| QF01/0408-4.0E | Course Plan for Bachelor program - Study Plan Development and Updating Procedures/ Artificial Intelligence Department |
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|---|---|---|---|---|---|---|---|
| **Study plan No.** | **2021/2022** | | **University Specialization** | | **Artificial Intelligence** | | |
| **Course No.** | **0142210** | | **Course name** | | **Computing systems for data science and artificial intelligence** | | |
| **Credit Hours** | **3 hours** | | **Prerequisite Co-requisite** | | **Introduction to data science** | | |
| **Course type** | ☐ **MANDATORY UNIVERSITY REQUIREMENT** | ☐ **UNIVERSITY ELECTIVE REQUIREMENTS** | ☐ **FACULTY MANDATORY REQUIREMENT** | ☐ **Support course family requirements** | ☑ **Mandatory requirements** | ☐ **Elective requirements** | |
| **Teaching style** | ☐ **Full online learning** | | ☐ **Blended learning** | | ☑ **Traditional learning** | | |
| **Teaching model** | ☐ **2 Synchronous: 1asynchronous** | | ☐ **2 face to face : 1synchronous** | | ☑ **3 Traditional** | | |

**Faculty member and study divisions' information (to be filled in each semester by the subject instructor)**

| Name | Academic rank | Office No. | Phone No. | E-mail | |
|---|---|---|---|---|---|
| **To be filled by the instructor** | | | | | |
| | | | | | |
| **Division number** | **Time** | **Place** | **Number of students** | **Teaching style** | **Approved model** |
| **To be filled by the instructor** | | | | | |
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| | | | | | |

**Brief description**

This course is intended to provide an overview of different software and tools that assist data scientists in the data analysis process. These tools includes Spark, Hadoop, R, etc. Additionally, it gives an introduction to cloud computing, big data computing, and IoT computing.

**Learning resources**

| | | | | |
|---|---|---|---|---|
| Course book information (Title, author, date of issue, publisher ... etc) | 1- R for Data Science. Hadley Wickham and Garrett Grolemund, O'Reilly -2017.<br>2- Introduction to Computation and Programming Using Python, By John V. Guttag and Julie Sussman, 2016.<br>3- Introduction to Cloud Computing, M Praveen, 2020. | | | |
| Supportive learning resources (Books, databases, periodicals, software, applications, others) | 1. Data Analytics with Hadoop, Benjamin Bengfort and Jenny Kim, O'Reilly Media, 2016<br>2. Data Science Thinking The Next Scientific, Technological and Economic Revolution, Longbing Cao, Springer, 2018. | | | |
| Supporting websites | | | | |
| The physical environment for teaching | ☑ Class room | ☐ labs | ☐ Virtual educational platform | ☐ Others |
| | | | | |
| Supporting people with special needs | ---------- | | | |
| For technical support | ---------- | | | |

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**Course learning outcomes (S= *Skills, C= Competences K= Knowledge,)***

| No. | Course learning outcomes | The associated program learning output code |
|---|---|---|
| | **Knowledge** | |
| **K1** | **Understand different types of computing for data science using different tools.** | **MK3** |
| **K2** | **Learn about different data science tools.** | **MK3** |
| | **Skills** | |
| **S1** | **Applying Hadoop and Spark for big data computing.** | **MS3** |
| **S2** | **Applying R in statistical computing.** | **MS3** |
| **S3** | **Applying Weka for data science.** | **MS3** |
| | **Competences** | |
| **C1** | **The ability to apply various cutting-edge tools for data science.** | **MC1** |

**Mechanisms for direct evaluation of learning outcomes**

| Type of assessment / learning style | Fully electronic learning | Blended learning | Traditional Learning (Theory Learning) | Traditional Learning (Practical Learning) |
|---|---|---|---|---|
| First exam | 0 | 0 | **%20** | 0 |
| Second / midterm exam | %30 | %30 | **%20** | 30% |
| Participation / practical applications | 0 | 0 | **10** | 30% |
| Asynchronous interactive activities | %30 | %30 | **0** | 0 |
| final exam | %40 | %40 | **%50** | 40% |

**Note:** Asynchronous interactive activities are activities, tasks, projects, assignments, research, studies, projects, and work within student groups ... etc, which the student carries out on his own, through the virtual platform without a direct encounter with the subject teacher.

**Schedule of simultaneous / face-to-face encounters and their topics**

| Week | Subject | learning style* | Reference ** |
|---|---|---|---|
| **1** | Introduction to Data Science | Lectures | Handouts |
| **2** | Weka Toolkit for Data Science | Lectures | Handouts |
| **3** | Weka Toolkit for Data Science | Lectures | Handouts |
| **4** | Case Study 1: Using Weka on a given dataset | Lectures | Handouts |
| **5** | Statistical Computing Systems – Introduction into R | Lectures | TB1 |
| **6** | Statistical Computing using R | Lectures | TB1 |
| **7** | Mid Exam Estimated + Revision | Lectures | TB2 |
| **8** | Computing Platforms: IDEs, Notebooks, Google Colab, Jupyter | Lectures | TB2 |
| **9** | Computation in Python | Lectures | TB2 |
| **10** | Case Study 2: Computation in Python | Lectures | TB2 |
| **11** | Introduction to Big Data Computing – Hadoop and Spark | Lectures | Handouts |
| **12** | Introduction into Cloud Computing | Lectures | TB3 |
| **13** | AWS, Azure, and Google Cloud for Data Science | Lectures | Handouts |
| **14** | Introduction to Deep Learning Computing using GPUs, CUDA, Keras, and Tensorflow | Lectures | Handouts |
| **15** | Introduction to IOT Computing using Arduino Systems | Lectures | Handouts |
| **16** | **Final Exam** | | |

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*** Learning styles: Lecture, flipped learning, learning through projects, learning through problem solving, participatory learning ... etc.**
**** Reference: Pages in a book, database, recorded lecture, content on the e-learning platform, video, website ... etc.**