

# SysML MODEL BUILDER INTERMEDIATE EXAM

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## Accommodations

For learning or physical disability exam accommodations, please contact [certification@omg.org](mailto:certification@omg.org).



## Language

English. Use of translation apps during the exam is prohibited.



## Cancellations/Refunds

An exam may be cancelled >24 hours prior to its scheduled date via [Pearson VUE](#) for a full refund or the exam price will be forfeited.



## Passing Score

>=55/90 correct answers  
or >=61% correct answers



## Duration

105 mins in native English-speaking countries. 135 mins in all others.  
**Note:** Extra time confirmed via email following exam order completion.



## Prerequisites

Passing scores on SysML Model User and Model Builder Fundamental exams.



## Fee

US\$350 + taxes  
(regional currency equivalent and taxes)



## Technical Issues

Contact [Pearson VUE Customer Service](#). Make sure to perform a [System Test](#) on your computer before scheduling an online exam.



## Format

Multiple choice  
(text and images)



## Validity

Certifications expire 3 years after exam date. Take the same or higher level exam to extend certification validity.

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## STANDARD COVERED

- [System Modeling Language \(SysML\) v1.2](#)

## RECOMMENDED STUDY MATERIALS

- **A Practical Guide to SysML: The Systems Modeling Language, 3rd Edition (Friedenthal, Moore and Steiner)**: Chapters 4 (An Automobile Example Using the SysML Basic Feature Set) and 17 (Residential Security System Example Using the Object-Oriented Systems Engineering Method). All authors contributed to the SysML specification.
- **Systems Engineering with SysML/UML: Modeling, Analysis, Design (Weilkiens)**: \*Authors contributed to the standard.
- [MBSE Practices in Telescope Modeling \(Weilkiens\)](#)
- [Cookbook for MBSE with SysML](#)
- [Survey of Model-Based Systems Engineering \(MBSE\) Methodologies \(Estefan\)](#): Chapter 2 (Differentiating Methodologies from Processes, Methods, and Lifecycle Models)
- [Systems Engineering Best Practices with the Rational Solution for Systems and Software Engineering \(Hoffmann\)](#)
- [The OMG SysML Tutorial](#)
- [Simulation-Based Design Using SysML: Part 1: A Parametrics Primer \(Peak\)](#)
- [Hybrid SUV Example \(SysML v1.2\)](#)
- [SysML Notations and Conventions](#)

33%

### BUILDING A BEHAVIORAL MODEL USING THE FULL SET OF SysML CONSTRUCTS

#### How To Use SysML to Model System Behavior

**Building An Activity Diagram Using the Full Set of SysML Constructs:** I/O Flow: Optional vs. required, streaming, rates (continuous and discrete), no buffer, overwrite, token ordering (FIFO, LIFO, etc.), data store/central buffer, object node state, parameter set, and probabilities. Control Flow: Control Operators: Flow final, and advanced control operations (decision input/ join specification). Control pins and interruptible regions. Actions: Primitive actions. Constraints: Pre/post conditions and defining properties on activities.

**Building A Sequence Diagram Using the Full Set of SysML Constructs:** Messages, Lifelines: Selectors, lifeline decomposition and activations (including nested). Interaction Operators: Advanced interaction operators, combining interaction operators and nesting interaction operators. Interaction Decomposition: Interaction use or references and gates. Constraints: Observations and timing constraints and state invariants.

**Building A State Machine Diagram Using the Full Set of SysML Constructs:** Understanding that a SM represents the states of a block (Friedenthal). Transitions: Graphical transition notation, internal transitions and deferred events. State Hierarchy: Composite states and orthogonal composite states. Pseudo States: Junction state, choice, history states – shallow, deep, fork and join, entry and exit points, and terminate nodes. Nested State Machines: Submachine states. Connection points.

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29%	<p><b>BUILDING A STRUCTURAL MODEL USING THE FULL SET OF SysML CONSTRUCTS</b></p> <p><b>Building the Block Definition Diagram:</b> Adding Block Features: Receptions, ordered and unique collections, read only properties, property redefinition, constraint (reference to parametrics below), distributed properties. Block Relationships: Shared vs composite aggregation (white vs black diamond), association blocks and generalization sets. Value Types: Enumerations, structured value types ("position vector" with XYZ structure). Blocks and Behavior: Classifier behavior (See Friedenthal), owned behaviors, activity hierarchies on bdds. Defining instances.</p> <p><b>Building the Internal Block Diagram:</b> Block Properties: Creating a property specific type and notation for part multiplicities on ibd's. Ports: Flow Ports: Flow specifications and properties, conjugated ports, and compatibility rules including item flows and ports. Standard Ports: Defining required and provided interfaces, typing a port with required and provided interfaces (i.e., with a provided interface and with a classifier with use/realize relationship). Port delegation (for both flow ports and standard ports). Connectors: Nested connector ends, item flows/item properties, conveyed classifiers, typing item properties, ownership of item properties, and connector properties.</p>
11%	<p><b>BUILDING A PARAMETRIC MODEL USING THE FULL SET OF SysML CONSTRUCTS</b></p> <p><b>How To Use Constraints in SysML to Model System Analyses: Defining Constraints on A Block Definition Diagram Using the Full SysML Feature Set:</b> Nesting of constraints, trade study support (Annex E.4), measures of effectiveness, objective functions, alternatives, and constraining flows.</p>
10%	<p><b>BUILDING A REQUIREMENTS MODEL USING THE FULL SET OF SysML CONSTRUCTS</b></p> <p><b>Building A Requirements Diagram Using the Full Set of SysML Constructs (5%):</b> Specialized requirements (SysML Annex C: functional, interface, performance, physical and design constraints), establishing requirements traceability (derive, verify, satisfy, refine, trace and containment), tracing requirements in tables and matrixes, representing verification and testing, test context as well as test case.</p> <p><b>Building A Use Case Model Using the Full Set of SysML Constructs (5%):</b> Relating use cases to behavioral models – activity diagrams and state machines, and relating use cases to requirements.</p>
6%	<p><b>MODEL CONCEPTS</b></p> <p><b>Modeling guidelines and Practices:</b> Application of modeling guidelines and practices.</p>
6%	<p><b>ORGANIZING A SYSTEM MODEL USING THE FULL SET OF SysML CONSTRUCTS</b></p> <p><b>Building A Package Diagram Using the Full Set of SysML Constructs:</b> Package and element import, defining and using view and viewpoint, building and using model libraries, as well as awareness of assessment criteria (e.g., structured queries) and activities.</p>
5%	<p><b>DEFINING STEREOTYPES, PROPERTIES, AND CONSTRAINTS (EXTENSION, SUBCLASS)</b></p>