ESIGELEC

MASTER IN SCIENCES AND TECHNOLOGY

INFORMATION SYSTEMS

COURSE OUTLINE - 2018-2020

In partnership with

INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES ROUEN

Supported by

RÉGION NORMANDIE

TABLE OF CONTENTS

A. Course Structure 1
B. Programme Objectives 3
C. Attendance Policy 3
D. Evaluation 5
E. Fraud & Cheating 6
F. Awarding The Master's Degree 6
G. Retaking Exams 7
H. Requirement For Academic Progress 8
I. Courses & ECTS Credits 11
J. Course Curriculum & Syllabus 16
K. Internship / Professional Thesis 37
L. The Study Board 38

A

COURSE STRUCTURE

The Master's Programme comprises:
For students with a 4-year Bachelor's Degree minimum and with a specialisation in Information technology / Computer science / Information science / Communication engineering -

- Semester 2 – Academic (on campus)
- Semester 3 – Academic (on campus)
- Semester 4 – Internship (company/laboratory)

For students with a 3-year Bachelor's Degree OR with a 4-year Bachelor's Degree in another engineering stream OR choosing to join the first semester -

- Semester 1 – Academic (on campus)
- Semester 2 – Academic (on campus)
- Semester 3 – Academic (on campus)
- Semester 4 – Internship (company/laboratory)

The first three academic semesters* are offered between September 2018 and January 2020.

Lectures, tutorials, lab work, practical work, projects, conferences and / or seminars make up the academic semesters. Evaluation, in the form of tests, quizzes, exams, etc. is conducted on a regular basis. Faculty members are from ESIGELEC and/or INSA Rouen, from partner companies and from partner universities in France or abroad.

The final semester is devoted to industrial or research experience, during which students must do a mandatory internship in a company or laboratory for a period of 4 months (min.) to 6 months (max.). While ESIGELEC and/or INSA Rouen provide assistance to find internships, students are expected to play an active part, as internships are not offered automatically.

* 2 academic semesters in the case of students granted direct entry into the second semester, beginning February 2019.

The students have up to a maximum of two years, after the final academic semester:

- to find and complete the internship,
- to submit a professional thesis and make an oral presentation before a convened jury,
- and to clear all the ECTS credits of the Master's Programme.

Failure to meet these requirements may result in the degree not being awarded.

The Student Status

After completion of the academic semesters at ESIGELEC, students have a maximum of two years to find and finish the internship, submit the professional thesis, complete the oral presentation, and clear all the ECTS credits of the Master's Programme, failing which they will not be awarded the degree from ESIGELEC and INSA Rouen, except in some exceptional cases, approved both by ESIGELEC and INSA Rouen.
Students will retain the Registered Student status till the end of the academic year 2019/2020.

Students who, at the end of the academic year 2019/2020 (likewise for 2020/2021), have already started but have not yet: completed the internship / submitted the professional thesis / completed the oral presentation and have cleared all the ECTS credits of the academic semesters will retain the Registered Student status for the academic year 2020/2021 (likewise for 2021/2022), without having to pay the applicable fees.

Students who, at the end of the academic year 2019/2020 (likewise for 2020/2021), have not started the internship or obtained the required ECTS credits for the academic semesters, must re-register for the academic year 2020/2021 (likewise for 2021/2022), by paying the applicable fees, failing which, they will be struck off the rolls of ESIGELEC and will cease to be students of the school.

The validity of the Registered Student status will end automatically and immediately after the student will be presented to the official jury of ESIGELEC and INSA Rouen OR after a maximum duration of two years after completion of the academic semesters, whichever is earlier, except in some very specific cases approved both by ESIGELEC and INSA Rouen.

B PROGRAMME OBJECTIVES

The Master's Programme seeks to equip the students with the relevant knowledge, professional skills and practical experience in Information Systems for industry or for research. They will learn how to design, develop and implement information systems in different sectors. Students will also acquire basic managerial skills.

The international environment at ESIGELEC allows students to discover new cultures and languages. Students must appear for the TCF / TEF certification exams in French (or TOEIC for French speaking students). The mandatory internship gives the students a hands-on experience in the work environment. Our graduates find job opportunities as developers, project managers, consultants or researchers in the field of information systems.

C ATTENDANCE POLICY

ESIGELEC views class attendance as the student's individual responsibility. Students are expected to comply with ESIGELEC's attendance policy throughout their study period. All lectures, tutorials, practical work, projects, conferences and seminars are mandatory. Attendance will be monitored by the faculty members at the beginning of each class and the attendance sheet will be maintained by the Studies Office of ESIGELEC.

Late entry into class:

If a student is late by 10 or more minutes, he/she will be refused entry into the classroom and the faculty member will make a note in the attendance register. Such cases will be considered as unjustified absence. If a student is late less than 10 minutes, he / she will be accepted into the classroom and the faculty will make a note in the attendance register.

3 late entries of less than 10 minutes will be considered as 1 case of unjustified absence.

Absence from class:

A student who is absent for medical reasons must submit a medical certificate within 3 working days, in order for the absence to be excused. Leave letters in the case of other accepted anticipated absences must be signed at least 3 days prior to the absence, by the Academic Coordinator of the Master's Programme, in order for the absence to be excused. No other justifications of absence will be excused by ESIGELEC.

Penalty:

Students will receive an oral warning after 5 occurrences (unjustified absence). A stern oral warning will be given after 10 instances. 20 such cases may lead to the student's dismissal from ESIGELEC.

Absence from examination:

Only students whose absence from an examination has been excused will be allowed to re-take the examination.
Students whose absence from an examination has not been excused will be marked 0/20 in the said examination and will not be authorized to retake the examination.

D EVALUATION

Evaluation may include tests, quizzes, presentations or other formats as decided by the faculty members, who may also authorise the use of reference documents or calculators, if they deem it necessary. Each such test will be graded on a maximum mark of 20.

Scores & ECTS credits (European Credit Transfer System)

- The Master's Programme is divided into several weighted courses, all of which include one or more weighted modules. Each course represents a certain number of credits.
- The score of a module is the average of the weighted scores of the different evaluation processes conducted within the same module.
- The score of a course is the result of the weighted averages of all modules of the course.
- The final overall score of the student is the result of the weighted averages of all courses of the Master's Programme.
- The total number of ECTS credits of the Master's Programme is equal to the total of all the ECTS credits of its courses.
- One ECTS credit corresponds to about 25 hours of course work (lectures, tutorials, lab work, projects, practical work, evaluation, individual work).
- Students who are granted entry directly to the second semester, beginning February 2019, will automatically be awarded 30 ECTS credits, equivalent to the first semester of the Master's Programme.
- A statement of marks is sent to the students at the end of each academic semester and also after they are evaluated by the Jury of ESIGELEC and INSA Rouen.

E FRAUD AND CHEATING

Students indulging in fraudulent practices / cheating during an exam / oral presentation / project / practical work / internship report will be marked 0/20 for that piece of course work, evaluation exercise, report or exam. Examples of plagiarism, fraud or cheating, include, but are not limited to:

- Duplication of another student's work during a written assignment / exam.
- Use of a reference document or calculator not authorized by the faculty member during an evaluation exercise.
- Plagiarism (>20%) of reports, presentations, or computing programs, obtained by any means (book, magazine, other students, electronic files, Internet, work previously submitted in another course).

F AWARDING THE MASTER'S DEGREE

Each academic semester at ESIGELEC carries a total of 30 ECTS credits. The internship, professional thesis and oral presentation also carry a total of 30 ECTS credits. A student must obtain a minimum score of 10/20 in a course to be awarded the allocated ECTS credits of the course.

The Master's Degree is awarded if the student has obtained a minimum average score of 10/20 in each course, thereby obtaining the total number of 120 credits.

The jury of ESIGELEC and INSA Rouen for the Master's Degree comprises the President, faculty members of ESIGELEC and/or INSA Rouen, and representatives of the managing staff of ESIGELEC and/or INSA Rouen. This jury, chosen by the General Director of ESIGELEC, convenes up to a maximum of four times per year, i.e. April, July, September and December.

The Master in Sciences and Technology - Information Systems, awarded by ESIGELEC and INSA Rouen to students who have successfully cleared all requirements, is accredited by the French Ministry of Higher Education and Research.

G RETAKING EXAMS

If a student has obtained less than 10/20 in one or more courses in the academic semesters at ESIGELEC, the student will be asked to retake one or more exams in one or more modules of the courses concerned, as advised by the Academic Coordinator of the Master's Programme (even if the final overall score of the student in the Master's Programme is greater than 10/20).

Retaken exams will be organised by the Academic Coordinator of the Master's Programme:

- in semester 2, for courses completed in semester 1,
- before the start of semester 3, for courses completed in semester 2,
- at the end of August / beginning of September after completion of semester 3, for courses completed in semester 3.

The score(s) obtained from exam(s) retaken replace the previous score(s) obtained by the student in the module(s) concerned and a new average score will be calculated for the course(s) concerned.

If the student does not retake an exam as advised by the Academic Coordinator, the student will be marked 0/20 for the module.

The new average(s) of the course(s) must be greater than 10/20 to obtain the requisite credits.

H REQUIREMENT FOR ACADEMIC PROGRESS

UPON COMPLETION OF ACADEMIC YEAR 1 AND RETAKEN EXAMS

- A student who obtains 60 ECTS credits will gain entry into academic year 2.
- A student who obtains between 42 and 59 ECTS credits will be allowed to continue with academic year 2, but will have to retake, in academic year 2, all or some of the exams in all the modules of all the courses of academic year 1, for which the student has not yet obtained the requisite credits, and as advised by the Academic Coordinator of the Master's Programme.
- A student who obtains between 18 and 41 ECTS credits will have to redo academic year 1 (but only the courses for which the requisite ECTS credits have not yet been obtained), the following academic year. Failure to clear the 60 required ECTS credits of academic year 1 after redoing academic year 1 may result the entry into academic year 2 refused and the degree not being awarded.
- A student who does not obtain a minimum of 18 ECTS credits will be disqualified from the programme and will not be awarded the degree.

UPON COMPLETION OF ACADEMIC YEAR 2 AND RETAKEN EXAMS

- A student must obtain a total number of 120 ECTS credits for academic years 1 & 2 to be awarded the Master's Degree.
- A student who fails to clear all the ECTS credits for academic year 1 before the end of academic year 2 will be required to redo academic year 1 (but only the courses of academic year 1 for which the requisite ECTS credits have not yet been obtained), the following academic year, or will be disqualified from the programme and will not be awarded the degree, if the student would also be required to redo one or two semesters of academic year 2 due to his/her scores obtained in academic year 2. Failure to clear the 60 required ECTS credits after redoing academic year 1 the following academic year, may result the degree not being awarded.
- A student who obtains between 21 and 29 ECTS credits for semester 3 will have to retake, during the following academic year, all or some of the exams in all the modules of all the courses of semester 3, for which the student has not yet obtained the requisite credits and as advised by the Academic Coordinator of the Master's Programme. If the student fails to obtain the 30 ECTS credits of semester 3 during the next academic year, he/she will be required to redo semester 3 (but only the courses for which the requisite ECTS credits of semester 3 have not yet been obtained), the following academic year, or will be disqualified from the programme and will not be awarded the degree, if academic year 1 was already repeated. Failure to obtain the 30 ECTS credits of semester 3 after redoing semester 3 the following academic year, may result the degree not being awarded.

- A student who obtains between 10 and 20 ECTS credits for semester 3 will be:
  - Disqualified from the programme if academic year 1 was already repeated or if academic year 1 will have to be repeated,

    OR
  - Be required to redo semester 3 (but only the courses of semester 3 for which the requisite ECTS credits have not yet been obtained) the following academic year, if academic year 1 was not already repeated and if academic year 1 will not have to be repeated. Failure to clear the 30 ECTS credits of semester 3 after redoing semester 3 the following academic year, may result the degree not being awarded.
- A student who obtains less than 10 ECTS credits in semester 3 will be disqualified from the Master's programme and will not be awarded the degree.
- If a student doesn't obtain the 30 ECTS credits of semester 4 (Internship), the Academic Coordinator of the Master's Programme may:
  - Instruct the student to submit a fresh professional thesis and/or redo the oral presentation, within a maximum period of 2 years, after the final academic semester,.

    OR
  - Instruct the student to redo a fresh internship, including submission of a professional thesis and an oral presentation, within a maximum period of 2 years, after the final academic semester.

    OR
  - Deny the award of 30 ECTS, on the grounds of misconduct during the internship.

A student can only redo courses of one academic year (academic year 1 or academic year 2), and can redo only once a course or the internship, during the Master's Programme.

COURSES & ECTS CREDITS

Courses	Modules	Duration (hours)	Weight	ECTS Credits
Semester 1: 30 Credits / 354 hours				
Computer Science 1	Fundamentals of Data Communication and Networking	24	2	11
	Introduction to Object Oriented Programming with Java	40	4	
	Database Management Systems	24	2	
	Fundamentals of Web-Centric Development	30	3	
Business Analysis	Econometrics, Probabilities & Statistics	30	2	7
	General Accounting	20	2	
	Decision Making in Finance: Optimization	30	3	
Project	Cross-Cultural Awareness / Team Working	36	2	6
	Minor Project	60	4	
Foreign Language	French as a Foreign Language OR English as a Foreign Language	60	6	6
Total Credits				**30**

Courses	Modules	Duration (hours)	Weight	ECTS Credits
Semester 2: 30 Credits / 330 hours				
Computer Science 2	Enterprise Network	20	2	13
	Object-Oriented Programming with Java EE	40	4	
	Development of Mobile Application	40	4	
	Intro to .NET Framework (C#)	24	3	
Business Intelligence	Big Data: Challenges and Opportunities	40	4	10
	PL/SQL Programming for Databases	20	2	
	Artificial Intelligence: Principles and Techniques	20	2	
	Data Driven Applications with R	20	2	
Project Management	Oral Communication & Presentation Skills	14	1	3
	Analysis & Design with UML	32	2	
Foreign Language	French as a Foreign Language OR English as a Foreign Language	60	4	4
Total Credits				**30**

Courses	Modules	Duration (hours)	Weight	ECTS Credits
Semester 3: 30 Credits / 346 hours				
Information Systems	Cloud Computing	20	2	10
	Information Systems & Organizations	30	3	
	Information System Security	30	3	
	Web-centric Development & ASP.NET	20	2	
Business Management	Management Control & Business	32	3	7
	Marketing In A Technical Environment	32	3	
	Intellectual Property & Internet Protection Laws	12	1	
Project Development & Management	Project management	30	2	9
	R & D Projects	80	7	
Foreign Language	French as a Foreign Language OR English as a Foreign Language	60	4	4
Total Credits				**30**
Semester 4: Internship of 4 to 6 months				

J

COURSE CURRICULUM & SYLLABUS

Fundamentals of Data Communication & Networking

Module Code: MSTSI11 **Duration: 24h**

Objectives

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

- Understand the very basic operation of communication networks
- Distinguish between different communication technologies
- Distinguish between different communication services
- Choose communication technologies and services appropriate for given requirements
- Get a better understanding of the Internet communication services they use in everyday life

List of topics

- Basics of information transmission
- Classical telecommunications services
- Integration of telecommunication services
- Principles of networking and protocols
- TCP/IP communication architecture
- LAN/WLAN technologies
- Mobility

Introduction to Object-Oriented Programming with JAVA

Module Code: MSTSI12 **Duration: 40h**

Objectives

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

- Write, test and set up a Java programme and documentation from a given situation
- Use vocabulary relating to OO languages within the framework of Java
- Explain the design and set up for the life-cycle of a Java programme / explain the design

- Process and working of a Java program (define bytecode and explain the role of a JVM)
- Document code and create the Javadoc
- Respect Java writing code structures
- Use existing classes and packages
- Use basic Eclipse functions: editing, compiling, operating, importing and debugging

List of topics

- Storing information, communicating information, making choices, creating repetitions
- Initiation to Object-Oriented programming
- From algorithms to writing functions, classes and objects, UML classes
- Collecting objects (a fixed amount and undetermined amount), using UML

Database Management Systems

Module Code: MSTSI13 **Duration: 24h**

Objectives

At the end of this module students will be:

- Familiar with data modeling concepts (E/R and UML Class diagrams) used in database development
- Able to create databases and pose complex SQL queries of relational databases
- Able to develop an appreciation and familiarity in the use of DBMS's (ORACLE)

List of topics

- Introduction to databases
- Modelling using E/R and UML class diagrams
- Normal forms
- Relational algebra
- Embedded SQL (overview)
- SQL and optimization

Fundamentals of Web-centric Development

Module Code: MSTSI14 **Duration: 30h**

Objectives

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

- How the web relates to the Internet
- What HTTP is
- The notions of web server and web client
- The role of PHP, HTML,CSS, Javascript languages
- The major steps of a web project implementation
- The value of validation for web site security

The student will also be able to create a Web site which:

- Is dynamic
- Follows the separation of content and presentation principle
- Is in keeping with HTML5 and CSS standards
- Is secured against SQL injections and defacement attacks
- Is in project mode, using especially the Git version control system

List of topics

- Introduction to the internet and World Wide Web
- HTML (Hypertext Markup Language)
- Editing and viewing HTML
- Headers, titles, meta-tags
- Special characters
- Lists
- Tables
- Basic forms
- Metatags
- Cascading Style Sheets
- Embedded Anchors, Images, Links, Objects
- Dynamic web pages with PHP
- Introduction to javascript

Econometrics, Probabilities and Statistics

Module Code: MSTSI15 **Duration: 30h**

Objectives

At the end of this module, students will have a modern view of statistical methods for high dimensional estimation and classification, as well as stochastic prediction. They will also understand and apply econometric methods for panel data.

List of topics

- Basic concepts of probability:
- Events
- Laplace rule
- Conditional probability
- Rule of total probability
- Bayes' rule
- Descriptive statistics:
- Mean
- Median
- Histogram

General Accounting

Module Code: MSTSI16 **Duration: 20h**

Objectives

At the end of this module students will acquire the fundamentals of accounting.

List of topics

- Daily operations
- Income statements
- Inventory
- Accounting management tools
- Management / cost accounting

Decision Making in Finance: Optimization

Module Code: MSTSI17 Duration: 30h

Objective

The objective of this course is to provide future engineers with the basic mathematical tools of stochastic calculus for modeling in finance with a particular emphasis on the hedging strategy in the Black-Scholes-Merton model.

List of topics

- Stochastic Integration with respect to Brownian Motion
- Itô's Lemma
- Stochastic Differential Equations
- Call and Put Options
- Self-financing Portfolio Strategies
- Greeks: Delta, Gamma, Theta, Vega

Cross Cultural Awareness / Working in a Team

Module Code: MSTCCAWT Duration: 36h

Objectives

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

- Recognise the different elements that make up culture
- Demonstrate the role culture plays on general and professional communication and behaviour
- Suggest ways to begin respecting and reconciling the cultural differences that make a difference
- Analyse the cultural elements inherent in different situations
- Evaluate the relative importance of different cultural elements in different communication situations
- Apply different cultural orientations to correctly analyse different situations
- Interact more sensitively within international teams
- Develop a capacity for culturally sensitive critical analysis

- Sensitively interpret different elements of verbal and non-verbal communication
- Sensitively analyse critical incidents
- Clearly distinguish between objective and subjective culture
- Integrate a new team from an initial team

List of topics

- Modern leadership models and their application
- The influence of national cultures on leadership
- The building and management of international, multi-discipline, remote and virtual teams

Minor Project

Module Code: MSTSI18 **Duration: 60h**

Objectives

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

- Familiarise themselves with real-world situations similar to that of future professional environments
- Acquire skills to exercise their initiative and independence
- Improve their organizational, interpersonal and communication skills
- Learn to manage time

List of topics

- Designing a product
- Product testing

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
- Random Access Protocols, ALOHA, and CSMA
- 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

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: 20h**

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

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

Cloud Computing

Module Code: MSTSI31 **Duration: 20h**

Objectives

At the end of this module students will:

- Be familiar with fundamental cloud computing topics, in relation with both technology and business considerations
- Be able to develop a web project using the Google Cloud platform (PaaS cloud model)

List of topics

- Fundamental cloud computing terminology and concepts
- Basics of virtualization

- Specific characteristics that define a cloud
- Software as a service (SaaS), platform as a service (PaaS) and infrastructure as a service (IaaS)
- Cloud delivery models
- Create and deploy the first application on the Google cloud platform
- Saving the data into the cloud
- Google cloud SQL service
- Google cloud data store service
- Exploiting the data store using Objectify
- Google blob store service (special case of Google storage service)
- Google account API

Information Systems & Organizations

Module Code: MSTSI32 **Duration: 30h**

Objectives

At the end of this module students will be able to develop an understanding of the complex relationship between technical knowledge and business practice.

List of topics

- The value of IT
- IT strategic alignment
- IT and customer interaction
- IT and the value chain / integration / collaboration
- IT and organizational change (adoption / acceptance / appropriation of IT)
- IT switching costs, network effects and technology lock-in
- IT and society
- Knowledge management and collective intelligence

Information System Security

Module Code: MSTSI33 **Duration: 30h**

Objectives

At the end of this module students will:

- Be familiar with technologies used to maintain and develop the security of the information systems in companies
- Be familiar with some guidelines and examples regarding security policies in companies

List of topics

- Overview on cryptography
  - Substitution ciphers, one-time-pads, stream ciphers, block ciphers
  - Public key cryptography, one-way hash-functions, digital signatures
  - PGP, SSL
- Internet and IP security
  - E-Mail, MIME-types, active content security (including e.g. viruses, trojan horses, worms, phishing, social engineering)
  - VoIP, WLAN
  - Firewalls
  - Packet filter, application gateways, web application firewalls
  - Firewall topologies
  - Intrusion detection

Web-centric Development and ASP.NET

Module Code: MSTSI34 **Duration: 20h**

Objectives

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

- Gain a thorough understanding of the philosophy and architecture of web applications using ASP.NET
- Acquire a working knowledge of web application development using web forms and visual studio
- Optimize an ASP.NET web application using configuration, security, and caching
- Access databases using ADO.NET and LINQ
- Implement rich client applications using ASP.NET AJAX
- Customize web applications through the use of HTTP handlers

and modules

List of topics

- Presentation of web applications using ASP.NET
- Development of web applications using ASP. NET
- Notions of optimization and customization of web applications

Management Control and Business

Module Code: MSTSI35 Duration: 32h

Objectives

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

- Acquire the fundamentals of accounting (introduction to general accounting and financial statements)
- Have an understanding of the methods and systems used by managers to achieve their objectives of planning, controlling and decision making.
- Develop analytical skills
- Develop problem-solving skills including understanding all financial and qualitative Implications of business decisions
- Define different types of organizations, their objectives and the manager's need for information
- Recognize cost behaviour patterns
- Perform cost-volume-profit and breakeven analysis
- Calculate inventory valuation under the direct cost concept, evaluate cost variances, prepare flexible budgets
- Define responsibility accounting

List of topics

- Daily operations

- Income statements
- Inventory, inventory valuation methods
- Accounting management tools
- Management / cost accounting
- The financial statements
- Decision making
- Managerial accounting and the business organization
- Cost behaviour / cost-volume relationship

Marketing in a Technical Enviroment

Module Code: MSTSI36 **Duration: 32h**

Objective

At the end of this module students will:

- Be familiar with issues in new product development
- Be familiar with marketing concepts
- Be familiar with marketing strategies used in new product development
- Be able to describe the Stage-Gate model of NPD
- Understand the use of Nagel's Pricing Pyramid

List of topics

- Market research methods
- Market segmentation
- Product positioning (4 Ps)
- Price elasticity
- Cross functional integration
- The champion role
- Business intelligence
- Cross-cultural issues in marketing
- 'Start-Up!' simulation that demonstrates marketing issues in NPD
- Brand Management and the role of advertising
- Market Orientation and Market Myopia

Intellectual Property & Internet Protection Laws

Module Code: MSTSI37 **Duration: 12h**

Objectives

At the end of this module students will:

- Be familiar with constraints of laws
- Be familiar with the French National Commission in charge of Privacy Protection, how it works and what its powers are
- Be aware of the responsibilities of everybody inside an organization
- Be aware of the responsibility of the internet user, regarding in particularly the intellectual property

List of topics

- Intellectual property (IP) laws (Trademarks, Patents, Copyright, Domain Names & Design) that can be used / displayed on the Internet
- Internet & web laws
- IP infringements on the Internet
- E-commerce, e-contracts, such as general terms of use and general conditions of sale, licence contracts
- Internet user duties and rights
- Web hosting provider duties and liability
- Personal date protection in particularly in companies and on social networks
- Privacy Protection

Project Management

Module Code: MSTPM **Duration: 30h**

Objectives

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

- Appreciate the need for project management including formal methods, as a recognised discipline
- Appreciate the need for effective planning, control and delivery mechanisms
- Understand the complexities of different types of computing

projects and some of the methods used to manage them
- Apply some of the skills and knowledge learned in any future project (including during other module(s) of this course, and, in particular, documentation for development project)

List of topics
- What is a project? The need for PM, formal methods
- Managing large, complex, international projects
- Un peu de franglais (PM culture & language in English & French)
- Management of projects, project life cycle, roles of the project manager and stakeholders
- Stakeholder management, scope, creep
- Work planning, project breakdown structures and estimating
- Resource planning, estimating, management
- Risk identification, analysis, management
- PERT and Gantt charts, their use and shortcomings
- PM planning tools (including practical sessions with MS Project)
- Change control, documentation, configuration management
- Project control, quality, documentation, delivery management
- Project closure; maintenance projects
- Types of computing projects and risks; computing PM methods
- Cost-benefit analysis and project accounting may be touched upon, but are not in the scope of this course

Research & Development Projects

Module Code: MSTSI38 Duration: 80h

Objectives

At the end of this module students will be able to:
- Improve their organizational skills (within a team, facing deadlines) and manage their time
- Improve their communication skills
- Work in a real-world situation close to their future professional environments
- Filter and identify relevant online information according to a targeted subject
- Constitute a bibliographical study

- Develop functional specifications and success strategies
- Estimate the workload of each identified task
- Analyse their production capacity
- Design and build computer applications with current standards and new opportunities
- Integrate research approaches
- Evaluate the quality level for a developed application
- Present their work and justify the outcome

List of topics

- State of the art practices
- Technical / feasibility studies
- Research methodologies and approaches
- Information processing
- Experimental results and evaluation

English as a Foreign Language

Module Code: MSTENG1 MSTENG2 MSTENG3 **Duration: 180h**

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)

French as a Foreign Language

Module Code: MSTFRE1 MSTFRE2 MSTFRE3 **Duration: 180h**

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)

Note: The programme can be modified in keeping with the faculty member's prerogatives or organizational constraints.

K

INTERNSHIP / PROFESSIONAL THESIS

The internship will take place either in a company or in a research laboratory in a university. Students are encouraged to do their internship in France or in another European country, but may choose to do so elsewhere in the world too. The duration of the internship is of 4 months (min.) to 6 months (max.). ESIGELEC and INSA Rouen provide assistance to students to find internships but they are expected to play an active part, as the internships are not offered automatically.

A professional thesis will have to be submitted upon completion of the internship and the students will have to make an oral presentation before a convened jury, at ESIGELEC or at the representative offices of ESIGELEC abroad (or remotely, upon special written request, authorised by the school).

An internship form, providing all required information must be filled and submitted to the Internship Department at ESIGELEC, as soon as the student has obtained an offer. The Head of the Internship Department and the Academic Coordinator of the Master's Programme will validate and approve the information (if relevant) by duly signing on the said form. ESIGELEC, the company / research laboratory and the student will then countersign an Internship Agreement (if required) issued at ESIGELEC. A copy of the agreement is retained by ESIGELEC, the company or research laboratory and the student.

A faculty member of ESIGELEC or INSA Rouen will be assigned the task of visiting or contacting the student at least once during the internship. In the event of questions regarding the internship, the preparation of the oral presentation and/or the professional thesis, the student may remain in contact either with the assigned faculty member or the Academic Coordinator of the Master's Programme, during the period of the internship or thereafter.

The topic of the professional thesis chosen by the student must be communicated to the Academic Coordinator of the Master's Programme for approval, within the first month of starting the internship.

The professional thesis (2 hard copies by post and 1 soft copy in Word or pdf via intranet) must be submitted to ESIGELEC at least 3 weeks before the oral presentation before a Jury comprising of a President (from ESIGELEC or INSA Rouen), one faculty member from ESIGELEC or INSA Rouen and the industrial tutor (if possible). This presentation must be done within four months, at the latest, of completion of the internship. The total duration of the oral presentation will be of 60 minutes (30 min. presentation + 15 min. Q&A + 15 min. deliberation among jury members).

These presentations, conducted over 2 days, are typically organized at the end of March, at the end of June, in the beginning of September and at the end of November each year.

A student has a maximum period of 2 years after the final academic semester, to find the internship, complete it, submit the professional thesis and conduct the oral presentation before a convened jury, after successful completion of the internship.

THE STUDY BOARD

The Board of Studies, whose members are representatives from industry, universities, INSA Rouen & ESIGELEC, oversees the course content and recommends changes when necessary.

The Board of Studies, which meets at least once a year, also ensures that the course content and laboratories are streamlined in keeping with the changing industry requirements. A meeting between the Academic Coordinator of the Master's Programme and all faculty members is convened at the end of each module, to assess the relevance of the content, equipment and issues which may have occurred while delivering the module.

A meeting is also convened every two months between the Academic Coordinator of the Master's Programme and the students to discuss academic and non-academic issues.



School of Engineering
Supported by the Chamber of Commerce and Industry of Rouen

ESIGELEC
Technopôle du Madrillet
Avenue Galilée BP10024
76801 Saint-Etienne du Rouvray - France
Phone: +33 (0)2 32 91 58 58
Fax: +33 (0)2 32 91 58 59
www.esigelec.fr

Cover graphic designed by Vexels.com