Ministry of Higher Education and Scientific Research
Djilali BOUNAAMA University - Khemis Miliana(UDBKM)
Faculty of Science and Technology
Department of Mathematics and Computer Science

Chapter 1

Introduction :
1. Introduction to Computer Science

MI-L1-UEF121 : Algorithms and Data Structures I

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Course
Topics

1. **Computer science**

2. **Hardware and Equipment**

3. **Softwares**

4. **Jobs and Professions**

5. **Studies**

Computer Science

Definition

Computer Science

- ✓ *Computer Science* designates the **automation** of information processing by a concrete (machine) or an abstract system.

  - ▪ Example: "John", "Smith", 30000

- ✓ *Computer Science* refers to all of the **sciences** and **techniques** related to information processing.

- ✓ *Computer Science* can also refer to what relates to computer hardware (electronics), and office automation (bureautique).

- ✓ The French translation is « ***L'informatique*** »

Computer Science

Approch

« *Computer Science is the* **automated processing** *of* **data** *(or* **information***) by an electronic device: the computer* »

✓ ***Data or Information*** : computer manipulates numbers

➤ can represent various types of information: numbers (calculations or accounting), text, letters (characters), images or videos

➤ converting this information into a series of numbers raises the problem of data format, coding and standardized formats

✓ ***Automated*** :

➤ the processing is defined in a program which runs on its own,

➤ the user simply provides processing parameters

➤ establishing this program is the domain of programming

5

Approch

« *Computer Science is the* **automated processing** *of* **data** *(or* **information***) by an electronic device: the computer* »

✓ ***Processing*** : these data are :

➢ ***creates*** : automatic acquisition, type text, draw an image, record sound or video

➢ ***analyse*** : number analysis, finding word occurrences, identifying an object, speech recognition

➢ ***modify*** : calculations, typing text, modifying existing text, modifying contrast, brightness, colors, applying effects

➢ ***archive*** and ***restore***

Computer Science

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Definitions

- ✓ *Informatics* (science de l'information) : the study of systems, biological or artificial, that record, process and communicate information.

- ✓ *Computer science* (l'Informatique théorique) : procedural epistemology, the study of algorithms, software, and computers.

- ✓ *Computer engineering* (Génie informatique) : the manufacture and use of computer hardware.

- ✓ *Software engineering* (Génie logiciel ou ingénierie de logiciel) : software modeling and development

- ✓ *Information technology* (Technologies de l'information) : Represents the evolution of techniques and technologies related to Computer Science.

- ✓ *Information and communication technolog* : (Technologies de l'information et de la communication TIC)

Computer Science

Application areas of Computer Science

✓ ***Computer Science for management*** :

➢ guide management and management processes in companies,

➢ areas of activity: human resources management, sales administration, purchasing management, marketing, finance

✓ ***Computer Science scientifique:***

➢ assist design engineers in industrial engineering fields

➢ design and size equipment using calculation programs

➢ used in design offices to simulate scenarios quickly and reliably.

Computer Science

Application areas of Computer Science

✓ *Real time Computer Science* :

> ➢ define software for controlling systems in direct contact with the world

> ➢ aeronautics, space, weaponry, miniaturization of circuits

✓ *Knowledge management :* (*L'ingénierie des connaissances*)

> ➢ consists of managing innovation processes

> ➢ bring coherence between the three areas of management, real time, and scientific

✓ *Intelligence* (*Intelligence ou Veille*) *Economic and strategic :*

> ➢ use information technologies to search for information (search engines)

Computer Science

Hardware & Equipment

Definitions

✓ ***Computer materiel*** is all the components that can be found in a computer, peripherals and embedded devices.

✓ To designate Computer ***materiel*** & equipment, we also use the English term "***hardware***".

✓ A ***computer*** is a set of electronic circuits for manipulating data in binary form, represented by variations of an electrical signal.

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Types of computers

✓ ***Computers*** or ***PC***: desktop or laptop

  ➢ composed of a central unit: a case containing the motherboard, processor, RAM, power supply, and storage units.

  ➢ A console: a screen (output), a keyboard and a mouse (input).

  ➢ Various peripherals: a printer, a scanner, etc..

✓ ***Workstations***:

  ➢ Particularly powerful and expensive PCs,

  ➢ used only for professional purposes

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Types of computers

✓ *Mainframes*

➤ A cabinet houses the CPU and power supply, one or more storage devices (hard drive, backup) while Hardware & Network Equipment (router, hubs, modem) are in the same room (separate racks).

➤ An administration console (screen, keyboard, etc.) is located in this same room.

✓ *Servers:*

➤ universal storage location for users connected to servers

➤ perform tasks: serve as a firewall, host a web server, etc.

Components of a computer

✓ **UCT** or **CPU** (Central Processing Unit) or **Processor :** includes command and control unit (**UCC**) + arithmetic and logical unit (**UAL**).

✓ **Read-Only Memory:** (**ROM**)

➤ contains programs essential to the operation of the hardware.

✓ **Random Access Memory:** (**RAM**)

➤ Required for the execution of any program (Volatile).

✓ **Peripheral devices**

✓ all units intended for reading or writing information (keyboard, screen, printer

✓ These devices are physically connected by electrical tracks (lines) called **buses**
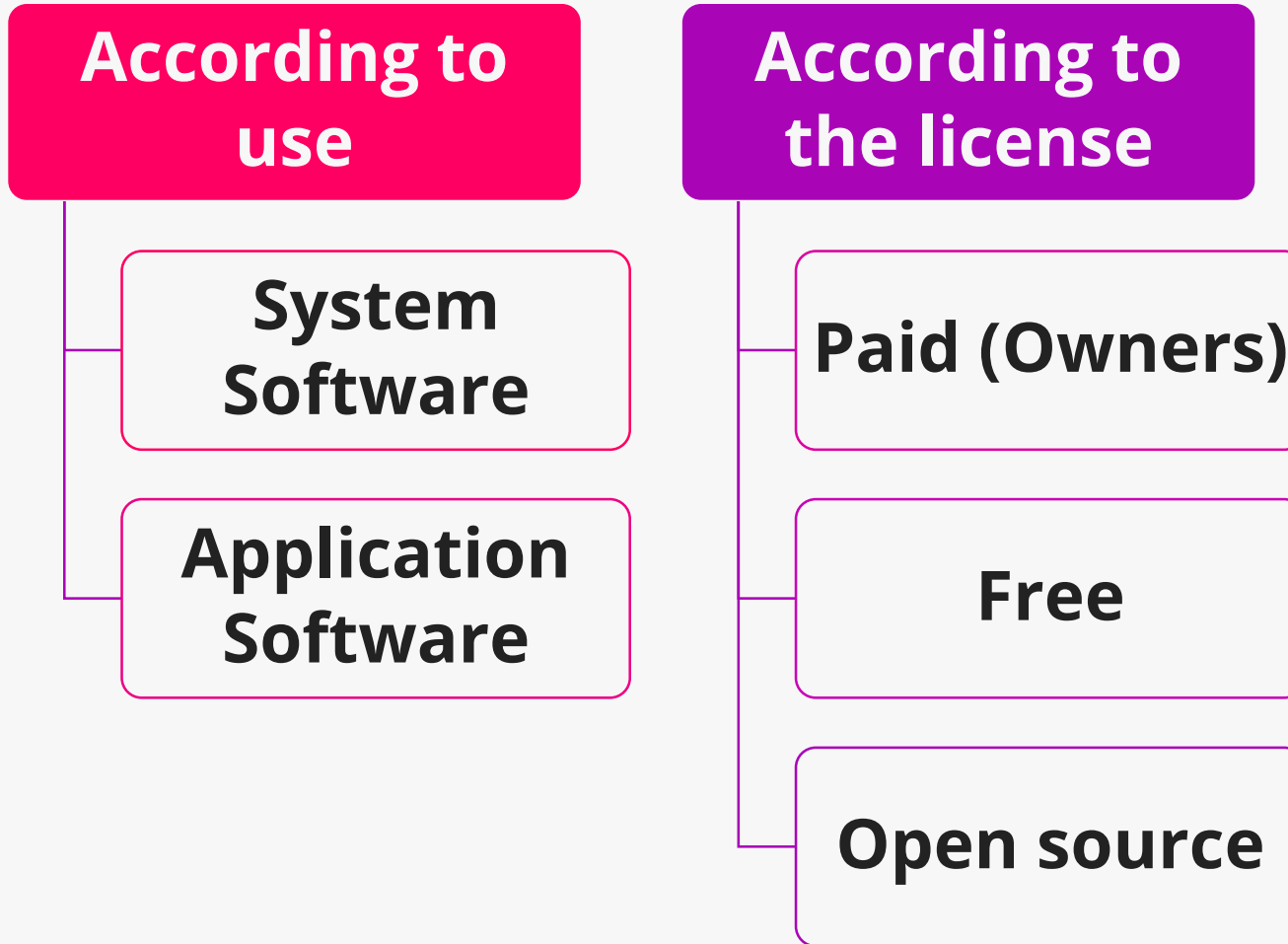
14

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SoftWare

Definition

✓ A **Software** refers to the intangible part of Computer Science, the organization and processing of information: **programs**.

✓ A **Software** is a set of programs that allows a computer or computer system to perform a particular task or function

Software Categories

Softwares

According to use
- System Software
- Application Software

According to the license
- Paid (Owners)
- Free
- Open source
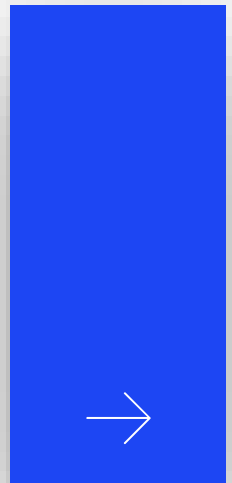
Softwares according to use

✓ **System Software**:

    ✓ *Operating systems:* MS Windows, Linux Ubuntu, Androis, iOS, Mac OS..

    ✓ *Device drivers:* Motherboard drivers, graphics card drivers, etc.

    ✓ *Firmware:* BIOS, UEFI, Embedded systems...

    ✓ *Programming language tools:* Interpreter, compiler and assemblers,

    ✓ *Utilities:* Anti-virus (Avast, McAfee), CCleaner, WinRAR, ...

✓ **Application Software:**

    ✓ *Content Management:* MS Word, Google Docs...

    ✓ *Database Management:* MS Access, MySQL, Oracle ...

    ✓ *Multimedia:* Adobe Photoshop, VLC Media Player, Inkscape ...

    ✓ *Web browser:* Google Chrome, Mozilla Firefox, ...

    ✓ *Accounting and Management:* SAP, Ciel, ...

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Softwares according to the license

✓ **Paid software:**

  ✓ MS Office, SAP, Sky

✓ **Freeware:**

  ✓ Adobe Reader, Skype, TeamViewer, …

✓ **Shareware:**

  ✓ Adobe Acrobat, Winzip, etc.

✓ **Free Software (Open Source):**

  ✓ Moodle, Mozilla Firefox, Apache Web Server..

Communication

Jobs & Professions

Computer scientist

✓ **Computer scientist** works in Computer Science.

✓ The variety of **computer scientists** reflects on the one hand computer *techniques* and on the other hand *methods* of organizing computer work.

✓ It is illustrated in the context of *research*, system *design*, production and *management*, *maintenance*.

✓ These activities may concern the *hardware* domain and/or the *software* domain.
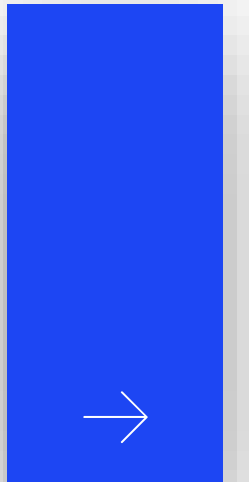
21

Opportunities and Jobs

Private sector

Public Sector

Independent (Freelancer)

22

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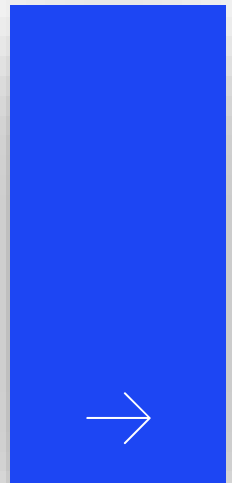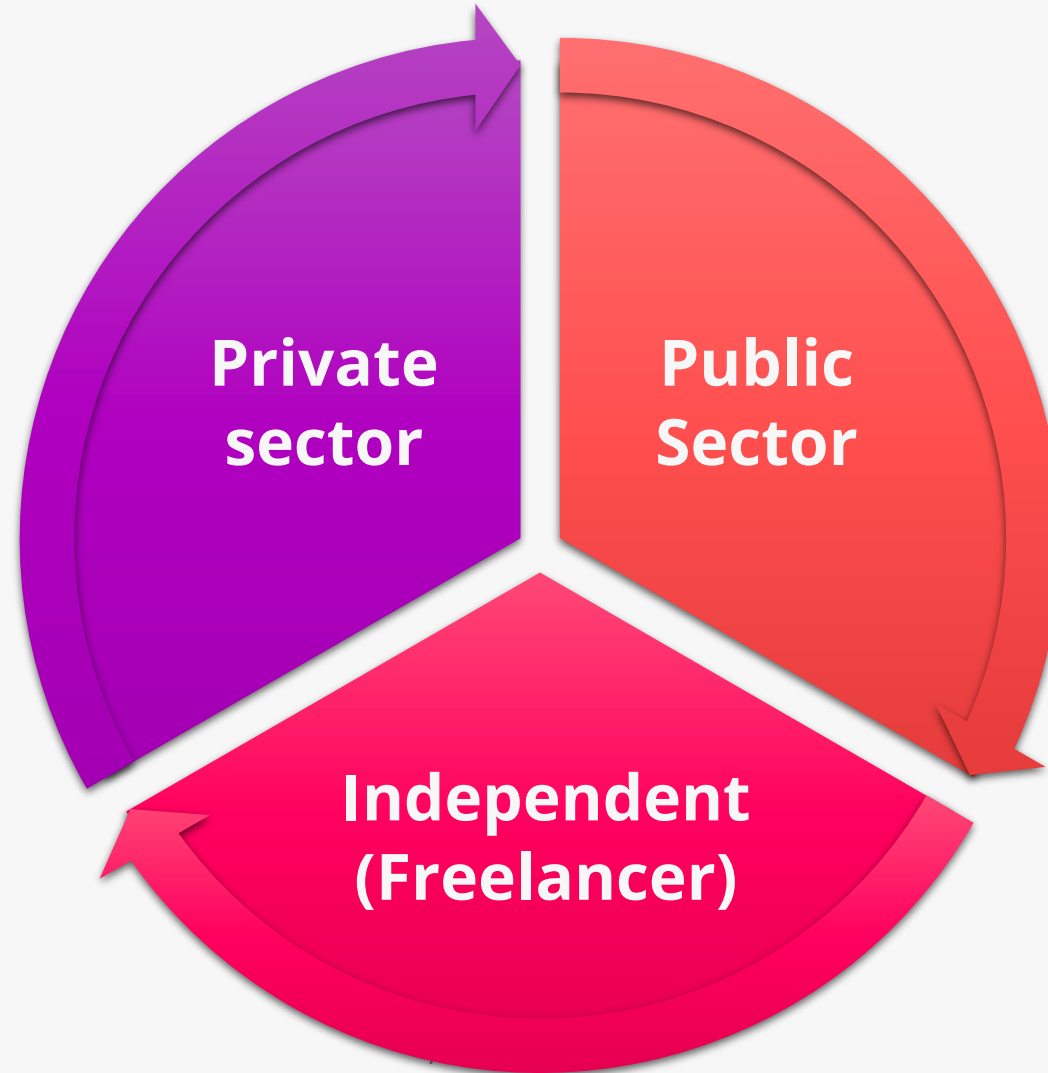
Public Sector

Jobs & Professions

IT engineer

IT Technician

Teaching in fundamental

Teaching in professional training

→

Private sector

Jobs & Professions
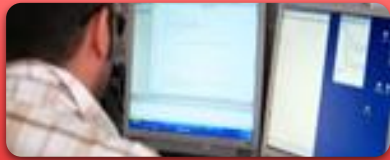
Software developer

Web and mobile developer

Systems and network administrator

Database administrator

Information systems architect

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24

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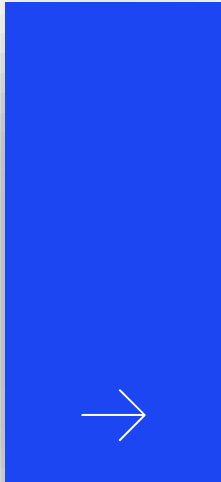
Studies

« Mathematics and Computer Science » domain

✓ The **mathematics and computer science** path is intended for students who wish to have a solid foundation in **computer science** and **mathematics**.

✓ The first year (L1) is designed to allow you to choose and opt for a more specialized path in computer science or mathematics.

Studies

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« Mathematics and Computer Science » domain

Mathematics and Computer Science

Mathematics

Computer Science

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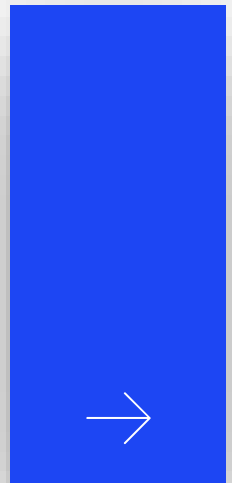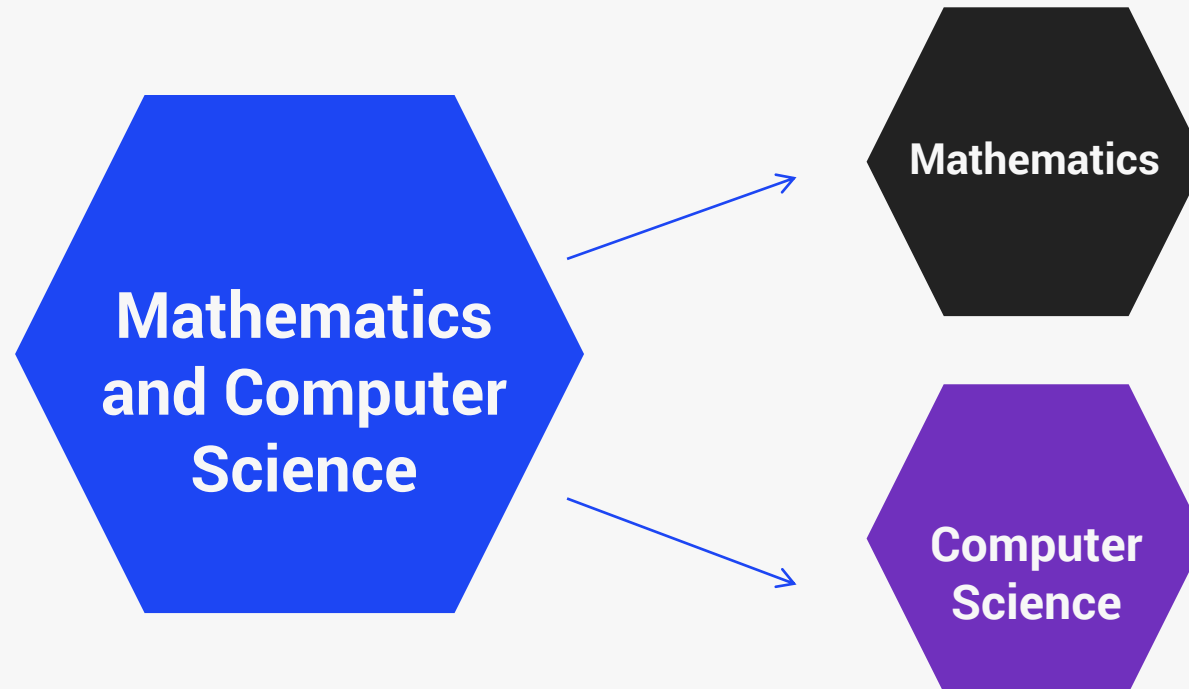
Objectives

Studies

01
- **basic general training in the fundamental areas of Computer Science:** Operating Systems, Algorithmics, …

02
- **specialized training in computer systems:** Information systems, Databases, etc.

03
- **Prepare a Master's degree in computer science or others**

04
- **mastery of programming languages to approach a development or administration profession**

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Continuation to Master's Studies

Studies

The path is spread over 04 semesters, the last semester is devoted to a project.

Master in Computer Science

- Software engineering
- Networks and Distributed Systems
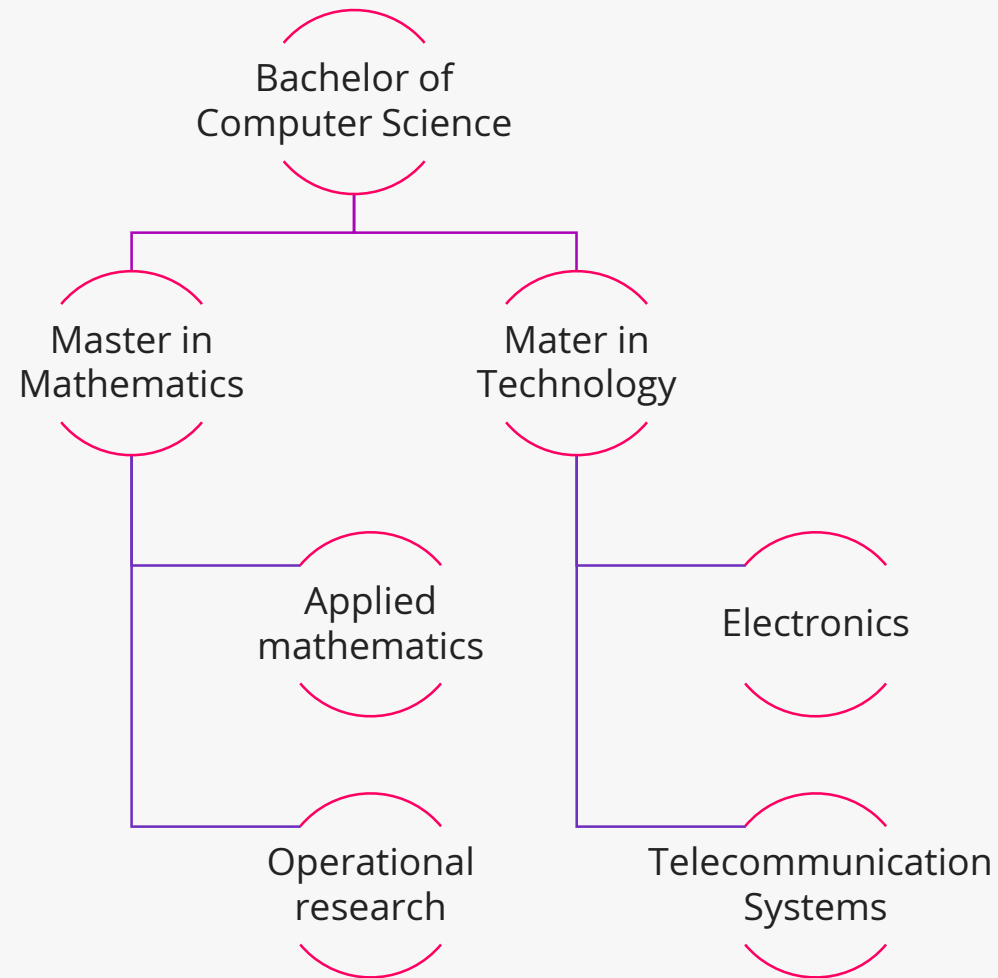- Intelligent Computer Systems
- Computer Systems Security
- Software Engineering and Distributed Systems
- Artificil Intelligence and Big Data

29

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Continuation to Master's Studies

Studies

Bridges are possible between the computer science degree and other fields:

Bachelor of Computer Science

Master in Mathematics

Mater in Technology

Applied mathematics

Electronics

Operational research

Telecommunication Systems

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