MINOR
APPLIED DATA SCIENCE

As from January 2020 our study programme Information & Communication Technology offers the one-semester Minor "Applied Data Science" (30 ECTS). This programme is taught in English and accessible to international (exchange) students.

Are you interested by what data can do for the world we live in and are you willing to learn? Then "Applied Data Science" may be what you are looking for.

What is it that data can do for the world live in? Think of medical specialists, for example, using data science to predict a person's health based on decades of experience and historical data. In aviation data is crucial to ensure passengers board on time and to predict when maintenance is needed for the most effective use of the airplanes. But data is also all around you. Think about Siri, Chatbots, Tesla or Google Maps. These services are used daily, most likely also by you, and are based on years of data processing and machine learning.

We have created the ultimate conditions to experience and learn Applied Data Science in real-life challenges. We apply a structured process for data solutions by using the "Cross Industry Standard Process for Data Mining (CRISP-DM)", known for understanding the challenge and/or problem, setting realistic data mining goals and reserving the time that is actually needed for data preparation. All in order to achieve an iterative process to reach data mining goals and further improving the machine learning models.

STRUCTURE
The topics you will work on are learning how to set up, carry out and motivate practically orientated research, partly by following instructions (lectures) but above all, by carrying out your own research project. You will be supported by experienced researchers and process-

supporting lecturers. Instructions will be given in a way that optimally support the research that you are carrying out.

You will learn about (Advanced) Machine Learning & Deep learning. Most people know about (linear) regression models. You will be introduced to more advanced models, ranging from ensemble models, such as random forest to gradient boosting, which could be applied in predicting remaining 'useful life' of infrastructural assets such as a lock. For challenges with object recognition with a huge number of images, you will be introduced to use "Deep Learning" to train your model.

OVERVIEW MAIN LECTURES
In this in-depth minor, you will learn the following:

- What is the context of your problem and which solutions are available?
- To arrive at the correct working method, you create a decision tree to find out which model and/or algorithm to choose in which context;
- Based on CRISP DM, you define the research problem;
- You get in-depth training into which models are useful for the topics taught by the lecturers;
- Through advanced machine learning you are trained to implement multiple models;
- Based on output of the models, you come to understand this output and enhance your models;
- After tuning and enhancing the models, you learn how to evaluate the output and check these against the problem you are researching.

Many of the learning objectives are optional. This means that you have the freedom to choose the ones that match your research. The context of your research will be a real-life problem so it will be determined on the demands and needs of the professional field when you start your minor.

LEARNING OBJECTIVES

- You learn how to define a problem and to understand what is required to solve it;
- You learn to choose the correct model and/or algorithm to achieve the data mining goals;
- You learn to use and implement the chosen model and/or algorithm;
- You learn to make substantiated decisions on improving your model(s);
- You learn to prove that your model(s) have achieved the data mining goals.

ADMISSION REQUIREMENTS
To participate in this minor, you must have completed your first study year of an IT-related study programme. You also need to have a substantial interest in Data Science. Next to that, you must have experience with the CRISP-DM Methodology and basic programming skills, minimally with Python. You may be asked to give evidence of your knowledge of Python. Based on your educational background the programme coordinator will determine whether you will be accepted.