



BASIC USER



INTRODUCTION TO MODELICA & MODELON IMPACT

Lecture 1.0

Modelon

OVERVIEW

✓ Model Based Systems Engineering (MBSE)

✓ Key features of Modelica

✓ Modelon Impact

✓ Model Libraries

✓ FMI technology



COMPOSING SYSTEM MODELS

Lecture 1.1

Modelon

OVERVIEW

- ✓ How to launch/access Modelon Impact
- ✓ UI features of Modelon Impact
- ✓ Composing a system model
- ✓ Setting parameters
- ✓ Getting results
- ✓ Help and documentation



SIMULATION AND POSTPROCESSING

Lecture 1.2

Modelon

OVERVIEW

✓ Setting up an experiment model

✓ Running multiple experiments

✓ Dynamic Solvers Settings

✓ Results

✓ Stickies and views



REUSABLE COMPONENTS

Lecture 1.3

Modelon

OVERVIEW

- ✓ Library packages
- ✓ Creating reusable subsystems
- ✓ Connector Interface
- ✓ Parameter Interface
- ✓ Component views
- ✓ Documentation and Icon editor



WORKSPACES AND ARTIFACTS

Lecture 1.4

Modelon

OVERVIEW



Import/Export of workspaces



Import of Modelica libraries



Export of compilation/simulation artifacts



ADVANCED USER



HIERARCHICAL SYSTEM MODELING

Lecture 2.1

Modelon

OVERVIEW

- ✓ Benefits with hierarchical models
- ✓ Library Architecture and Model Structure
- ✓ Browse model hierarchy
- ✓ Parameter propagation and modifiers
- ✓ Reconfigurable models
- ✓ System stickies and views



EQUATION-BASED MODELING

Lecture 2.2

Modelon

OVERVIEW

✓ Equation-based components

✓ State selection

✓ Initialization

✓ Index reduction



MODEL UTILIZATION

Lecture 2.3

Modelon

OVERVIEW



Types of analyses available



Design of Experiments using Impact



Custom views in Impact



TROUBLESHOOTING

Lecture 2.4

Modelon

OVERVIEW



Development - Best practice



Troubleshooting



Basic Diagnostics



BASIC MODELICA



MODELICA LANGUAGE

EQUATION BASED COMPONENTS

Lecture 3.1

Modelon

OVERVIEW

- Modelica class container
- Accessing the source code
- Modelica at a glance
- Variables and types
- Arrays and matrices
- Equation and algorithm
- Operators and statements
- Connectors and connect()
- Balancing concept and partial
- Inheritance v/s Instantiation



MODELICA LANGUAGE

ADVANCED FEATURES

Lecture 3.2

Modelon

OVERVIEW

- Encapsulation
 - Breaking encapsulation
- Advanced connectors
 - Stream connectors
 - Overdetermined connectors
 - Bus connector



ANNOTATIONS

Lecture 3.3

Modelon

OVERVIEW

- Annotations
- Variables
- Connectors
- Functions
- Documentation
- Icons



FROM MODELICA MODEL TO SIMULATION MODEL

COMPILER AND SOLVER INSIGHTS

Lecture 3.4

Modelon

FROM MODELICA MODEL TO SIMULATION MODEL

- Process overview
- Modelica model translation
 - Steps toward simulation
 - Flattening
 - From connect to equations
 - Index reduction
 - Causalization and sequencing
- Notes on C/C++ compilers
- Compiled model simulation
 - Dynamic v/s Steady-state
 - Dynamic solvers
 - Steady-state solvers



ADVANCED MODELICA



INTRODUCTION TO MODELICA

Reconfigurable models

Modelon

OVERVIEW

- Creating reconfigurable models
 - Templates and interfaces
 - Conditional components
 - Arrays of components
- Replaceable functions



INTRODUCTION TO MODELICA

Data management

Modelon

OVERVIEW

- Organizing models and data
 - Data records
 - Variant libraries
- Data based components



INTRODUCTION TO MODELICA

Hybrid systems

Modelon

OVERVIEW

- What is a hybrid system?
- What is an event?
- Chattering
- Avoiding events



INTRODUCTION TO MODELICA

External Code

Modelon

OVERVIEW

- External Functions
- External Objects



BASIC WORKFLOWS



PYTHON & JUPYTER INTRODUCTION

Modelon

OVERVIEW

- Python
 - Some Background
 - Basic Operations and data types
 - Tips & Tricks
- Jupyter
 - What is Jupyter?
 - Jupyter Goodies



WORKFLOW AUTOMATION

The Modelon Impact Client library



OVERVIEW

- Overview
- Impact architecture
- The Impact execution & storage API
- Modelon Impact Client – Python



FMI INTRODUCTION



INTRODUCTION TO FMI TECHNOLOGY

Introduction and background



OVERVIEW



Introduction and Background to FMI



What Is FMI?



Resources When Using FMI



FMI AND IMPACT

Working with FMI in Modelon Impact

Modelon

OVERVIEW



FMI in Modelon Impact



FMU Export considerations



FMU Import considerations



FMI TOOLBOX

FMI Toolbox for Matlab Introduction

Modelon

OVERVIEW



Overview



Simulink Interface



MATLAB Interface