Model-Based Design with MATLAB, Simulink & Stateflow

Industry-Oriented Online Course | From Engineering Requirement to Industry-Ready Model

Course Agenda

Module	Topic	Indicative Hours	Key Coverage
1	MATLAB Fundamentals for Engineers	6–8	MATLAB environment; variables, arrays & matrices; operators/indexing; scripts & functions; c
2	Simulink Fundamentals	10–12	Block-based modelling; sources/sinks; gain, sum, product, integrator; switch/saturation; subs
3	Stateflow	6–8	States, transitions, events, conditions/actions; entry/during/exit; junctions; default transitions;
4	MAAB Guidelines	6–8	Naming conventions; signal/block naming; ports & interfaces; data types/constants; sample ti
5	Model-Based Design	8–10	Requirement → functional analysis → mathematical model → Simulink model → simulation –
6	Industry Project	12–15	Complete DC Motor Speed Control System: requirement analysis, mathematical model, Simu

End-to-End Industry Project: DC Motor Speed Control

1. Requirement	2. Analysis	3. Mathematical Model	4. Simulink Model
Define system and functional requirements	Break requirements into functional/model level elements	Develop motor and controller equations	Build and simulate the model
5. Stateflow	**6. MAAB Review**	**7. Verification**	**8. Final Model**
Add operating states and fault logic	Review model quality and modelling practices	Execute test cases and validate results	Documented, structured and industry-ready model

Branch-Specific Applications

Electrical	Mechanical	Electronics / E&TC	CSE
Motor/inverter control; power converters; battery systems	Mass-spring-damper systems; vehicle suspension; robotics	Sensor signal processing; embedded control; real-time testing	Algorithm modelling; state machines; automation; AI/I

Who Should Join?

CSE, Mechanical, Electrical, Electronics/E&TC;, Mechatronics, Instrumentation and related engineering students; final-year students; fresh graduates; and engineers looking to build practical MBD skills.

Learning Outcomes

- Understand the Model-Based Design methodology and its role in engineering development.
- Create MATLAB scripts and engineering calculations required for modelling.
- Build structured Simulink models and configure simulation parameters.
- Develop Stateflow-based state machines and fault/operating logic.
- Apply MAAB-oriented modelling practices for readability, consistency and maintainability.
- Convert requirements into functional models and test cases.
- Perform simulation-based verification and interpret results.
- Complete an end-to-end industry-oriented MBD project from requirement to verified model.

Course Deliverables

Online video lessons (~48–61 hours) • MATLAB examples • Simulink/Stateflow model files • practical exercises • MAAB checklist/review examples • requirement document • test cases • industry project • quizzes/assignments • completion certificate.

Core positioning: One MBD methodology across multiple engineering branches — learn the tools, understand the workflow, and apply them to a realistic engineering problem.