 28, 2025 (All Saturdays and Sundays 5 - 8 PM)
	Advance	Tentatively starting from July 26, 2025 (All Saturdays and Sundays 5 - 8 PM)
	Custom	The commencement of classes is conditional upon the enrolment of 15 participants in each module. Once the modules are filled, classes will begin from the subsequent weekend.
Cohort 6	Level 1	Tentatively starting from October 1, 2025
	Level 2	Tentatively starting from October 25, 2025 (All Saturdays and Sundays 5 - 8 PM)
	Advance	Tentatively starting from November 22, 2025 (All Saturdays and Sundays 5 - 8 PM)
	Custom	The commencement of classes is conditional upon the enrolment of 15 participants in each module. Once the modules are filled, classes will begin from the subsequent weekend.

The same schedule will be repeated for the subsequent years.



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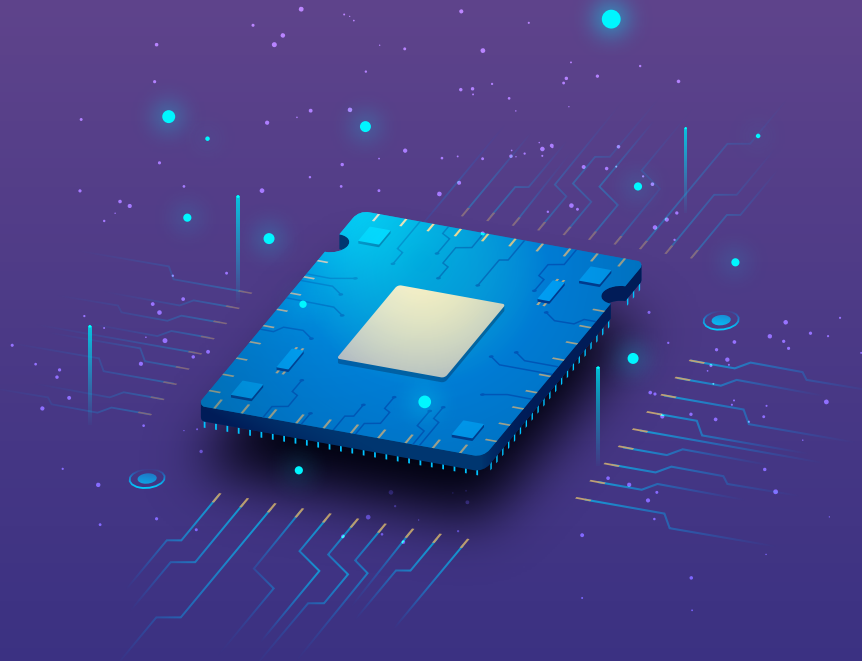

India Semiconductor Workforce Development Program

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