Exchange Program: Computer Science

Course catalog proposal – Fall semester (September – January)

Course Name	Level	Lectures (h)	Tutorials (h)	Practical work (h)	ECTS
C language	Bachelor/Undergrad.	12*		4	2
Project in Software Engineering and Programming	Bachelor/Undergrad.			64	7
Databases principles and SQL	Bachelor/Undergrad.	16*	20	28	7
Principles of Operating Systems (Unix)	Bachelor/Undergrad.	26*	10	22	7
Introduction to Algorithms and Software Engineering	Bachelor/Undergrad.	14*	12	6	4
Graph theory (Operations research)	Master/Graduate	16*	8	8	4
Linear programming (Operations research)	Master/Graduate	16*	6	10	4
Software Engineering: software quality	Master/Graduate	8*		16	2
Software Engineering: Project Management	Master/Graduate	2*		10	2
Project in Software Engineering and Programming	Master/Graduate			64	7
Business Intelligence (IS option)	Master/Graduate	6	12	32	6
Mobile systems (SA option)	Master/Graduate	2*		18	2
Multimedia systems (SA option)	Master/Graduate	4*		12	2
Project in Information Systems or Distributed Systems	Master/Graduate			64	7
Research project (initiation)	Master/Graduate			23+	5
Supervised project					20
Supervised project					30
French course			30		5

* The lectures are basically taught in French, with English documents, and the tutorials and practical work are all inEnglish.
** This course is mandatory. The lessons are taught at the University Center for Teaching French to International Students (Centre Universitaire d'Enseignement du Français pour Etudiants Etrangers - C.U.E.F.E.E. - http://international.univ-tours.fr/cuefee).

Course details - Fall semester (September – January)

C language Course code: S5.2.1 Lectures:12h Tutorials: 0h Practical work: 4h ECTS: 2 Course supervisor: Mostafa Darwiche	This course aims to give students the basics of C language and is aimed at beginners in programming. In summary: 1.1. From Source Code to Executable, Memory Organization of a Program 1.2. Data types, operators and expressions 1.3. Instructions, control structures and functions 1.4. Advanced types 1.5. Pointers 1.6. Dynamic allocation 1.7. The files 1.8. Additions (function pointers and preprocessor) Practical work: take charge of a development environment and learn to find your way around a project • Create a project • Start the debugger (set breakpoints, execute step by step …) • Understand and take advantage of error messages and warnings
Project in Software Engineering and Programming Course code: S5.2.3 et S5.5.3 Lectures: 0h Tutorials: 0h Practical work: 64h ECTS: 7 Course supervisor: Project supervisor	In this project, the student should provide C language program to solve a predefined problem. As part of the project, the student should develop a prototype and test his or her implementation.
Databases principles and SQL Course code: S5.3 Lectures:16h Tutorials: 20h Practical work: 28h ECTS: 7 Course supervisor: Claudine Tacquard	This course addresses the following database concepts: the entity relationship (E/R) model, the relational model, functional dependencies, database normalization, relational algebra, basic and advanced SQL (aggregations, modifications, advanced operations, views, data definition, constraints, triggers, authorization), and transactions.

Principles of Operating Systems (Unix) Course code: S5.4 Lectures:26h Tutorials: 10h Practical work: 22h ECTS: 7 Course supervisor: Mathieu Delalandre	Part I - principles of operating systems: this lecture is concerned with fundamental principles of operating systems including process model and control, scheduling algorithms, synchronization problems, and resource and memory management. The course sets a particular focus on principles and paradigms, to be handled during tutorials. Part II - the UNIX system: in this course studies the architecture of the UNIX operating system. The course starts with a historical view of the system and an introduction to the "UNIX philosophy". Then, the course presents the system from a user's perspective, that is, the shell and its most widely-used commands. Next, the course explores the architecture of the system setting a special focus on the file and process control subsystems.
Introduction to Algorithms and Software Engineering Course code: S5.5.1&2 Lectures:14h Tutorials: 12h Practical work: 6h ECTS: 4 Course supervisor: Nicolas Ragot	This course reviews the basic concepts of algorithms: data structures, conception and presentation of algorithms. The course also introduces the basics of software engineering, setting a special focus on how to document software, how and why using versioning repositories and memory checking tools.
Graph theory (Operations research) Course code: S7.1.1 Lectures:16h Tutorials: 8h Practical work: 8h ECTS: 4 Course supervisor: Jean-Charles Billaut	This course introduces some notions of Operational Research (OR). After an introduction to the theory of complexity, some basic OR methods will be introduced such as graph theory, dynamic programming, branch and bound, and integer programming formulations.

Linear programming (Operations research) Course code: S7.1.2 Lectures:16h Tutorials: 6h Practical work: 10h ECTS: 4 Course supervisor: Yannick Kergosien	Linear programming (LP) is a modeling technical in OR. This course will introduce the concepts of LP: modeling and solving. The module is decomposing of 6 parts: Introduction to OR and PL, basic notions and theory in PL, how to solve a PL using the Simplex method, duality in PL, integer linear programming and branch and bound methods, and mathematical solver (Cplex).
Software Engineering: software quality Course code: S7.2.2 Lectures:8h Tutorials: 0h Practical work: 16h ECTS: 2 Course supervisor: Nicolas Ragot	This course introduces in more detail methods and tools for high quality software development. More precisely, development cycles, quality tools and methods (design patterns, profiling tools, software testing) are detailed. Methods and concepts for project management are also investigated (project management paradigms; project planning; cost estimation and scheduling; project management tools...)
Software Engineering: Project Management Course code: S7.2.3 Lectures:2h Tutorials: 0h Practical work: 10h ECTS: 2 Course supervisor: Nicolas Ragot	This course introduces in more detail methods and tools for high quality software development. More precisely, development cycles, quality tools and methods (design patterns, profiling tools, software testing) are detailed. Methods and concepts for project management are also investigated (project management paradigms; project planning; cost estimation and scheduling; project management tools...)

Project in Software Engineering and Programming Course code: S7.5 Lectures: 0h Tutorials: 0h Practical work: 64h ECTS: 7 Course supervisor: Project supervisor	Under the advice of a faculty member, in this project the student puts into practice his or her skills in algorithms and programming languages. The main goal of the project is to design and implement a small application in C, C++, or Java.
Business Intelligence (IS option) Course code: S9.3a.2 Lectures:6h Tutorials: 12h Practical work: 32h ECTS: 6 Course supervisor: Gilles Venturini	This course begins with an introduction to basic concepts in business intelligence (BI): overview of a BI project, extract/transform/load, multidimensional models, OLAP and the specific case of relational OLAP, reporting, key performance indicators, dashboards, survey of existing software. Then, practical hands on exercises and case studies are proposed with typical BI software (Microsoft SQL Server and Integration Services, QlikView, etc.).
Mobile systems (SA option) Course code: S9.3b.1 Lectures:2h Tutorials: 0h Practical work: 18h ECTS: 2 Course supervisor: Romain Raveaux	The problem of mobile terminals (autonomy, RAM, CPU, dimension), The different existing systems, then Focus on Android Open System, The layered model, Linux kernel changes for a mobile system, Hardware abstraction layer, Optimizing the JAVA virtual machine, Interprocess communication, Native development, Low level instructions. The practical work will focus on: communication between processes and Native Application.

Multimedia systems (SA option) Course code: S9.3b.2 Lectures:4h Tutorials: 0h Practical work: 12h ECTS: 2 Course supervisor: Romain Raveaux	In this course, the following topics are presented: Introduction to multimedia systems, Still image compression techniques, Video compression techniques, Automatic search of multimedia content, Scheduling for multimedia system, Multimedia file paradigm (VCR, NVD), Multimedia Network Protocols (RTSP), Partitioning files, Multimedia memory management (cache, disk).
Project in Information Systems or Distributed Systems Course code: S9.4a&b Lectures: 0h Tutorials: 0h Practical work: 64h ECTS: 7 Course supervisor: Project supervisor	At the beginning of the semester the student selects of the following topics to conduct his or her project: information systems or systems and parallelism. The project is evaluated through a report and a public presentation in front of a panel of faculties. Information systems option: the project focuses on designing and implementing a functionality or a simplified information system. Systems and parallelism option: the project focus on topics related to operating and distributed systems, and parallel and networking programming. Projects in this are typically address specific applications/frameworks for mobile, grid, and multimedia computing.
Research project (initiation) Course code: S9.5 Lectures: 0h Tutorials: 0h Practical work: 23h ECTS: 5 Course supervisor: Project supervisor	This part of the research initiation project deals with a state of the art on a given research topic.