

BUSINESS INTELLIGENCE (BI)- DEC1

INFORMATION GENERALE :		
Niveau (L3, M1, M2) / Semestre (S1, S2)	M2	IKSEM
Langage :	English	
Nom et coordonnées del'intervenante responsable	Raphael Bijjaoui	
Autres intervenants:		
Perspective (ex: Recherche,Pratique)	Pratique	
Domaine (ex: Ingénierie SI, Informatique, Gestion,Mathématique)	Ingénierie SI, Gestion	
Objectifs : <ul style="list-style-type: none"> - Connaissances théoriques à développer - Compétences techniques à développer 	<p>Following this course, the students will understand:</p> <ul style="list-style-type: none"> ● the business motivations for a company to build or acquire a business intelligence (BI)system, ● what are the key technical principles and components of such asystem, ● and how to design and build a fully functional BI environment. <p>We will discuss the underlying technologies and technics that must be used to design a datawarehouse.</p> <p>The student will experiment building himself the key parts of a Bi environment (Databases, ETLs, Cubes, Reports).</p> <p>By the end of the course, the student will be able to present theroleofeachpartofthesystem,explainthedesignoptions while setting up a solution architecture and finally implement the key components of a Blenvironment.</p>	
Mots clés : Indiquer les concepts et les termes le plus souvent utilisés ou les plus importants <i>ex : requirements, businessprocess model, process mining, ProM, SOA, web service, OO,M V C , product line, ERP</i>	Business Intelligence, Datawarehouse ETL Operating Data Storage, Staging, Cube OLTP, OLAP Reports, Dashboards	

ORGANISATION DE FORMATION

Volume Horaire Total et répartition souhaitable (ex : 1 jour complet , 1 demi journée , 1demi-journée par semaine)	30 h, 5 jours, 1 x semaine
Evaluation finale :	Examen
Activités ex : cours magistraux (CM), travaux pratique (TP),travaux dirigés (TD), séminaires, ateliers de créativité, projet individuel, projet par équipe,e t c	CM et TP
Répartition approximative entre les cours (théorie) et les travaux pratiques	15h théorie - 15h pratique
Prérequis: Indiquer les compétences et les connaissances nécessaires pour suivre la formation : ex. : Java OO, familiar with eclipse, good level UML, knowledge of Bonita or similar BPM frameworks, experience with MySQL ; basic knowledge of graph theory	Having access to a PC , with Power BI installed (https://www.microsoft.com/en-us/download/details.aspx?id=58494) Those having a mac or linux device, will have to build a Windows Virtual Machine to be able to attend the class. Being knowledgeable on relational database system and SQL language should make things easier but is not mandatory.

CONTENUE DE LA FORMATION:

Résumé de cours:

1) Day 1

Lecture :

Business Intelligence : an introduction.

Analytics and Database modeling : advanced understanding.

How the Business Intelligence integrates with what's called Ambient Intelligence (ie : IOT, BIG DATA, IA)

Practical work :

Note : The student has to have access to a PC and optionally to a Microsoft Azure Cloud Subscription. Two options will be given to experiment the knowledge acquired.

In the case of a cloud access, students will have to use it's own student subscription in Microsoft Azure.

In case of a PC installation, student will be downloading the source of the tools that will be used throughout the course.

The first activity will be to setup a properly working environment.

Presentation of the use case that will be used throughout the course : the students will analyze, design and build a business intelligence end to end solution throughout the course.

By the end of the day :

The student will have a high level understanding of the business intelligence application architecture, their needs for a company, the tools used.

The student will also have a fully functional environment to work and experiment.

2) Day2**Lecture :**

Role, usage, structure of a data warehouse environment : Operating Data Storage, Staging, data warehouse, Datamart, Cube

Data storage modeling adapted to its role and usage

Database Modeling : Inmon Vs Kimball Vs DataVault

Introduction to main design options : OLTP, OLAP, MPP, Data Lake, etc ...

Practical work :

Analyze, design and build of the data warehouse applied to the use case.

By the end of the day :

The student knows the role of the different components of the business intelligence architecture

The student has analyzed, designed and build the components of the project.

3) Day3**Lecture:**

Role, usage, structure of a data extraction, transformation and loading (ETL) pipeline in the data warehouse environment.

Review of the main cases of data transformation, parameterization, loading improvements, incident management...

Practical work :

Data exploration using a data visualization tool (like Power BI)

Data contract interface definition and implementation with an ETL tool

By the end of the day :

The student knows the impact of a state of the art data loading pipeline (data quality, technical anomaly logging, transformations, ...)

The student has designed and implemented the data pipeline in his own environment.

4) Day4**Lecture:**

Role, usage, structure of an OLAP database Modeling and visualization of multidimensional data.

Practical work :

Analysis, design and building of a multidimensional database

By the end of the day :

The student knows the multidimensional analysis concepts and in which cases it should be employed

The student has designed and implemented its own OLAP solution and knows how to navigate the data with pivot tables or a dashboarding tool.

5) Day5

Lecture :

Data visualization :

Different tools : Reports, Dashboards, ad hoc analyses, infographics ...

Different usages : Mobility, Tablets, Pc/Laptops

Guidance to choose the right way to represent data in order to convey and highlight the message

Practical work :

Definition, design and implementation of a report of each type (pro format, dashboard, ad hoc) for each usage

Lien vers les supports ou un échantillon de slides

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Références bibliographiques / sources à indiquer aux étudiants pour la préparation hors classe:

Machine Learning – DEC3

INFORMATION GENERALE :		
Niveau (L3, M1, M2) / Semestre (S1,S2)	M2	S2I/IKSEM
Langage :	English / French	
Nom et coordonnées del'intervenants p o n s a b l e	Elena Epure :elena.epusre@univ-paris1.fr Jacques Robin :jacques.robin@univ-paris1.fr	
Autres intervenants:	TBD	
Perspective (ex: Recherche,Pratique)	Pratique, Recherche	
Domaine(ex: SI,Informatique, Gestion,Mathématique)	Ingénierie SI	
Objectifs : <ul style="list-style-type: none"> - Connaissances théoriques à développer - Compétences techniques à développer 	<p>Machine learning is a set of processes and algorithms to discover knowledge from data for both business intelligence and artificial intelligence applications engineering.</p> <p>The aim of this course is to acquire a general vision of the diversity of machine learning usages, and for each usage, its associated development processes, inputs, outputs, algorithms and parameters.</p> <p>After the course, the students should be able to define the requirements of a machine learning problem and choose the input and output knowledge representation, data sources, algorithms, parameters and tools that best fit those requirements. They should also be able to evaluate whether a first resulting machine learned model fits its requirements, and if it does not (the usual case), iteratively adjust the choices of input, output, algorithms and parameter until it does.</p>	
Mots clés : Indiquer les concepts et les termes le plus souvent utilisés ou les plus importants <i>ex : requirements, business process model, process mining, ProM, SOA, web service, OO, MVC , product line, ERP</i>	Machine learning, supervised learning, unsupervised learning, inductive learning, analogical learning, symbolic learning, sub-symbolic learning, deep learning, neural networks, clustering, probabilistic learning, relational learning, training, testing, cross-validation, sampling, knowledge representation, artificial intelligence, datamining.	

ORGANISATION DE FORMATION	
Volume Horaire Total et répartition souhaitable (ex : 1 jour complet , 1 demi journée , 1 demi-journée parsemaine)	30 h, 5 jours x 6h
Evaluation finale :	Examen
Activités <i>ex : cours magistraux (CM), travaux pratique (TP),travaux dirigés (TD), séminaires, ateliers de créativité, projet individuel, projet par équipe,e t c</i>	CM, practical exercices on the different tools
Répartition approximative entre les cours(théorie) et les travauxpratiques	<i>15h théorie, 15h pratique</i>
Prérequis: Indiquer les compétences et les connaissances nécessaires pour suivre la formation <i>; ex. : Java OO, familiar with eclipse, good level UML, knowledge of Bonita or similar BPM frameworks, experience with MySQL ; basic knowledge of graphtheory</i>	Very basic concepts of probability theory and statistics
CONTENUE DE LA FORMATION:	
Résumé de cours:	
<ol style="list-style-type: none"> 1. Introduction to machine learning (supervised, unsupervised, inductive, analogical) 2. Deep neural network learning 3. Probabilistic and relational learning 4. Machine learning for artificial intelligence 5. Student seminars on advanced topics (e.g., ensemble, transfer, incremental, lifelong, reinforcement and adversarial learning) 	
Lien vers les supports ou un échantillon de slides	--
Références bibliographiques / sources à indiquer aux étudiants pour la préparation hors classe:	
<ul style="list-style-type: none"> • Artificial Intelligence: A Modern Approach, 4th Edition, Stuart Russell and Peter Norvig, Pearson • Data Mining: Practical Machine Learning Tools and Techniques, 4th Edition, Ian Witten, Eibe Frank, Mark Hall and Christopher Pal, 2020, Morgan Kaufmann • Foundations of Probabilistic Logic Programming: Languages, Semantics, Inference and Learning. Fabrizio Riguzzi, 2018, River Publishers 	

Process Mining - DEC4

INFORMATION GENERALE :		
Niveau (L3, M1, M2) / Semestre (S1, S2)	M2	S2I/IKSEM
Langage :	English / French	
Nom et coordonnées del'intervenante responsable	Deneckere Rébecca - denecker@univ-paris1.fr	
Autres intervenants:		
Perspective (ex: Recherche, Pratique)	Pratique, Recherche	
Domaine (ex: Ingénierie SI, Informatique, Gestion, Mathématique)	Ingénierie SI	
Objectifs : <ul style="list-style-type: none"> - Connaissances théoriques à développer - Compétences techniques à développer 	<p>Process mining techniques allow for extracting information from event logs. For example, the audit trails of a workflow management system or the transaction logs of an enterprise resource planning system can be used to discover models describing processes, organizations, and products. Moreover, it is possible to use process mining to monitor deviations (e.g., comparing the observed events with predefined models or business rules).</p> <p>The aim of this course is to understand the concepts and techniques underlying process mining (petri nets, decision trees, cluster analysis, workflow nets, alpha algorithm, dependency nets, causal graphes...) and to be able to use these techniques in different tools (Disco, ProM).</p>	
Mots clés : Indiquer les concepts et les termes le plus souvent utilisés ou les plus importants <i>ex : requirements, business process model, process mining, ProM, SOA, web service, OO, MVC, product line, ERP</i>	Process, Process mining, conformance checking, deviation	

ORGANISATION DE FORMATION	
Volume Horaire Total et répartition souhaitable (ex : 1 jour complet , 1 demi journée , 1 demi-journée parsemaine)	30 h, 5 jours x 6h
Evaluation finale :	Examen
Activités ex : <i>cours magistraux (CM), travaux pratique (TP),travaux dirigés (TD), séminaires, ateliers de créativité, projet individuel, projet par équipe,e t c</i>	CM, practical exercices on the different tools
Répartition approximative entre les cours (théorie) et les travaux pratiques	<i>9h théorie - 21h pratique</i>
Prérequis: Indiquer les compétences et les connaissances nécessaires pour suivre la formation <i>: ex. : Java OO, familiar with eclipse, good level UML, knowledge of Bonita or similar BPM frameworks, experience with MySQL ; basic knowledge of graph theory</i>	To know what is a process.
CONTENUE DE LA FORMATION:	
Résumé de cours:	
Theory and exercises on petri nets, decision trees, cluster analysis, workflow nets, alpha algorithm, dependency nets, causal graphes Applications with Disco and ProM	
Lien vers les supports ou un échantillon de slides	--
Références bibliographiques / sources à indiquer aux étudiants pour la préparation hors classe:	
Process Mining: Data Science in Action by W.M.P. van der Aalst, Springer Verlag, 2016 (ISBN 978-3-662-49850-7).	

ISI1: Model Driven Engineering

INFORMATION GENERALE :		
Niveau (L3, M1, M2) / Semestre (S1, S2)	M2	S2I/IKSEM
Langage :	English (IKSEM) / French (S2I)	
Nom et coordonnées de l'intervenant responsable	Deneckere Rébecca -denecker@univ-paris1.fr	
Autres intervenants:	Naoufel Kraiem	
Perspective (ex: Recherche, Pratique)	Pratique, Recherche	
Domaine (ex: Ingénierie SI, Informatique, Gestion, Mathématique)	Ingénierie SI	
Objectifs :	<p>Course Outcomes</p> <p>On successful completion of the course student will be able to understand:</p> <ul style="list-style-type: none"> - Connaissances théoriques à développer <ul style="list-style-type: none"> To abstract a model into a metamodel using a modeling notation To understand the usefulness of MDE, and its applicability scenarios To understand the main concepts and principles of MDE To review modelling notations, like the UML and OCL. - Compétences techniques à développer <ul style="list-style-type: none"> To understand the importance and role of model transformations in MDE, and to be able to apply them in practice using current technologies. To understand and apply in-place and model-to-model transformation, to learn and apply specific languages for transformations. 	
Mots clés :	MetaModeling	
Indiquer les concepts et les termes le plus souvent utilisés ou les plus importants ex : requirements, business process model, process mining, ProM, SOA, web service, OO, MVC, product line, ERP	Model Driven Engineering	

ORGANISATION DE FORMATION

Volume Horaire Total et répartition souhaitable
(ex : 1 jour complet , 1 demi journée , 1 demi-journée parsemaine)

30 h, 5 days, 1 x week

Evaluation finale :

Exam

Activités

ex : cours magistraux (CM), travaux pratique (TP),travaux dirigés (TD), séminaires, ateliers de créativité, projet individuel, projet par équipe,e t c

CM, exercices

Prérequis:

Indiquer les compétences et les connaissances nécessaires pour suivre la formation

: ex. : Java OO, familiar with eclipse, good level UML,knowledge of Bonita or similar BPM frameworks, experience with MySQL ; basic knowledge of graphtheory

Modeling skills

CONTENUE DE LA FORMATION:

Résumé de cours:

The course presents the enabling technologies of the model driven approach to software engineering. Topics covered include UML metamodel, UML profiles, Meta-Object Facility (MOF), Introduction to the Object Constraint Language (OCL), Model Driven Development (MDD), Model Driven Architecture (MDA), Platform-Independent Models (PIM), Platform-Specific Models (PSM), Model Transformations, Action Specification, Automatic System Generation, Using MDA in a typical project, Case Studies.

Tools :

Eclipse Modeling Framework

Topic	
Understand the concept of metamodeling	6h
Practice metamodeling on several known models	6h
Developing Modeling language (abstract Syntax, Graphical Concrete Syntax, Textual Concrete syntax)	3h + 3h Lab
Model to model Transformations (ATL, Graph Transformations, Mastering transformations)	3h +3h lab
Model To Text transformation	2h + 1h Case Study
Managing Models	2h + 1h Case Study

Lien vers les supports ou un échantillon de slides

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ISI2: Advanced process engineering & process modelling

INFORMATION GENERALE :		
Niveau (L3, M1, M2) / Semestre (S1, S2)	M2	S2I/IKSEM
Langage :	English (IKSEM) / French (S2I)	
Nom et coordonnées del'intervenante responsable	Deneckere Rébecca - denecker@univ-paris1.fr Irina Rychkova - irina.rychkova@uyniv-paris1.fr	
Perspective (ex: Recherche, Pratique)	Pratique, Recherche	
Domaine (ex: Ingénierie SI, Informatique, Gestion, Mathématique)	Ingénierie SI	
Objectifs : - Connaissances théoriques à développer - Compétences techniques à développer	<ul style="list-style-type: none"> • To be able to construct a process on an intentional way. • To understand different paradigms of process modeling and their use • To master the statecharts modeling notation and tool 	
Mots clés : Indiquer les concepts et les termes le plus souvent utilisés ou les plus importants <i>ex : requirements, business process model, process mining, ProM, SOA, web service, OO, MVC, product line, ERP</i>	Intentional process modeling Product/Process State machine Statechart Case management process	

ORGANISATION DE FORMATION	
Volume Horaire Total et répartition souhaitable (ex : 1 jour complet , 1 demi journée , 1 demi-journée parsemaine)	30 h, 5 days
Évaluation finale :	Exam
Activités <i>ex : cours magistraux (CM), travaux pratique (TP),travaux dirigés (TD), séminaires, ateliers de créativité, projet individuel, projet par équipe,e t c</i>	CM, exercices
Répartition approximative entre les cours (théorie) et les travaux pratiques	<i>9h course - 21h practical exercises 3 days on Intentional Process modeling 2 days on Base State Machine</i>
Prérequis: Indiquer les compétences et les connaissances nécessaires pour suivre la formation <i>: ex. : Java OO, familiar with eclipse, good level UML, knowledge of Bonita or similar BPM frameworks, experience with MySQL ; basic knowledge of graph theory</i>	BPM, basics of state-oriented modeling, FSM
CONTENUE DE LA FORMATION:	
Résumé de cours:	
<p>In the first part of the class, we discuss intention-oriented paradigm for process modeling. The meta-model MAP is used to explore intentional process modeling and we apply it in different case studies.</p> <p>In the second part of the class, we discuss activity-oriented and state-oriented paradigms for process modeling. We discuss state machines and statecharts modeling for system specification. We define the limits of BPM and examine how the state-oriented paradigm can overcome these limits. We use YAKINDU statecharts tool for process modeling and simulation.</p>	
Lien vers les supports ou un échantillon de slides	--

Requirements Engineering / Ingénierie des Exigences - ISI3

INFORMATION GÉNÉRALE :		
Niveau (L3, M1, M2) / Semestre (S1, S2)	M2	S2I/IKSEM
Langage :	English / Français	
Nom et coordonnées del'intervenante responsable	Camille Salinesi -camille@univ-paris1.fr	
Autres intervenants:		
Perspective (ex: Recherche,Pratique)	Practice and Research / Pratique et Recherche	
Domaine(ex: SI,Informatique, Gestion,Mathématique) <i>Ingénierie SI</i>	Information Systems Engineering / Ingénierie SI	
Goals / Objectifs :	<p>This lecture's goal is to get familiar with the fundamental problems and specific way of working of requirements engineering (RE). We shall draw a map of known and proved RE methods, techniques and Tools. The lecture is organized in a sequence through which we will progress along RE maturity levels, from most elementary requirements specification techniques, up to complex elicitation or prioritisation approaches.</p> <p><i>Le but de ce cours est de se familiariser avec les problématiques et démarches spécifiques de l'ingénierie des exigences (IE). Nous dresserons un panorama des méthodes, techniques et outils connues et éprouvées de l'IE. Le cours est organisé en une séquence au cours de laquelle nous progresseront dans les niveaux de maturité de l'IE, partant des bonnes pratiques les plus élémentaires de spécification des exigences à des démarches complexes d'élucidation ou de priorisation des exigences.</i></p>	
Mots clés : Indiquer les concepts et les termes le plus souvent utilisés ou les plus importants <i>ex : requirements, business process model, process mining, ProM, SOA, web service, OO, MVC , product line, ERP</i>	<p>Requirements, Goals, Needs, Features, Engineering and Management, Methods/Techniques/Tools.</p> <p>Project Management, Business Analysis, Systems and Software Quality, Innovation.</p> <p>Information Systems, Software Products, COTS.</p> <p><i>Exigences, Buts, Besoins, Caractéristiques, Ingénierie et Management, Méthodes/Techniques/Outils</i></p> <p><i>Gestion de Projet, Analyse Métier, Qualité de Systèmes et des Logiciels, Innovation.</i></p> <p><i>Systèmes d'Information, Produits Logiciels, COTS.</i></p>	

ORGANIZATION /ORGANISATION DE LA FORMATION

Total duration and distribution /Volume horaire et répartition	30 hours, 5 full days /30 h, 5 jours complets
Evaluation/Evaluation:	Final Exam /Examen Terminal
Activities /Activités ex : cours magistraux (CM), travaux pratique (TP),travaux dirigés (TD), séminaires, ateliers de créativité, projet individuel, projet par équipe, e t c	Lectures, practical exercises, self assessment tests, homework / CM, exercices pratiques, tests d'auto-évaluation, devoirs maison
Distribution between theory and practice / Répartition entre théorie et pratique	20h (morning) - 10h practice theory(after noon) 20h (matin) - 10h pratique théorie(après midi)
Preriquisits /Prérequis	To know the basic principles of project management, conceptual modelling Fundamentals, some programming experience, writing and communication skills /Connaître les principes élémentaires de la gestion de projet, fondamentaux de la modélisation conceptuelle, expérience en programmation, compétence en rédaction et en communication.

TEACHING CONTENTS /CONTENU DE LA FORMATION:

Summary of the lecture /Résumé du cours

- **Challenges:** embedding RE in software development lifecycles, RE terminology, RE risks, expected benefits.
- **Return on experience:** success and failure factors, myths and realities of RE, typical mistakes and pitfalls.
- **Requirements Quality:** defects typology, nocuity, principles and limitation of verification.
- **Elucidation:** Enquiry cycle, investigation techniques interviews, observation, creativity (brainstorming, focus groups, 6x6), archaeology, prototypes, scenarios, storyboards, etc.
- **Documentation:** forms of documentation, standards, authoring style, requirements attributes, effect of using natural language, models, glossaries, patterns, etc.
- **Prioritisation:** decision situations, decision criteria, techniques (triage, agreement, compromise, vote, cost/benefits analysis, multicriteria decision making), problems due to the number and diversity of stakeholders, etc.

- **Enjeux:** inscription dans les cycles de vie, terminologie de l'IE, tâches de l'IE, bénéfices attendus
- **Retours d'expérience:** facteurs d'échec et de succès, mythes et réalités de l'ingénierie des exigences, erreurs types
- **Qualité des exigences:** typologie des erreurs, nocuité, principes et limites de la vérification
- **Elucidation:** cycle d'enquête, techniques d'investigation, interviews, observation, créativité (brainstorming, focus group, 6x6), archéologie, prototypes, scénarios, storyboards, etc
- **Documentation:** formes documentaires, standards, style rédactionnel, attributs des exigences, effets de l'emploi du langage naturel, modèles, glossaires, gabarits, etc.

- **Priorisation:** *situation de décision, critères de décision, techniques (triage, accord, compromis, vote, analyse coûts/bénéfices, décision multicritère), problème de la multiplicité des parties prenantes, etc.*

Slides /Transparents

-- <https://cours.univ-paris1.fr/enrol/index.php?id=6253>

Litterature /Références bibliographiques

Klaus Pohl. Requirements Engineering, Fundamentals, Principles ad Techniques. Springer Verlag 2010

Aybuke Aurum, Claes Wohlin. Engineering and Managing Software Requirements. Sringer Verlag 2005

ESOA - ENTERPRISE AND SERVICE-ORIENTED ARCHITECTURE

Part I – SOA, Enterprise Architecture and Strategic Alignment

30h, 5 sessions x 3h+3h.

Evaluation: Exam

Service-Oriented Architecture was defined in 90x, it is a paradigm for the realization and maintenance of organizational business processes and technical infrastructure. In this class, we discuss the concepts of **enterprise application integration and service design according to SOA**. We also introduce **strategic alignment** and discuss the importance of **IT management** for organizations. We introduce **enterprise architecture** – a discipline that facilitates strategic alignment and enables a transition from IT management to **IT strategy**.

Key words: SOA, EA

Course description.

In this class, we start with **SOA** (Service-Oriented Architecture) – the framework for implementing business process in organizations. We examine the notion of **service** and the infrastructure that has to be developed in order to implement SOA. We discuss the advantages and limitations of SOA and service technologies.

Enterprise architecture (EA) is a process of translating a business vision and strategy into effective business processes and IT infrastructure. (SOA can be seen as an architecture for implementation of such processes and infrastructure within EA).

The sessions will combine traditional lecture (the notes will be available on EPI) and case-based learning - group work on practical business problems (cases) illustrating the theoretical concepts seen in class.

The evaluation of the course will be based on participation in the case sessions + exam.

ISI5 - Cybersecurity

Cybersecurity is inseparable from cyberspace. And each evolution brings with it its own security risks. This opens up infinite possibilities for penetrating information systems and reaching work tools. The boundary between the professional and personal spheres is blurring (BYOD: bring your own device, teleworking, etc.) and outsourcing and pooling jointly lead to cloud computing with questions about data location (legal access by local authorities in particular) and resilience.

Cyber threats are particularly insidious and dangerous. The "Introduction to Cybersecurity" course will help you identify today's threats and the methods and best practices to protect an organization's data.

Contact : **Corinne Plourde**

corinne.plourde@4cysec.io

Semantic web and Knowledge management

At the end of this course, students should be able

- to read an ontology, understand its content and purpose,
- create, modify and debug an ontology.

Semantic web basics

1st session – RDF

Introduction to the Web of data (Semantic Web)
The architecture of the Semantic Web
Resource Identification
W3C standards (the shift from XML to RDF)
The information triplification process
The different RDF's serialisation syntaxes

2nd session – SPARQL, lifting and querying

Data store, Data set and Graph semantic
SPARQL, queries as pattern graphs
SPARQL endpoints
SPARQL Data digging
Other SPARQL tools

Knowledge management and

Ontologies 3rd session – Knowledge representation

Data, information, knowledge
What is a "representation"?
Knowledge representation approach survey
Semantic network, Conceptual graph
The limitations of the relational model
Data lifting technics
The different knowledge representation structures : Sets, Trees, Lattices, Graphs
Ontology, intuitively

4th session – Ontologies

Definitions

Ontology as representation

RDFS, OWL : Ontology expressivity

Ontology autopsy, reading and analysis

A pragmatic toolset

5th session - Ontology design

Ontology Management and Engineering

Concrete design

Strategy and methodology

Acquisition, capitalization, enrichment

Recapitulation

ENTERPRISE ARCHITECTURE and DIGITAL TRANSFORMATION

Irina Rychkov and Nicolas Herbaut

30h, 5 sessions x 6h.

Evaluation: Exam

In this course, we discuss different approaches for (IT) service design, development and evolution of a company and examine the role of IT Strategy as compared to Business Strategy.

We introduce the concepts required for successful creation and management of **Foundation for Execution** of a company – the IT infrastructure and resources required for digitizing the core business processes of a company. These concepts include: Operating Model, Enterprise Architecture (EA) and engagement model.

Enterprise Architecture is traditionally defined as a “Master Plan” that drives the long-term development and evolution of the organizational IT and business activities. However, prior to focus on the detailed master plan, the identity of an organization, its core capabilities and values have to be analyzed. **Operating Model** defines the fundamental requirements for the organizational IT and allows for long-term strategic planning in IT.

During this course, you will learn about four operating models and their characteristics.

Based on the operating model of an organization, you will be able (i) to identify the core requirements for its foundation for execution (ii) to reason about and to propose relevant enterprise architecture principles for this organization.

We further extend the operating models to cover recent research topics showing that Enterprise Architecture is an asset for companies willing adapt to their ecosystem and thrive on organizational and technological paradigm shifts. First, we will discuss how to Enterprise Architecture helps reason about **Digital Transformation deployment** by presenting frameworks to analyze Digital Capabilities and their impact on the **Adaptive Loop**. Then, we will address the concepts of **Resilience and Antifragility** to show how to companies, with the right capabilities, can tolerate shocks and sometime benefit from it. These concepts will be exemplified with numerous case studies and an Antifragile architecture design process..

The sessions will consist of lectures, discussions and exercises.

The evaluation of the course will be based on the exam.

Reference:

- Ross, Jeanne W., Peter Weill, and David Robertson. *Enterprise architecture as strategy: Creating a foundation for business execution*. Harvard Business Press, 2006
- Korhonen, J. J., & Halen, M. (2017). Enterprise architecture for digital transformation. Proceedings - 2017 IEEE 19th Conference on Business Informatics, CBI 2017, 1, 349–358. <https://doi.org/10.1109/CBI.2017.45>
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Offre de Formation

INFORMATION GENERALE :	
Titre de l'intervention :	Variability, Software product lines and factories
Niveau (L3, M1, M2) / Semestre (S1,S2)	M2 / S2I/IKSEM
Langage :	English / French
Nom et coordonnées del'intervenantsresponsable	Raúl MAZO :raul.mazo@univ-paris1.fr
Autres intervenants:	
Perspective (ex: Recherche,Pratique)	Pratique, Recherche
Domaine (ex: Ingénierie SI,Informatique, Gestion, Mathématique)	Ingénierie SI, Software Engineering
Objectifs :	<p>Following this course, the students will understand the concept of Software Product Line Engineering as a new production paradigm which helps to create software factories by industrialising software production.</p> <p>The students will also learn why the applications of Software Product Line Engineering techniques in the software industry are convincing and promising. In this course, students will learn why and how to implement a software product line.</p> <p>We will also discuss some trends and remaining challenges in this field of software engineering.</p>
<ul style="list-style-type: none"> - Connaissances théoriques à développer - Compétences techniques à développer 	
Mots clés : Indiquer les concepts et les termes le plus souvent utilisés ou les plus importants <i>ex : requirements, businessprocess model, process mining, ProM, SOA, web service, OO,M V C , product line, ERP</i>	Variability, software product lines, software factories, component-based software development, constraints, project management, requirements.

ORGANISATION DE FORMATION	
Volume Horaire Total et répartition souhaitable (ex : 1 jour complet , 1 demi journée , 1 demi-journée par semaine)	30 h, 5 jours, 1 x semaine
Evaluation finale :	Examen
Activités <i>ex : cours magistraux (CM), travaux pratique (TP),travaux dirigés (TD), séminaires, ateliers de créativité, projet individuel, projet par équipe, etc</i>	CM, projet par équipes avec des présentations intermédiaires
Répartition approximative entre les cours (théorie) et les travaux pratiques	15h théorie - 15h - pratique
Prérequis: Indiquer les compétences et les connaissances nécessaires pour suivre la formation <i>: ex. : Java OO, familiar with eclipse, good level UML, knowledge of Bonita or similar BPM frameworks, experience with MySQL ; basic knowledge of graph theory</i>	Familiar with project management, programming (java, services and constraints), requirements engineering, component-based design, testing and basic knowledge of graph theory
CONTENUE DE LA FORMATION:	
Résumé de cours:	
<p>The content of this course is summarised as follows:</p> <ol style="list-style-type: none"> 1. Introduction to product line engineering and variability management 2. Preliminary analysis of a product line project (scoping) 3. Domain engineering <ul style="list-style-type: none"> Requirement engineering of a domain Product line modeling Implementation and test of reusable domain components Transformation of product line models Reasoning on product line models 4. Configuration <ul style="list-style-type: none"> Different types of configuration Interactive and guided configuration 5. Application engineering <ul style="list-style-type: none"> From a configuration to a product definition Product derivation and assembling 6. Evolution and management of a product line 	
Lien vers les supports ou un échantillon de slides	--
Références bibliographiques / sources à indiquer aux étudiants pour la préparation hors classe:	
<ol style="list-style-type: none"> 1. Clements P., Northrop L. Software Product Lines: Practices and Patterns, Addison Wesley, Reading, MA, USA, 2001. 2. Dhungana, P. Grünbacher, and R. Rabiser. The DOPLER Meta-Tool for Decision-Oriented Variability Modeling: A Multiple Case Study. Automated Software Engineering, 2010. 	

3. Kang K., Cohen S., Hess J., Novak W., Peterson S. Feature-Oriented Domain Analysis (FODA) Feasibility Study, Technical Report CMU/SEI-90-TR-21, Software Engineering Institute, Carnegie Mellon University, November 1990.
4. Mazo R., Salinesi C, Diaz D., Djebbi O., Lora-Michiels A. Constraints: the Heart of Domain and Application Engineering in the Product Lines Engineering Strategy. International Journal of Information System Modeling and Design IJISMD. pp.33-68. ISSN1947-8186, eISSN1947-819. April-June 2012, Vol. 3, No.2.
5. Parnas D.L. On the Criteria to be Used in Decomposing Systems into Modules. Communications of the ACM, December 1972.
6. Poh K, Böckle G; vander Linden F. Software Product Line Engineering – Foundations, Principles, and Techniques. Springer, Heidelberg (2005)

Cloud & Pervasive Computing- IT3

GENERAL DESCRIPTION		
Level (L3, M1, M2) / Semester (S1, S2)	M2 S2I/IKSEM	S2
Language:	English / French	
Lecturer in charge:	Carine Souveyet - Carine.Souveyet@univ-paris1.fr	
Lecturer(s):	Luiz Angelo Steffeneel - angelo.steffeneel@univ-reims.fr Manuele Kirsch Pinheiro - Manuele.Kirsch-Pinheiro@univ-paris1.fr	
Perspective (ex: <i>Research, Practical</i>)	Pratique, Recherche	
Domain (ex: <i>Engineering of Information Systems, IT, Management, Math</i>)	IT (Information Technology)	
Learning goals: - Theoretical knowledge - Technical skills	<p>Expected learning outcomes :</p> <ul style="list-style-type: none"> • Comprendre les concepts liés à l'orientation service et sa généralisation au cloud computing • Reconnaître les enjeux de l'adoption du cloud au niveau d'une entreprise et des Webservices • Reconnaître les différents concepts techniques liés au cloud computing • Appréhender l'usage d'une plateforme Cloud • Appréhender la notion de virtualisation et ses enjeux • Reconnaître et savoir utiliser les différents types de virtualisation • Administrer et déployer des applications Cloud • Énoncer les caractéristiques des SI pervasifs • Savoir les reconnaître dans le monde de l'entreprise • Conceptualiser un SI pervasif • Reconnaître les caractéristiques des applications sensibles au contexte • Être capable de faire l'ingénierie de ces types d'application 	
Keywords: <i>ex: requirements, business process model, process mining, ProM, SOA, web service, OO, MVC, product line, ERP</i>	Cloud computing, service orientation, SOA, virtualization, ubiquitous/pervasive computing, context-aware computing, IoT, fog computing	
ORGANIZATION		
Volume and organization (ex : 1 full day, 1/2 day, time per week)	30 h, 5 days, 1 x week	
Evaluation:	Practical / Final term	
Activities	CM and practical lessons, notably using	

<i>ex : theoretical lecture (CM), exercise lessons (TP),seminaries, ateliers, individual or group projects,e t c .</i>	small Java projects
Organization between theoretical andpractical/exerciceslessons	12h theory - 18h exercise lessons
Required skills: Necessary knowledge and skills for correctly following the lessons <i>ex.: Java, familiar with eclipse, good level UML,knowledge of Bonita or similar BPM frameworks, experience with MySQL; basic knowledge of graph theory</i>	<ul style="list-style-type: none"> • Java • Notions of WebServices • Notions of Linux (levelbeginner)
CONTENUE DE LA FORMATION:	
Summary:	
<ul style="list-style-type: none"> • Introduction to cloudcomputing • Presentation of the different cloudmodels • Introduction to virtualization and its application to cloudplatforms • Evolution of Information System: the Pervasive Information Systems(PIS) • Introduction to the notion of context and to the context-awaresystems • Introduction to IoT (Internet of Things) and to fog computing and their application intoPIS 	
Slides and content URL:	--
Bibliography:	
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Crash Course on Blockchain and its use cases

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Centre de Recherche en Informatique Paris, France

2020-2021

Scope

This Crash Course is targeted at graduate students that want to discover Blockchains and Distributed Ledgers technologies, understand their application over a large spectrum of use cases derived from academic research and industry deployments.

Summary

The leading module of this course poses the ground foundations of the technology, and explores just enough theory to get started with blockchain and is meant to be accessible to students majoring in computer science, economics, business or law. Then, topic-modules covering use cases in various areas such as IOT, Supply Chain, Token Economy, Healthcare and Legal issues can be cherry-picked depending on the audience research interests. Finally, hands-on sessions allow students with a strong background in computer science to create their first private chains and develop their smart contracts to support both students and research projects.

Course Description

A Opening Session: Introduction to Blockchain and Distributed Ledgers

Duration: 3h **Prerequisites:** N/A

Schedule: —

Abstract: — In this session, we cover the history of blockchains and their

underlying technologies. We present current state-of-the-art platforms and explain how their consensus mechanism, transaction and execution models differ to accommodate a variety of requirements.

B TopicSession: BC and communicationtechnologies

Duration:3h

Prerequisites:SessionA,ComputerSciencemajor

Schedule:—

Abstract: —In this session, we cover advances in blockchain with major use cases related to communication technology such as computer networks, IOT and security.

C TopicSession:TokenEconomics

Duration:1h30**Schedule:**

e: —Prerequisites:

Session A

Abstract: —In this session, we cover advances in blockchain and cryptocurrency research revolving around Initial Coin Offerings, cryptocurrency payments, asset pricing and corporate finance.

D TopicSession: Healthcare, Energy and SupplyChain

Duration:1h30**Prerequisites:**

Session A

Schedule: —

Abstract: —In this session,we coverblockchain use cases from research and industry regarding healthcare, patient data, energy and physical goods distribution and traceability.

E TopicSession on Legal andPrivacyChallenges

Duration:3h**Prerequisites:**

Session A

Schedule: —

Abstract:—Inthissession,wecovernewlegalchallengesarisingfromblockchain models,primacyoflawforsmartcontracts,GDPRimpacts.

F TutorialSession on Ethereum OR Hyperledger:deploy-ing aprivatechain and running smartcontracts

Duration:2 → 6h00

Prerequisites:SessionA,ComputerSciencemajor,personallaptop

Schedule:—

Abstract Ethereum: —Ethereum: In this hands-on session, students will

learn how to create and configure a private chain with the popular Ethereum platform and write smart contracts with solidity

AbstractHyperledgerFabric:—In this hands-on session, students will learn how to create and configure a private chain with the Hyperledger Fabric platform and write smart contracts in JavaScript, Python or Go.

G Forum Session: on Blockchain and Distributed Ledger current research Challenges

Duration: 2 3/4h

Prerequisites: Session A, research Master or PhD students
Schedule: —

Abstract: —In this session, we summarize current research challenges for BC and distributed ledgers and students can present and discuss their own blockchain ideas.

Summary of the Blockchain Crash Course

Title	keywords	Duration	Date
A Opening Session: Introduction to Blockchain and Distributed Ledgers	blockchain, consensus, transaction, smart contracts	3h00	—
B Topic Session: BC and communication technologies	Networks, IOT, Security	3h00	—
C Topic Session: Token Economics	Bitcoin, Token, currency	1h30	—
D Topic Session: Healthcare, Energy and Supply Chain	Traceability, data	1h30	—
E Topic Session on Legal and Privacy Challenges	smart contracts, GDPR	3h00	—
F Tutorial Session on Ethereum OR Hyperledger: deploying a private chain and running smart contracts	development, solidity, linux	2→6h00	—
G Forum Session: on Blockchain and Distributed Ledger current research Challenges	research, publication	2→3h00	—

Table 1: Crash course on blockchain and its use-case sessions

Research Methods - REC1

INFORMATION GENERALE :		
Niveau (L3, M1, M2) / Semestre (S1, S2)	M2	S2I/IKSEM
Langage :	English / Français	
Nom et coordonnées de l'intervenant responsable	Prof. Camille Salinesicamille.salinesi@univ-paris1.fr	
Autres intervenants:		
Perspective (ex: Recherche, Pratique)	Research / Recherche	
Domaine (ex: <i>Ingénierie SI, Informatique, Gestion, Mathématique</i>)	Information Systems Engineering / Ingénierie SI	
Goals / Objectifs :	<p>At the end of this lecture, students should be able to</p> <ul style="list-style-type: none"> - Define a scientific project - Conduct a research study - Report a research project in a scientific document and - Evaluate and criticize a research work from its inception to its report 	
Mots clés :	Design science, research method, science	
Indiquer les concepts et les termes le plus souvent utilisés ou les plus importants <i>ex : requirements, business process model, process mining, ProM, SOA, web service, OO, MVC, product line, ERP</i>		

ORGANIZATION /ORGANISATION DE LA FORMATION

Total duration and distribution /Volume horaire répartition	30 hours, 5 full days /30 h, 5 jours complets
Evaluation/Evaluation:	none
Activities /Activités ex : cours magistraux (CM), travaux pratique (TP),travaux dirigés (TD), séminaires, ateliers de créativité, projet individuel, projet par équipe, e t c	Lectures, practical exercises, self assessment tests, homework / CM, exercices pratiques, tests d'auto-évaluation, devoirs maison
Distribution between theory and practice / Répartition entre théorie et pratique	20h (morning) - 10h practice theory(after noon) (matin) - 10h pratique 20h théorie(après midi)
Prerequisites /Prérequis	Statistical analysis techniques and tools, interview and survey techniques/Techniques et outils d'analyse statistique, techniques d'interview et de survey

TEACHING CONTENTS /CONTENU DE LA FORMATION:

Summary of the lecture /Résumé du cours

- **Challenges:** what is science, knowledge, scientific research
- **Fundamentals:** deductive and inductive reasoning, empirical science, typology of research methods, reproducibleresearch
- **Research design:** defining a research question and sub-questions, specifying hypotheses , selecting the relevant protocol
- **Desktop studies:** Systematic Literature Review, Mapping Studies, Interviews, Surveys
- **Controlled Experiments**
- **Real life experiments:** action research, case studies
- **Reporting research:** writing and evaluating a paper, a thesis, a report; making an oral presentation, making a poster
- **Ethics** in science, plagiarism

Slides /Transparents

-- <https://cours.univ-paris1.fr/enrol/index.php?id=6253>

Litterature /Références bibliographiques

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- Per Runeson, Martin Host, Austen Rainer, and Bjorn Regnell. (2012). Case Study Research in Software Engineering: Guidelines and Examples (1st ed.). Wiley Publishing.
- Field, A. P., & Hole, G. (2010). How to design and report experiments (Repr.). Los Angeles [u.a.]: SAGE.
- Tichy, W.F. Should Computer Scientists Experiment More? 16 Reasons to Avoid Experimentation. (1998). IEEE Computer Vol. 31, No. 5, pp.32-40.
- Shadish, W.R., Cook, T.D. & Campbell, D.T. Experimental and Quasi-Experimental Designs for Generalized Causal Inference. (2002). Boston: Houghton Mifflin Company.
- Montgomery, D. C. Design and Analysis of Experiments (1997), John Wiley & Sons, New York, USA.
- Reason, P. and Bradbury, H. (2008) The SAGE Handbook of Action Research: Participative Inquiry and Practice (2nd edition). London: SAGE.