EXCHANGE PROGRAM

COURSE OUTLINE
Semester 2 (February - June)

SOFTWARE ENGINEERING & DIGITAL TRANSFORMATION
(ENGLISH-TAUGHT)

ACADEMIC YEAR - 2023-2024

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THE EXCHANGE PROGRAM

A student exchange program is one that you will undertake during the course of study that you are already pursuing. This study period in another university abroad will allow you to leverage and enhance your skills in an international environment.

Course delivery will almost definitely differ from what you are used to in your university, it is therefore important that you take a close look at this course outline, in order that you understand what to expect during the semester / year at ESIGELEC. We encourage you to pay attention to the information provided to you on each module and to go through all the other points this document covers, like attendance, evaluation, support services, etc.

This document is key to making your experience at ESIGELEC a successful one.

A SEMESTER 2 (FEBRUARY - JUNE)

SNAPSHOT – COURSES, MODULES, DURATION, WEIGHT & ECTS CREDITS

30 CREDITS / 340 HOURS				
Courses	**Weight**	**Modules**	**Duration (hours)**	**ECTS Credits**
Computer Science 2	2	Enterprise Network	20	13
	4	Object Oriented Programming with Java EE	40	
	4	Development of Mobile Application	40	
	3	Intro to .NET Framework (C#)	24	
Business Intelligence	2	Analysis & Design with UML	32	12
	4	Big Data: Challenges & Opportunities	40	
	2	PL/SQL Programming for Databases	20	
	2	Artificial Intelligence: Principles & Techniques	30	
	2	Data Driven Applications with R	20	
Communication & Language 2	1	Oral Communications & Presentation Skills	14	5
	4	French as a Foreign Language OR English as a Foreign Language	60	
Total Credis				**30**

All modules are delivered face-to-face, on campus, with all required safety measures. However, modules may be delivered partially or totally online and/or through distance mode.

B COURSE CURRICULUM & SYLLABUS

Enterprise Network
Module Code: MSTSI21   **Duration: 20h**

Objective

The course will cover the development and technical details of the Fundamentals of Wireless Communication and recent technological developments in Mobile communication systems.

List of topics

- WAN, LAN, MAN
- OSI Model
- TCP/IP
- Internet network
- Modern communication standards: 1G,2G,3G,4G and 5G standards
- Cellular Concept and Cellular System Fundamentals
- Trunking Cell Splitting and Sectoring Techniques
- Multiple Access Techniques, FDMA, TDMA, CDMA and OFDMA
- Link Budget analysis

Object-Oriented Programming with Java EE
Module Code: MSTSI22   **Duration: 40h**

Objective

At the end of this module students will have an understanding of:
- The significance and role of servlets
- The main concepts of JSP and servlets and apply them
- Development of complex applications using Java programming

List of topics

- Introduction to servlets
- Session with servlets
- JSPs main concepts
- Servlets and JSP pages
- Managing data flows
- Java processes
- Database connectivity with JDBC

Development of Mobile Applications
Module Code: MSTSI23   Duration: 40h

Objective

At the end of this module, students will be able to create an Android app.

List of topics

- Activities and Intents
- Basic UI elements (Layouts, Input controls, etc.)
- Async task, threading and handlers
- Data storage
- Networking using Android
- Location and Maps

Introduction to .NET Framework (C#)
Module Code: MSTSI24   Duration: 24h

Objectives

At the end of this module students will be able to explain:

- What the .NET framework is
- The .NET-specific vocabulary
- Which languages are available and when to use them
- The role of the ILAsm assembly language
- The strengths and weaknesses of C#/.NET and how they compare to JAVA and the JVM
- What LINQ is and when it should be used

Students will also be able to:

- Write a simple ILAsm programmes using a simple text editor
- Compile and decompile a .NET programmes written in IALSM and C# using the command line
- Write C# programmes using the Visual Studio platform
- Manipulate data using the .NET framalso ework components
- Use the MSDN documentation and the http://www.codeproject.com resource

List of topics
- .NET, an improved JVM ? Practical on ILAsm.
- From Eclipse/JAVA to Visual Studio/C#
- Data retrieval and manipulation using .Net components
- Advanced data manipulation with LINQ

Analysis and Design with UML
Module Code: MSTSI2A   Duration: 32h

Objectives

At the end of this module students will be able to:
- Be familiar with the process for designing software applications, with a special focus on the Unified Modeling Language (UML) and Java as design tools
- Be familiar with the major steps in software design, including the development of user requirements, specifications, data bases, user interfaces, and software models

List of topics
- Overview of software design: challenges, accomplishments, and failures
- Overview of software lifecycle model and its variants
- Overview of object oriented design – Java classes, objects, inheritance, associations
- Requirements analysis and use case design – UML use case and sequence diagrams
- Class design – UML class diagrams
- Modeling activities and interactions – UML activity and state diagrams

Big Data: Challenges and Opportunities
Module Code: MSTSI26   Duration: 40h

Objective

At the end of this module, students will be able to understand the issues and contributions of Big Data as well as the technologies to implement it.

List of topics
- Understand the concepts and challenges of Big Data
- Big Data technologies and main market distribution (Cloudera, Hortonworks, Spark, Storm...)
- Techniques for analyzing Big Data (data preparation, machine learning, clustering...)
- Data visualization

PL/SQL Programming for Databases
Module Code: MSTSI27   Duration: 20h

Objectives

At the end of this module students will be able to:
- Write PL/SQL modular programs to extract and manipulate information from an oracle database using, if necessary, dynamic SQL statements
- Automate information processing using triggers
- Design and implement exceptions
- Use appropriate structure to implement the specified functionality
- Use appropriate SQL language clause (join, subquery or group) to query an oracle database
- Explain the role of indexes and transactions
- Create and query a view

List of topics
- Pre-requisite check : SQL queries using joins, subqueries and/or groups, SQL data creation and manipulation statements
- SQL topics among : views, creation and query using views, indexes, main transactions, instructions, data types
- General overview of PL/SQL
- Interaction with the database (one row and multiple rows)
- Functions & procedures (exceptions)
- Triggers (exceptions)

Artificial Intelligence - Principles and Techniques
Module Code: MSTSI28   Duration: 30h

Objective

At the end of this module, students will be able to understand notions of artificial intelligence and related issues.

List of topics
- Presentation of different types of algorithms:
  - Supervised
  - Unsupervised
  - Statistical
  - Non-statistical
  - Reinforcement
  - Deep learning
- Agent paradigms:
  - Hierarchical
  - Reactive
  - Cognitive
  - Hybrid

- ○ Machine Learning Algorithms:
  - · IDecision Tree
  - · Bayesian
  - · Regression
  - · SVM
  - · K-means
- ○ Neural networks:
  - · Gradient Descent
  - · Evolutionary Algorithms
  - · Genetic Algorithm

Data Driven Applications with R
Module Code: MSTSI29   Duration: 20h

Objective

At the end of the module, students will be able to program in R and use R for effective data analysis.

List of topics
- ○ Explain the R value for the processing of big data
- ○ Load data from various sources
- ○ Clean, explore and visualize data
- ○ Present the results of its analysis

Oral Communication and Presenting Skills
Module Code: MSTOCPS   Duration: 14h

Objectives

At the end of this module students will be able to:
- ○ Have a clear model of what constitutes successful and unsuccessful presentations
- ○ Have practiced giving formal presentations in English.
- ○ Be more aware of their own downfalls when presenting

List of topics
- ○ Methods for putting together an oral presentation
- ○ Practice

French as a Foreign Language
Module Code: MSTFRE2   Duration:60h

Objectives

At the end of this module students will be able to:
- ○ Oral comprehension
  - · Understand standard French used in everyday situations at work, school, etc.
- ○ Written comprehension
  - · Understand texts written in standard French used in everyday situations such at work, school, etc.
- ○ Oral expression
  - · Participate in a regular day-to-day conversation on familiar topics
  - · Ask and exchange information
  - · Prepare and give a short formal presentation
- ○ Written expression
  - · Write short, clear and coherent texts on familiar/everyday situations with basic grammar and vocabulary

List of topics

- ○ Revision of grammar and vocabulary
- ○ Preparation for the Test of French Language (TCF or TEF)

English as a Foreign Language
Module Code: MSTENG2   **Duration: 60h**

Objectives

At the end of this module students will be able to:

- Oral comprehension
  - Understand standard English used in everyday situations at work, school, etc.
- Written comprehension
  - Understand texts written in standard English used in everyday situations such at work, school, etc.
- Oral expression
  - Participate in a regular day-to-day conversation on familiar topics
  - Ask and exchange information
  - Prepare and give a short formal presentation
- Written expression
  - Write short, clear and coherent texts on familiar / everyday situations with basic grammar and vocabulary

List of topics

- Revision of grammar and vocabulary
- Preparation for the Test of English for International Communication (TOEIC)