P E N S

Pathway in Enterprise Systems Engineering

Pathway in Enterprise Systems Engineering (PENS)

Project Ref. No.: 586301-EPP-1-2017-1-PS-EPPKA2-CBHE-JP

http://www.pens.ps

Enterprise Systems Architecture
Course Specification

Course Specification

Course details

Course Name	Enterprise Systems Architecture
Course Code	PENS_[ESA]
Number of Credit Hours	[3]
ECTS Credits	5.5 (140 learning hours)
Course type (core / elective)	[core]
Pre-requisites	[None]
Weekly Hours • Theoretical • Practical • Total	• [3] • [.....] • [.....]
Course Description (provide 60-100 words describing the focus of the syllabus)	
This course introduces the foundations of Software Systems Architecture, technology architecture and Architectural styles such as Client / Server architecture, service-oriented architectures, data centered architectures, cloud computing, etc. It will discuss the key elements of software architecture, and describe the roles of a software systems architect and analyzes the architecture quality attributes like scalability, performance and availability and the software architecture lifecycle. It presents an introduction to the subject and concepts of Enterprise Systems Architecture (ESA).	
Course aim(s) (provide 30-50 words describing the aim of the course)	
The main objectives of this course are (i) Introduce students to the fundamental concepts and the role, facets of enterprise systems architecture (ii) Students will be able to analyze and evaluate software architectures and identify the different architectural styles. (iii) Develop student's skills and technology for existing architects and designers to create software architectures while taking into account functional and non-functional requirements.	

I. Intended Learning Outcomes of Course (ILOs)

On completing the course, students should be able to (provide 4-6 learning outcomes):

LO.1   Familiarity with the notion of software systems architectures, describe their importance and context. Understand the architecture continuum and the relation between software, applications, technology and solution architectures.

LO.2   Analyze and evaluate architectures Views and structures. Understand a range of middleware technologies that architects commonly leverage in application solutions.

LO.3   Understanding and use of architectural styles and patterns in the design of system architectures and their features. Discuss the technology that will likely influence the futures of software architects.

LO.4   Understand the context of software architecture. Discuss the stage iterative software architecture lifecycle and the Methods for creating and analyzing software architecture. Analyzing the essential tasks and documents that involve an architect.

LO.5   Understand software architectures while taking into account non-functional requirements. Understanding of, and modeling experience with, system and architecture qualities.

LO.6   Understand the role of enterprise architecture and the path to building enterprise level architecture models

II. Course Matrix Contents

Wee k	Main Topics / Chapters	Learning Hours	Intended Learning Outcome (s)
1	Introduction	[2]	N/A
2	Software Systems Architecture fundamental 1. Introduction 2. Definition of software architecture 3. Role and importance of SA	[9]	LO.1 ([5]: part 1, p.3) ([1], ch 1, p.1) ([4] ch.2 p.11)
3	4. Architectures and Technologies ▪ Architectural Views and structures: (logical view, process view, physical view, development view and Other views).	[9]	LO.1, LO.2 [7] ([1], 1.3.2 p7) ([1], 9.4 p137) ([4] ch.2 p.30) JMSE
4	Software Architecture life cycle 1. Architectural Requirements 2. Architecture Design 3. Documenting software architectures	[12]	LO.4 ([3] ch2, p.23 & next chapters) ([5]: part 1 p 44; part 3 p.271) ([1], ch 7, p.97) ([4], part 2, p.69)
5	4. Architecture, implementation and testing 5. Architecture Reconstruction and conformance 6. Architecture Evaluation	[12]	LO.4
6	Middleware Architectures and Technologies 1. Technology Classification 2. Distributed Objects	[9]	LO.2 ([1], ch 4, p.39) ([1], ch 6)
7	3. Message-Oriented Middleware 4. Application Servers 5. others	[12]	LO.2 ([1], ch 4)
8	Architectural styles 1. Client / Server architectures 2. Peer to Peer architectures 3. Data centered architectures	[12]	LO.3 ([3] ch4, p83; ch11, p413) ([5]: ch 13, p203,p223, p.108) ([4], ch11, p.135) JMSE
9	4. Event driven architectures 5. Cloud computing 6. Other styles	[12]	LO.3
10	Service Oriented Architecture and REST	[12]	LO.3 ([5]: p.222) ([3] p.433,,,, p416)

				([1], ch 5, p.65) [JMSE] ([6], ch 16 & ch22)
11	Software Quality Attributes 1. Performance 2. Security 3. Integration 4. Privacy	[9]	LO.5	LO.5 ([3] ch 21&13, p.447) ([5]: part 2, p.61) ([1], ch 3, p.23) [JMSE]
12	5. Modifiability 6. Scalability / elasticity 7. Other Quality Attributes	[9]	LO.5	
13	Enterprise Systems Architecture 1. Introduction 2. Definition of enterprise systems architecture 3. Enterprise architecture components	[12]	LO.6	LO.6 ([2]: section 1, p.23)
14	4. Structure of enterprise architecture 5. Advantages of enterprise systems architecture	[9]	LO.6	
Total Learning Hours	140			

III. Assessment Methods, Schedule and Grade Distribution

Assessment type	Used	Formative	Weight	Week	ILO(s)
Written exam (midterm)	Y	Y	[20%]	#[9]	● [1,2]
Written exam (final)	Y	Y	[40%]	#[14]	● [1,2,3,4,5,6]
Written coursework (individual)	Y	Y	[20%]	#[4,7, 10,14]	● [1,2,3,4,5,6]
Written coursework (group)	Y	Y	[20%]	#[14]	● [1,2,3,4,5,6]
Oral presentation (individual)	Y/N	Y/N	[.....%]	#[.....]	● [.....]
Oral presentation (group)	Y/N	Y/N	[.....%]	#[.....]	● [.....]
Test/Quiz	Y/N	Y/N	[.....%]	#[.....]	● [.....]
Other	Y/N	Y/N	[.....%]	#[.....]	● [.....]

IV. List of References

Essential textbook(s)	[1] Ian Gorton : **Essential Software Architecture** http://wiki.di.uminho.pt/twiki/pub/Education/MFES1112/Material/Gorton06-chapter1.pdf [2] Scott A. Bernard : **An Introduction to Enterprise Architecture** http://spots.augusta.edu/tschultz/resources/ebooks/IntroEntArch/FullText.pdf [3] Taylor, Medvidovic, Dashofy. "**Software Architecture: Foundations, Theory, and Practice**". Wiley, 2009.

Recommended textbook (s)	[4] Rozanski and Woods. "**Software Systems Architecture: Working with Stakeholders Using Viewpoints and Perspectives**", Addison-Wesley Professional, 2nd Edition, 2011. https://jegadeesansite.files.wordpress.com/2018/01/nick-rozanski-ec3b3in-woods-software-systems-architecture-working-with-stakeholders-using-viewpoints-and-per [5] Len Bass, Paul Clements, Rick Kazman, **Software Architecture in Practice** (3rd Edition), Publisher: Addison-Wesley Professional; (October 5, 2012) ISBN-10: 0321815734 ISBN-13: 978-0321815736 http://jz81.github.io/course/sa/Software%20Architecture%20in%20Practice%20(3rd).pdf
Course notes	● [.....]
Journal(s) / periodical(s)	● [.....]
Specific article(s)	● [.....]
Websites and other online resources	● [.....]

V. **Facilities required for teaching and learning**

● [Lab (PCs with Internet connection), projector]