Mastering Systems Integration; Course Overview

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Abstract

Course overview of the course Systems Integration.

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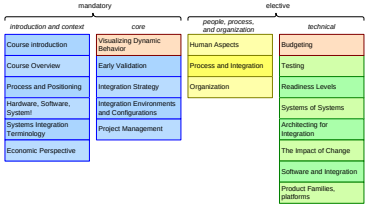
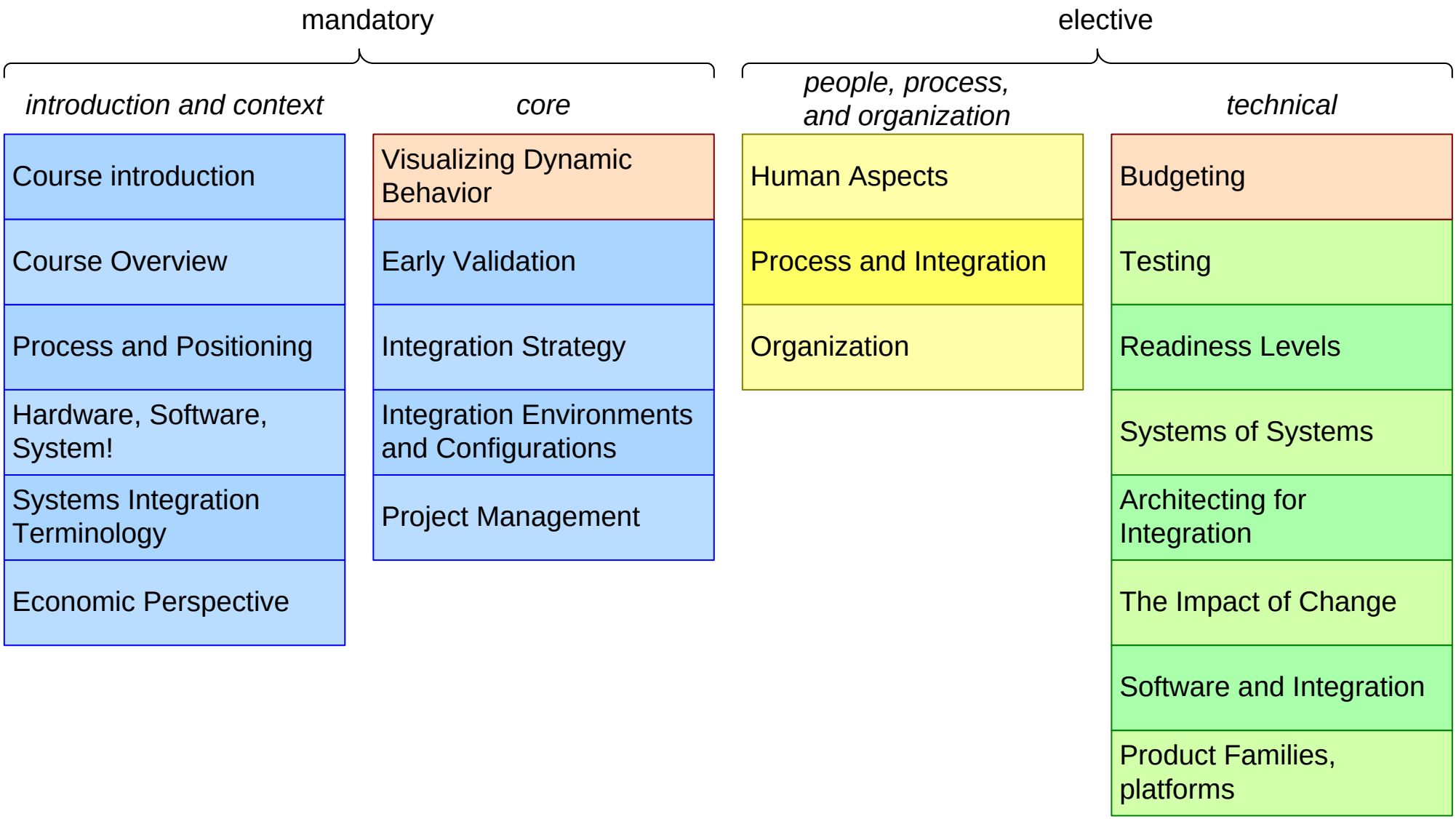


Nuggets Course Mastering Systems Integration



Content per Nugget

mandatory

elective

introduction and context

Course introduction
Why is integration difficult and poorly understood

Course Overview
nuggets, face-to-face program

Process and Positioning
integration in phase gate process
fail early, qualification
top-down and bottom-up

Hardware, Software, System!
from components to system qualities
different failure modes and patterns
early HW SW integration

Systems Integration Terminology
validation, verification
qualification, certification objective
evidence, regulatory agencies
site and factory acceptance

Economic Perspective
knowledge and life-cycle commitment
time-to-market
cost milestones

core

Visualizing Dynamic Behavior

Early Validation
V-model and late validation
from waterfall to iterative
continuous integration
from waterfall to agile processes

Integration Strategy
approach: fail early, reduce risk
perspectives
dynamic behavior
qualities
project, product, component
robustness of integration
cookbook

Integration Environments and Configurations
test configurations
modeling
configuration management
testware

Project Management
integration planning
test facilities, resource and supplier planning
Last Planner

people, process, and organization

Human Aspects
bias <https://en.wikipedia.org/wiki/List_of_cognitive_biases>
team work
motivation
approbation mindset versus internal

Process and Integration
process capability (of organization)
support with procedures, templates, tools
Governance

Organization
roles

technical

Budgeting

Testing
modeling, simulation prototyping, testing, monitoring (development & field), measuring, reviewing, inspecting
ALT, HALT, HASS
automation, regression
trouble shooting
diagnosis
design for experiment
testware

Readiness Levels
technology readiness
integration readiness

Systems of Systems integration
interoperability
COTS & characterization
Outsourcing (component, system, service)
data
cloud
time dimension
compatibility

Architecting for Integration
integration technologies
integration patterns
integration pitfalls

The Impact of Change

Software and Integration

Product Families, platforms
projects, products

Assignments in Face-to-Face Module

System Specification

- determine ***KPPs*** and their quantified specification
- assess ***risk*** of KPPs caused by volatility, uncertainty, complexity and ambiguity

  pick one ***high-risk*** KPP to elaborate
- describe ***typical use*** (including circumstances in the ***context***) related to KPP

System design

- make system, SW, and HW ***block diagrams*** (parts, interfaces, connections)
- model ***dynamic behavior*** resulting in the KPP
- map ***dynamic behavior*** on ***block diagrams***

  and ***budget***: quantify contributions to KPP
- re-assess ***risks*** of KPP

Systems Integration Plan

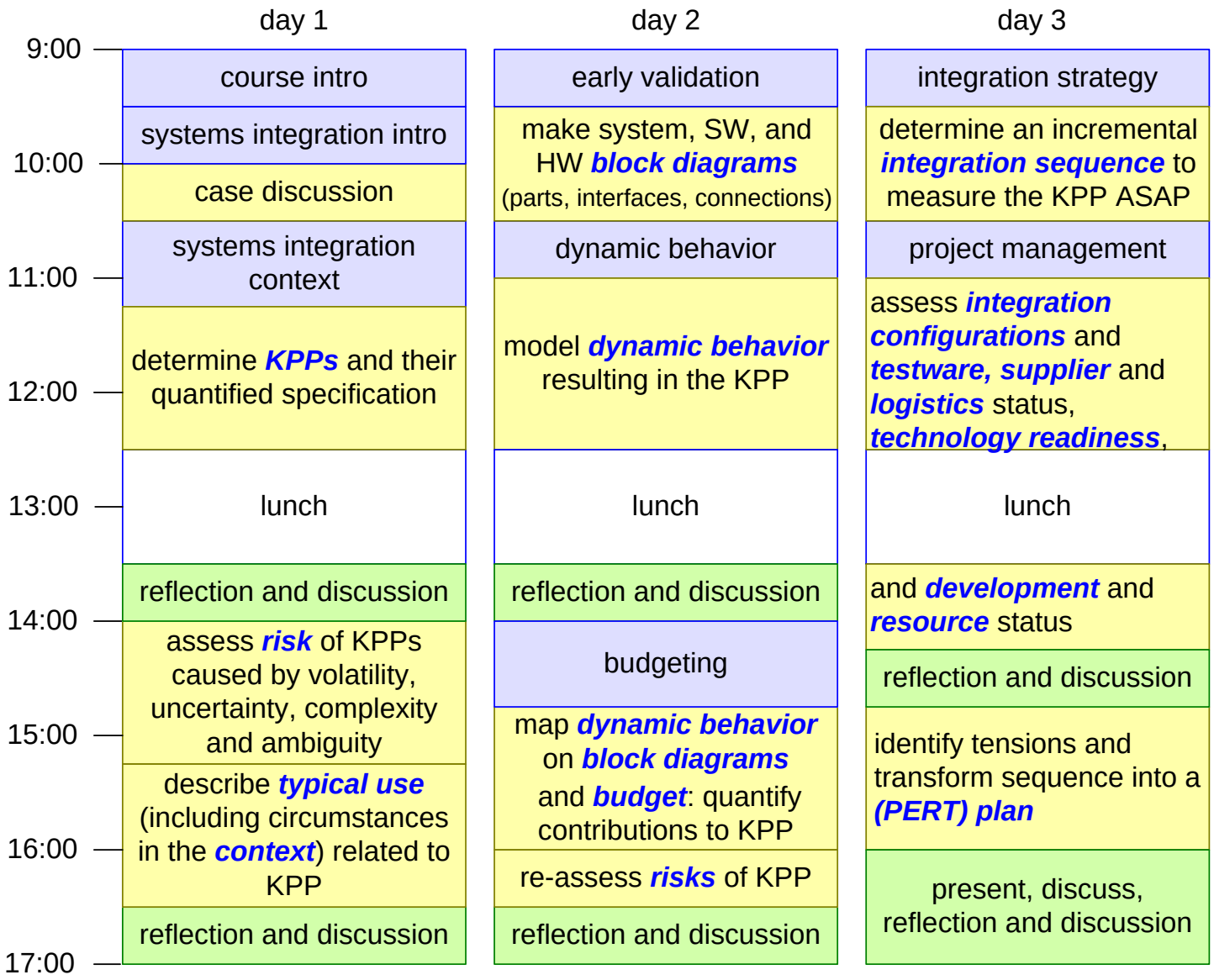
- determine an incremental ***integration sequence*** to measure the KPP as early as possible
- assess for the parts contributing to the KPP
  - ***fitness for purpose*** in customer context
  - ***integration configurations*** and ***testware***
  - ***supplier*** and ***logistics*** status
  - ***technology readiness***
  - ***development*** and ***resource*** status
- Identify ***tensions*** with development, logistics status, and availability of testware

  and transform the sequence in a ***(PERT) plan*** with required resources and ***integration configurations***
- assess ***robustness*** of the plan
- capture results in presentation

Reflection and Evaluation

- identify ***tensions*** or ***gaps*** in processes, organization, people, tools, instrumentation, context knowledge, etc. for executing the integration.

3-Day Face-to-Face Schedule



4-Day Face-to-Face Schedule