



Semiconductor Job Skills Catalog: *Call for Industry Participation*

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IEEE Global Semiconductors

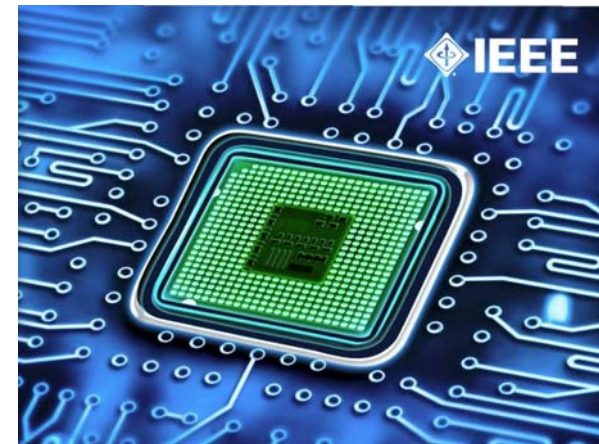
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IEEE Semiconductor Job Skills Catalog

- ▶ IEEE is the world's largest not-for-profit technical professional association for engineers and technologists.
- ▶ Many of our members are involved in various areas of the semiconductor value chain globally.
- ▶ To support global workforce development efforts and help build capacity, IEEE is working with global industry partners to create an online catalog of job skills required to work in the industry.
 - This catalog will be freely available, and is designed to provide a globally-accepted baseline of roles and skills that organizations in the industry look for.
 - The work will start at the technician level, and progress from there.



Building on Work Already Done

▶ To begin, we are identifying and compiling work already done in this space, such as:

- **Knowledge Skills and Abilities (KSA) Matrix** from SRC
- **Microsystems Process Technician Knowledge, Skills & Abilities** from the Micro Nano Technology Education Center in partnership with SEMI Foundation and National Institute for Innovation and Technology
- **Skills Standards for Technicians in the Highly Automated Manufacturing Environment** from the Maricopa Advanced Technology Education Center with major funding from the Intel Foundation and supported in part by a grant from the National Science Foundation

FUNCTIONS	SKILLS	Device Operations & Characterization	Logic Circuit Analysis	Mixed Signal Circuit	RF Circuits	SOC, ASIC, FPGA, SFP, SSD	HDL/VHDL, Circuit Simulators	Programming Languages & Applied Math	Board Design and Layout	Electrical, Optical, Thermal and Mechanical	FEM & CFD	Data Analysis	Statistics	DfE	Neural Networks/Deep Learning	Programming Languages	FMEA	Quality & Reliability	Physical & Electromechanical Failure Analysis	Programming (Python, Java, C++, C#, Ruby)	Deep structure, Algorithms, Object Oriented Programming	Software Development Life Cycle	Parallel Architectures & Simulation	Business strategy development	Company policy and global development	Regulatory Policies	Team Management and Leadership	Semiconductor Physics	Environmental Science	Chemistry	
		Device & Circuit Concepts	System Design, Verification, Validation & Simulation Tools	Modeling and Simulation	Experimentation	AI/ML Concepts	Failure Analysis	Software Development	Business Analytics	Team & Organizational	Semiconductor																				
Process and Product Architect		Desired	Desired	Desired	Desired	Not Required	Not Required	Desired	Not Required	Not Required	Not Required	Desired	Not Required	Not Required	Desired	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
Hardware Development Manager		Desired	Desired	Desired	Desired	Not Required	Not Required	Desired	Not Required	Not Required	Not Required	Desired	Not Required	Not Required	Desired	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
Signal Design & Architecture Engineer		Critical	Critical	Desired	Critical	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired
ASIC/ASIC Design Engineer		Critical	Critical	Desired	Critical	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired
RF Circuit Engineer		Critical	Critical	Desired	Critical	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired
Test Engineers		Critical	Critical	Desired	Critical	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired
Product Engineer		Critical	Critical	Desired	Critical	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired
Application Engineers		Desired	Critical	Desired	Desired	Not Required	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired
Layout/EDA Engineers		Desired	Critical	Desired	Desired	Not Required	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired
Systems Engineer		Critical	Critical	Desired	Critical	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired
Firmware Engineer		Desired	Desired	Not Required	Desired	Not Required	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired
Process Integrators (Test Leads)		Desired	Not Required	Not Required	Desired	Not Required	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired
Quality, Yield and Reliability Engineers		Not Required	Desired	Not Required	Critical	Not Required	Critical	Not Required	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired
Program Managers		Not Required	Not Required	Not Required	Desired	Not Required	Desired	Not Required	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired
Data Scientist		Not Required	Not Required	Desired	Desired	Critical	Not Required	Critical	Not Required	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired
Operations/Productivity Engineers		Not Required	Not Required	Not Required	Desired	Not Required	Desired	Not Required	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired
Software Engineers/Developers		Not Required	Not Required	Not Required	Desired	Not Required	Desired	Not Required	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired
Procurement Eng		Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
Supply Chain Manager		Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
HR		Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
Workforce Development		Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
Finance		Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
Business Development & Marketing		Not Required	Not Required	Not Required	Critical	Not Required	Not Required	Not Required	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired	Desired

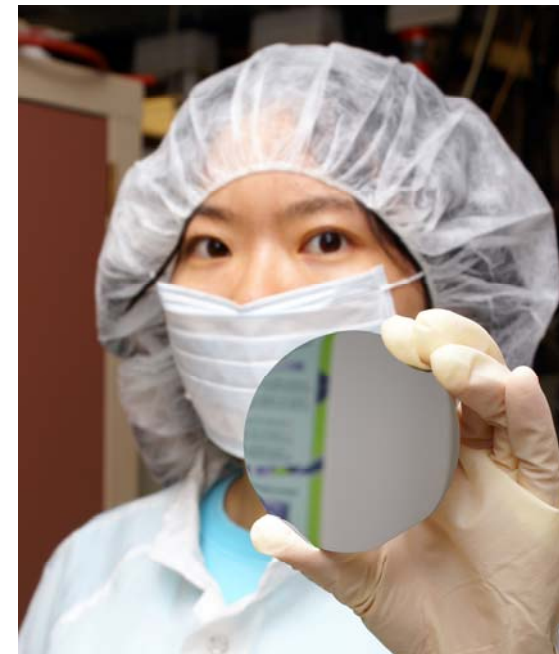
SKILLS →

↑ Functions

Functions	SKILLS →																															
	Device Operations & Characteristics	Logic Circuit	Analog Circuit	Mixed Signal Circuit	RF Circuits	SoC, ASIC, FPGA, SIP, SSD	HDL/HVL, Circuit Simulators	Programming Lang & Applied Math	Board Design & Layout	Board Design and Layout	Electrical, Optical, Thermal and Mechanical	FEM & CFD	Data Analysis	Statistics	DOE	Neural Networks/Deep learning	Programming Languages	FMEA	Quality & Reliability	Physical & Electrical Failure Analysis	Prog languages (Python, Java, C++, C#, Ruby)	Data structures, Algorithms, Object Oriented Programming	Software Development Life Cycle	Financial Modeling & Simulation	Business strategy development	Company policy and goals development	Regulatory Policies	Talent development and retention	Semiconductor Physics	Environmental Science		
	Device & Circuit Concepts	System Design, Verification, Validation & Simulation Tools					Modeling and Simulation	Experimentation	AI/ML Concepts	Failure Analysis	Software Development	Business Analytics	Team & Organizational	Semi																		
Process and Product Architect	Desired	Desired					Desired	Desired	Not Required	Not Required	Desired	Not Required	Not Required																			
Roadmap Development Manager	Desired	Desired					Desired	Desired	Not Required	Not Required	Not Required	Not Required	Not Required																			
Digital Design & Architecture Engineer	Critical	Critical					Desired	Critical	Desired	Desired	Desired	Not Required	Not Required																			
Analog / Circuit Design Engineer	Critical	Critical					Desired	Critical	Desired	Desired	Desired	Not Required	Not Required																			
RF Design Engineer	Critical	Critical					Desired	Critical	Desired	Desired	Desired	Not Required	Not Required																			
Test Engineers	Critical	Desired					Desired	Desired	Desired	Desired	Desired	Not Required	Not Required																			
Product Engineer	Critical	Critical					Desired	Desired	Not Required	Desired	Desired	Not Required	Not Required																			
Application Engineers	Desired	Critical					Desired	Desired	Not Required	Desired	Desired	Not Required	Not Required																			
Layout/CAD Engineer	Desired	Desired					Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required																			
Systems Engineer	Critical	Critical					Desired	Desired	Not Required	Not Required	Desired	Not Required	Not Required																			
Firmware Engineer	Desired	Desired					Not Required	Desired	Not Required	Not Required	Desired	Not Required	Not Required																			
Process Integrators (Team Lead)	Desired	Not Required					Not Required	Desired	Not Required	Desired	Not Required	Not Required	Not Required																			
Quality, Yield and Reliability Engineers	Not Required	Desired					Not Required	Critical	Not Required	Critical	Not Required	Not Required	Not Required																			
Program Managers	Not Required	Not Required					Not Required	Desired	Not Required	Not Required	Not Required	Desired	Not Required																			
Data Scientist	Not Required	Not Required					Desired	Desired	Critical	Not Required	Critical	Not Required	Not Required																			
Operations/Productivity Engineers	Not Required	Not Required					Not Required	Desired	Not Required	Not Required	Not Required	Not Required	Not Required																			
Software Engineer/Developer	Not Required	Not Required					Not Required	Desired	Not Required	Not Required	Critical	Not Required	Not Required																			
Procurement Eng	Not Required	Not Required					Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required																			
Supply Chain Manager	Not Required	Not Required					Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required																			
HR	Not Required	Not Required					Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required																			
Workforce Development	Not Required	Not Required					Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required																			
Finance	Not Required	Not Required					Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required																			
Business Development & Analytics	Not Required	Not Required					Not Required	Critical	Not Required	Not Required	Not Required	Not Required	Not Required																			

Industry Participation and Acceptance is Key to Success

- ▶ Our goal is to create an end product that will be extremely useful for hiring by organizations across the semiconductor value chain
- ▶ Industry input and acceptance of this work is vital to its success
- ▶ As a global organization, IEEE is uniquely positioned to bring together those from industry across the globe to identify standard skills requirements, and assist academic institutions in preparing students to work in this industry



Call for Participation

- ▶ IEEE is seeking engagement from industry to provide input on the project.
 - Participants will learn about the skills priorities of other organizations in the industry.
 - We expect that academic institutions globally will use the output of this work to design workforce training programs.
 - The results of the work can help participants ensure candidates hired demonstrate baseline skills mastery upon hire.

- ▶ The following participation opportunities exist:
 - **Provide the working group with existing skills and competencies** for semiconductor industry technicians as defined by your organization.
 - **Join the Industry Advisory group** to provide feedback and input on the output of the working group.
 - To be a part of the Industry Advisory group, you must be currently working in the industry, ideally in a learning and development/HR role or other hiring role within your organization.

To Get Involved or Learn More

Please contact:

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