

2020 - 2021



# COURSES IN ENGLISH FOR EXCHANGE STUDENTS

## Computer Science CS Course listing

## Course listing – autumn semester

MODULE	ID	ECTS	SEMESTER	PAGE
Introduction to algorithms and programming	CS_A_01	6	Autumn	3
Data structures and fundamental algorithms	CS_A_02	4	Autumn	4
Introduction to databases	CS_A_03	4	Autumn	5
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English	CS_A_05	3	Autumn	7
Principles of operating systems	CS_A_06	5	Autumn	8
Network Services	CS_A_07	3	Autumn	9
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Methodology for the production of applications	CS_A_10	6	Autumn	12
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## Course listing – spring semester

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English	CS_S_05	4	Spring	19
Distributed programming	CS_S_06	2	Spring	20
Web programming. Rich clients	CS_S_07	3	Spring	21
Design and development of mobile applications	CS_S_08	3	Spring	22
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Introduction to cryptography and compression theory	CS_S_10	3	Spring	24
Applied computer science: Image processing and video analysis	CS_S_11	3	Spring	25
English	CS_S_12	3	Spring	26
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ID:	<b>CS_A_01</b>			<b>ECTS</b>
Disciplinary field:	Algorithms, Programming, Languages			<b>6</b>
Module:	Introduction to algorithms and programming			
Semester:	<i>Autumn</i>			
Teaching hours:	9h	20h	30h	
	Lectures	Tutorial classes	Practical work	
Teaching type:	<input type="checkbox"/> English-only		<input checked="" type="checkbox"/> French-English	

- Objective(s):
  - To know how to break a problem down into simpler sub-problems and define simple types.
  - To structure a problem's data, paying attention to programming quality criteria.
- Skill(s):
  - Technical design of a computer solution.
  - Production of a computer solution.
  - Validation tests for a computer solution.
- Prerequisite(s):
  -
- Remark(s):
  -

ID:	<b>CS_A_02</b>			<b>ECTS</b>
Disciplinary field:	Algorithms, Programming, Languages			4
Module:	Data structures and fundamental algorithms			
Semester:	<i>Autumn</i>			
Teaching hours:	9h	16h	16h	
	Lectures	Tutorial classes	Practical work	
Teaching type:	<input type="checkbox"/> English-only		<input checked="" type="checkbox"/> French-English	

- Objective(s):  
- To know how to move from the design of an algorithm to its implementation in a programming language, being aware of strategies to reuse and for quality.
- Skill(s):  
- Technical design of a computer solution.  
- Production of a computer solution.  
- Validation tests for a computer solution.
- Prerequisite(s):  
- Introduction to algorithms and programming
- Remark(s):  
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ID:	<b>CS_A_03</b>			<b>ECTS</b>
Disciplinary field:	Database Management Systems			<b>4</b>
Module:	Introduction to databases			
Semester:	<i>Autumn</i>			
Teaching hours:	10h	12h	12h	
	Lectures	Tutorial classes	Practical work	
Teaching type:	<input type="checkbox"/> English-only		<input checked="" type="checkbox"/> French-English	

- Objective(s):  
- To acquire the knowledge required to manipulate a database.
- Skill(s):  
- Technical design of a computer solution.  
- Production of a computer solution.  
- Validation tests for a computer solution.
- Prerequisite(s):  
- Discrete mathematics.
- Remark(s):  
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ID:	<b>CS_A_04</b>			<b>ECTS</b>
Disciplinary field:	Economics, Management, Organisation, Law			<b>3</b>
Module:	Economic environment			
Semester:	<i>Autumn</i>			
Teaching hours:	-	30h	0h	
	Lectures	Tutorial classes	Practical work	
Teaching type:	<input type="checkbox"/> English-only		<input checked="" type="checkbox"/> French-English	

- Objective(s):  
- To understand the environment and economic stakes of organisations.
- Skill(s):  
- A global vision of contemporary economic problems.
- Prerequisite(s):  
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- Remark(s):  
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ID:	<b>CS_A_05</b>		<b>ECTS</b>
Disciplinary field:	Computing		<b>3</b>
Module:	English		
Semester:	<i>Autumn</i>		
Teaching hours:	-	12h	12h
	Lectures	Tutorial classes	Practical work
Teaching type:	<input checked="" type="checkbox"/> English-only		<input type="checkbox"/> French-English

- Objective(s):  
- English and computing
- Skill(s):  
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- Prerequisite(s):  
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- Remark(s):  
- For non-native speakers.



ID:	<b>CS_A_06</b>			<b>ECTS</b>
Disciplinary field:	Hardware Architecture, Operating Systems, Networks			<b>5</b>
Module:	Principles of operating systems			
Semester:	<i>Autumn</i>			
Teaching hours:	15h	14h	16h	
	Lectures	Tutorial classes	Practical work	
Teaching type:	<input checked="" type="checkbox"/> English-only		<input type="checkbox"/> French-English	

- Objective(s):
  - To understand the architecture of an operating system.
  - Sensitize students to administration problems: know how to install a system, know the basic principles of system administration.
- Skill(s):
  - Know the main principles and concepts of operating systems at the level internal.
  - Know some mechanisms for implementing operating systems multitasking, multi-user.
  - Core architectures.
- Prerequisite(s):
  - Architecture and programming of the basic mechanisms of a computer system.
- Remark(s):
  -

ID:	<b>CS_A_07</b>			<b>ECTS</b>
Disciplinary field:	Hardware Architecture, Operating Systems, Networks			<b>3</b>
Module:	Network Services			
Semester:	<i>Autumn</i>			
Teaching hours:	7h	10h	12h	
	Lectures	Tutorial classes	Practical work	
Teaching type:	<input type="checkbox"/> English-only		<input checked="" type="checkbox"/> French-English	

- Objective(s):  
- Interconnecting networks and implementing services.
- Skill(s):  
- Administration of systems, software and networks.  
- Advice and technical assistance for users, clients and services.  
- Preparation of quantitative and qualitative diagnostics, software technical support.
- Prerequisite(s):  
- Network Architecture.
- Remark(s):  
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ID:	<b>CS_A_08</b>			<b>ECTS</b>
Disciplinary field:	Algorithms, Programming, Languages			<b>3</b>
Module:	Advanced algorithms			
Semester:	<i>Autumn</i>			
Teaching hours:	8h	10h	12h	
	Lectures	Tutorial classes	Practical work	
Teaching type:	<input type="checkbox"/> English-only		<input checked="" type="checkbox"/> French-English	

- Objective(s):
  - To know how to use certain advanced data structures, how to implement some, and to know how to implement the algorithm that manipulate them.
- Skill(s):
  - Technical design of a computer solution.
  - Production of a computer solution.
  - Validation tests for a computer solution.
- Prerequisite(s):
  - Data structures and fundamental algorithms.
  - Graphs and languages.
- Remark(s):
  -

ID:	<b>CS_A_09</b>			<b>ECTS</b>
Disciplinary field:	Analysis, Design and Development of Applications			<b>5</b>
Module:	Advanced object design and programming			
Semester:	<i>Autumn</i>			
Teaching hours:	12h	18h	14h	
	Lectures	Tutorial classes	Practical work	
Teaching type:	<input type="checkbox"/> English-only		<input checked="" type="checkbox"/> French-English	

- Objective(s):
  - To produce a detailed design by applying design patterns, to implement it using object-oriented programming good practices.
- Skill(s):
  - Analysis of a computer solution.
  - Technical design of a computer solution.
  - Production of a computer solution.
- Prerequisite(s):
  - Basis of object-oriented programming.
  - Basis of object-oriented design.
- Remark(s):
  -

ID:	<b>CS_A_10</b>			<b>ECTS</b>
Disciplinary field:	Analysis, Design and Development of Applications, Economics, Management, Organisation, Law			<b>6</b>
Module:	Methodology for the production of applications			
Semester:	<i>Autumn</i>			
Teaching hours:	14h	22h	24h	
	Lectures	Tutorial classes	Practical work	
Teaching type:	<input checked="" type="checkbox"/> English-only		<input type="checkbox"/> French-English	

- Objective(s):
  - To analyze the requirements for the design and development of information systems in an organization.
  - To organize and manage a projetc
  - To cover te life cycle, integrating different points of view: the organization and its strategy, users, management, quality and technology, maintenance and operation.
- Skill(s):
  - Analysis of a computer solution.
  - Technical design of a computer solution.
  - Production of a computer solution.
- Prerequisite(s):
  - Basis of object-oriented programming.
  - Basis of object-oriented design.
  - Database programming and administration.
  - Functioning of organisations.
  - Computer project management.
- Remark(s):
  -

ID:	<b>CS_A_11</b>		<b>ECTS</b>
Disciplinary field:	Computing		4
Module:	English		
Semester:	<i>Autumn</i>		
Teaching hours:	-	20h	18h
	Lectures	Tutorial classes	Practical work
Teaching type:	<input checked="" type="checkbox"/> English-only		<input type="checkbox"/> French-English

- Objective(s):  
- Collaborating in English
- Skill(s):  
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- Prerequisite(s):  
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- Remark(s):  
- For non-native speakers.

ID:	<b>CS_A_12</b>			<b>ECTS</b>
Disciplinary field:	Computing			6
Module:	Internship/ Professional project			
Semester:	<i>Autumn</i>			
Teaching hours:	-	-	-	
	Lectures	Tutorial classes	Practical work	
Teaching type:	<input checked="" type="checkbox"/> English-only		<input type="checkbox"/> French-English	

- Objective(s):  
- Internship in a research lab of the university
- Skill(s):  
- Software development in computer vision
- Prerequisite(s):  
- Basis in Computer Vision
- Remark(s):  
-

ID:	<b>CS_S_01</b>			<b>ECTS</b>
Disciplinary field:	Algorithms, Programming, Languages, Analysis, Design and Development of Applications			<b>6</b>
Module:	Basis of object-oriented programming			
Semester:	<i>Spring</i>			
Teaching hours:	10h	20h	30h	
	Lectures	Tutorial classes	Practical work	
Teaching type:	<input type="checkbox"/> English-only		<input checked="" type="checkbox"/> French-English	

- Objective(s):  
- To develop a program in an object-oriented programming language from a detailed design.
- Skill(s):  
- Technical design of a computer solution.  
- Production of a computer solution.  
- Validation tests for a computer solution.
- Prerequisite(s):  
- Data structures and fundamental algorithms.
- Remark(s):  
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ID:	<b>CS_S_02</b>			<b>ECTS</b>
Disciplinary field:	Analysis, Design and Development of Applications			<b>4</b>
Module:	Basis of object-oriented design			
Semester:	<i>Spring</i>			
Teaching hours:	10h	14h	18h	
	Lectures	Tutorial classes	Practical work	
Teaching type:	<input type="checkbox"/> English-only		<input checked="" type="checkbox"/> French-English	

- Objective(s):
  - To understand and model a detailed design, produce the associated unit tests and implement it with an object language.
- Skill(s):
  - Analysis of a computer solution.
  - Technical design of a computer solution.
  - Production of a computer solution.
  - Validation tests for a computer solution.
- Prerequisite(s):
  - Data structures and fundamental algorithms.
- Remark(s):
  -

ID:	<b>CS_S_03</b>			<b>ECTS</b>
Disciplinary field:	Database Management Systems			<b>5</b>
Module:	Database programming and administration			
Semester:	<i>Spring</i>			
Teaching hours:	10h	15h	20h	
	Lectures	Tutorial classes	Practical work	
Teaching type:	<input type="checkbox"/> English-only		<input checked="" type="checkbox"/> French-English	

- Objective(s):
  - To master complex queries in SQL (Structured Query Language) and to know how to programme the DBMS side (stored procedures).
  - To become familiar with administration and data security.
- Skill(s):
  - Technical design of a computer solution.
  - Production of a computer solution.
  - Administration of systems, software and networks.
- Prerequisite(s):
  - Data structures and fundamental algorithms.
  - Introduction to databases.
- Remark(s):
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ID:	<b>CS_S_04</b>			<b>ECTS</b>
Disciplinary field:	Mathematics			<b>5</b>
Module:	Graphs and languages			
Semester:	<i>Spring</i>			
Teaching hours:	10h	16h	18h	
	Lectures	Tutorial classes	Practical work	
Teaching type:	<input type="checkbox"/> English-only		<input checked="" type="checkbox"/> French-English	

- Objective(s):  
- To discuss the concepts and central tools underlying the mathematics of computing.
- Skill(s):  
- Modelling using graphs and automatic devices.
- Prerequisite(s):  
- Basic knowledge of discrete mathematics (logic, relations) and linear algebra (matrix).  
- Basic knowledge of object programming.
- Remark(s):  
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ID:	<b>CS_S_05</b>			<b>ECTS</b>
Disciplinary field:	Computing			<b>4</b>
Module:	English			
Semester:	Spring			
Teaching hours:	0h	22h	16h	
	Lectures	Tutorial classes	Practical work	
Teaching type:	<input checked="" type="checkbox"/> English-only		<input type="checkbox"/> French-English	

- Objective(s):  
- Communicating in English
- Skill(s):  
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- Prerequisite(s):  
-
- Remark(s):  
- For non-native speakers.

ID:	<b>CS_S_06</b>			<b>ECTS</b>
Disciplinary field:	Hardware Architecture, Operating Systems, Networks, Analysis, Design and Development of Applications			<b>2</b>
Module:	Distributed programming			
Semester:	<i>Spring</i>			
Teaching hours:	4h	8h	8h	
	Lectures	Tutorial classes	Practical work	
Teaching type:	<input type="checkbox"/> English-only		<input checked="" type="checkbox"/> French-English	

- Objective(s):
  - To know how to program a distributed application.
- Skill(s):
  - Production of a computer solution.
  - Validation tests for a computer solution.
  - Operation and maintenance of a computer application.
- Prerequisite(s):
  - Principles of operating systems.
  - Network Services. Advanced object design and programming.
- Remark(s):
  -

ID:	<b>CS_S_07</b>			<b>ECTS</b>
Disciplinary field:	Web, Internet, Mobility			<b>3</b>
Module:	Web programming. Rich clients			
Semester:	<i>Spring</i>			
Teaching hours:	4h	12h	8h	
	Lectures	Tutorial classes	Practical work	
Teaching type:	<input type="checkbox"/> English-only		<input checked="" type="checkbox"/> French-English	

- Objective(s):
  - To know how to program a "rich" client.
- Skill(s):
  - Technical design of a computer solution.
  - Production of a computer solution.
  - Validation tests for a computer solution.
- Prerequisite(s):
  - Introduction to graphical user interfaces.
  - Server side Web programming.
  - Advanced object design and programming.
- Remark(s):
  -

ID:	<b>CS_S_08</b>			<b>ECTS</b>
Disciplinary field:	Web, Internet, Mobility			<b>3</b>
Module:	Design and development of mobile applications			
Semester:	<i>Spring</i>			
Teaching hours:	8h	12h	8h	
	Lectures	Tutorial classes	Practical work	
Teaching type:	<input type="checkbox"/> English-only		<input checked="" type="checkbox"/> French-English	

- Objective(s):
  - To learn how to develop applications on mobile devices.
- Skill(s):
  - Technical design of a computer solution.
  - Production of a computer solution.
- Prerequisite(s):
  - Introduction to graphical user interfaces.
  - Network services.
  - Advanced object design and programming.
- Remark(s):
  -

ID:	<b>CS_S_09</b>			<b>ECTS</b>
Disciplinary field:	Mathematics			<b>3</b>
Module:	Introduction to operational research and decision support			
Semester:	<i>Spring</i>			
Teaching hours:	8h	12h	8h	
	Lectures	Tutorial classes	Practical work	
Teaching type:	<input type="checkbox"/> English-only		<input checked="" type="checkbox"/> French-English	

- Objective(s):
  - To be aware of the existence of basic tools to assist decision making: linear programming,
  - To understand the operation and limitations of these methods.
- Skill(s):
  - Modelling a complex situation using a graph or correlated variables.
  - Making a reasoned decision by optimizing one or more criteria.
- Prerequisite(s):
  - Graphs and languages.
- Remark(s):
  -



ID:	<b>CS_S_10</b>			<b>ECTS</b>
Disciplinary field:	Mathematics			<b>3</b>
Module:	Introduction to cryptography and compression theory			
Semester:	Spring			
Teaching hours:	8h	12h	8h	
	Lectures	Tutorial classes	Practical work	
Teaching type:	<input type="checkbox"/> English-only		<input checked="" type="checkbox"/> French-English	

- Objective(s):
  - To learn the basics about cryptography.
  - Implement some simple cryptography and compression algorithms.
- Skill(s):
  - Been able to identify a simple security problem and know what type of cryptographic solution to choose to solve it.
- Prerequisite(s):
  - Discrete mathematics, linear algebra, basis of object-oriented programming.
- Remark(s):
  -

ID:	<b>CS_S_11</b>			<b>ECTS</b>
Disciplinary field:	Image Processing			<b>3</b>
Module:	Applied computer science: Image processing and video analysis			
Semester:	Spring			
Teaching hours:	8h	12h	8h	
	Lectures	Tutorial classes	Practical work	
Teaching type:	<input type="checkbox"/> English-only		<input checked="" type="checkbox"/> French-English	

- Objective(s):
  - This course will be an introduction to image processing and computer vision. The first goal is to understand how to represent and manipulate digital images and videos, to understand the principles of compression standards and classical image processing algorithms. The second objective is to provide an introduction and overview of 2 standard tools in image and video processing (Matlab / Scilab, OpenCV).
- Skill(s):
  - Image and video compression.
  - Low level image processing. OpenCV - Scilab/Matlab.
- Prerequisite(s):
  - Intermediate level of expertise in C++
- Remark(s):
  -

ID:	<b>CS_S_12</b>		<b>ECTS</b>
Disciplinary field:	Computing		<b>3</b>
Module:	English		
Semester:	<i>Spring</i>		
Teaching hours:	-	16h	10h
	Lectures	Tutorial classes	Practical work
Teaching type:	<input checked="" type="checkbox"/> English-only		<input type="checkbox"/> French-English

- Objective(s):  
- Working in English.
- Skill(s):  
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- Prerequisite(s):  
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- Remark(s):  
- For non-native speakers.

ID:	<b>CS_S_13</b>			<b>ECTS</b>
Disciplinary field:	Computing			<b>6</b>
Module:	Internship/ Professional project			
Semester:	<i>Spring</i>			
Teaching hours:	0h	0h	0h	
	Lectures	Tutorial classes	Practical work	
Teaching type:	<input checked="" type="checkbox"/> English-only		<input type="checkbox"/> French-English	

- Objective(s):  
- Internship in a research lab of the university.
- Skill(s):  
- Software development in computer vision.
- Prerequisite(s):  
- Basis in Computer Vision.
- Remark(s):  
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