NIRMA UNIVERSITY

Institute:	Institute of Technology
Name of Programme:	MTech Semiconductor Technology
Course Code:	6EC181VA22
Course Title:	Critical Thinking
Course Type:	Value Added Course
Year of Introduction:	2024-25

L	**T**	**Practical component**				**C**
		LPW	**PW**	**W**	**S**	
1	**-**	**-**	**-**	**-**	**-**	**-**

Course Learning Outcomes (CLOs)

At the end of the course, students will be able to-

1. take better decisions (BL 2)
2. evaluate facts in an argument (BL 3)
3. apply Art of Questioning (BL 3)
4. derive truth, ambiguity, vagueness and fallacy in arguments (BL 3)

	Contents	**Teaching hours (Total 15)**
Unit I	Thinking about information and emotions, truth and knowledge	**03**
Unit II	Recognizing arguments	**03**
Unit III	Inductive and Deductive Reasoning	**04**
Unit IV	Analysing defects, fallacies and avoiding them	**03**
Unit V	Reasoning & elementary argument analysis and organized thinking	**02**

Self Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents

Suggested Readings/References:

1. Howard Kahane & Nancy Cavender, Logic and Contemporary Rhetoric, Wadsworth Publishing.
2. Edward de Bono, Six Thinking Hats, Penguin
3. Selected videos showcasing cases and arguments
4. Daniel Feldman, Critical Thinking: Make Strategic Decision with Confidence

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Institute:	Institute of Technology
Name of Programme:	MTech Semiconductor Technology
Course Code:	6EC351CC24
Course Title:	Semiconductor Assembly, Packaging and Testing
Course Type:	Core
Year of Introduction:	2024-25

L	T	Practical component				C
		LPW	PW	W	S	
3	-	2	-	-	-	4

Course Learning Outcomes (CLOs)

At the end of the course, students will be able to

1. acquire fundamental knowledge of semiconductor packaging styles and materials (BL3)
2. apply test methods on semiconductor packaging. (BL5)
3. carry out failure mode analysis and assure the quality checks (BL5)
4. operate instruments and EDA tools required for semiconductor technology assembly, packaging and test. (BL6)

	Contents	**Teaching hours (Total 45)**
Unit I	**Semiconductor Packaging** Introduction to Assembly Flow, Packaging History, Package Families, Need of Packaging for Technologies.	**03**
Unit II	**Package Manufacturing Processes** Packaging Assembly Technology, Wafer Thinning, Dicing, Die Attach, Wire bonding, Flip Chip process, Flux Cleaning, Underfill, Encapsulation, Laser Marking, Solder Ball Attach, Reflow, Singulation, IC Packaging Toolsets & equipment operation, clean room operations.	**09**
Unit III	**Materials used in Semiconductor Packaging** Die Attached Adhesive, Underfill Materials, Bonding wires, Wafer Bumping, Under-bump Metallurgy, Ceramics and Glasses.	**06**
Unit IV	**Semiconductor Component and Package Test** Overview of Testing methodologies, components tested & their characteristics, Challenges in testing, Types of Testers (Automated test Equipment & Benchtop Testers), Components & Subsystems of Testers, Principles of Functional Testing, Parametric/ Boundary Scan /In-Circuit Test/ Flying Probe Test, Test Data Analysis, Design for Testability & Tester Calibration & Maintenance.	**10**
Unit V	**Electrical and Physical Failure Analysis** Package Failure Modes, Failure Detection Mechanisms, Failure Analysis Tools, Test Programs Debugging, Data Analytics, ESD & EMI Management.	**08**
Unit VI	**Quality and Statistical Process Control** Quality Control Plan (QCP) & Quality Management System (QMS), Incoming Material Inspection, In-Line Quality, Measurement System Analysis, Statistical analysis methods, Statistical Process Control (SPC), Fault Detection Control (FDC), Run-to-Run Control (R2R), Auto Defect	**05**