



Course offer Information & Communication Technology

Spring semester 2022-2023

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UNIVERSITY
OF APPLIED SCIENCES

INFORMATION & COMMUNICATION TECHNOLOGY

Information and Communication Technology (ICT) focuses on a hands-on approach, with real-life cases involving Software Engineering, Data Science, and Business IT Consulting. You will learn how to come up with new digital solutions to real company problems, you will develop solutions, and you will understand the technology involved. We welcome exchange students in our Autumn and/or Spring semester.

COURSE OFFER SPRING SEMESTER 2022-2023

In the Spring semester, the ICT programme for incoming exchange students like you consists of a single ICT package (Data Science with Software Engineering) of 30 EC. The courses are mainly taken by regular HZ 2nd year ICT students. If you need less than 30EC, you can drop some of the courses.

For a brief overview, see next page. For detailed course descriptions, see subsequent pages.

COURSES ESPECIALLY FOR EXCHANGE STUDENTS

- **CU34638 Dutch Culture & Language 2 ECTS**

This class helps you to become knowledgeable in basic Dutch and introduces you to Dutch culture and history.

TIMELINE OF HZ UAS ICT COURSES AND TESTS

Under Dutch law, every student is entitled to re-sit each test once per year. It is crucially important that you do not schedule your homeward travel home for before the re-sit opportunity. Test dates are usually finalised three to four weeks in advance. The Test weeks, however, are already scheduled. For a full overview of class weeks, see page 5.

- First classes: from Monday 06-02-2023

YOUR CONTACT PERSONS AT HZ



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DATA SCIENCE WITH SOFTWARE ENGINEERING

Course Code	Course Name	ECTS	Quarter	Year of HZ ICT Curriculum
CU75073	Data-driven Decision-making Project	10	1	2
CU75028	Cloud Computing	5	1	2
CU75074	Data Science / AI	7.5	2	2
CU75027	Data Visualisation	5	2	2
CU75060	IT Personality	2.5	1/2	2
Total		30		

COURSE DESCRIPTIONS

Overall study package description

Semester 2 of Year 2.

CU75073 Data-Driven Decision-Making Project

In this course you will be introduced to the iterative Data Science process, together with the CRISP-DM methodology. The emphasis will be on creating business insight (based on data) within complex environments. You will work as part of a mixed International/Dutch project group, delivering both business value to the external client and a professional portfolio for assessment purposes. You will also be introduced to the Python programming language, as a key tool for Data Science.

Learning outcomes the student will work on:

2.1B	You analyse the performance of an organization through a standard methodology.
2.1C	You map an organization process of an existing organization by using suitable methodologies.
2.1D	You assess a given situation on various security aspects.
2.1I	You map the branch and the company and you analyse how the process contributes to the company's goals.
2.4A	You submit a sound analysis report based on a company organization analysis.
4.5K	You ensure confidentiality of a data set by applying cryptography
6.1A	You can define and report the customers organisation and its problem.
6.1B	You can define & provide data mining goals.
6.1C	You can define business objectives and are aware of the need of information by the business.
6.1D	You can collect provided data sets and make them usable for the data science process.
6.1E	You describe collected and needed data by data types and metadata.
6.2A	You generate basic statistics summaries exploring data.
6.2B	You create a basic quality description to validate relevant data.
6.2C	You will exclude/include rows & columns to select relevant data.
6.2D	You clean data in order to achieve correct data types and handle missing values.
6.2E	You will perform basic feature extraction to construct correct and usable data.
6.2F	You are capable of converting data in correct formats to visualize data.
6.3A	You define metrics, independent records, & targets to generate a test design.
6.3B	You build the model and benchmark the predictions with basic statistic tooling.
6.3C	You assess relevant model(s) by the chosen metric.
6.4A	You summarise and evaluate results with business objective(s).
6.4B	You set up a list of actions to determine following steps.
6.4C	You produce a final report and present this to customer
6.4D	You review the data science process and you determine, and also report, lessons learned.
7.2D	You form an ethical opinion on a security-related case, taking into account the opinions of people who may think differently.

7.3P	Students can present their project, the content of their portfolio and their process considerations in a sound way making plausible the equal contribution of each project member to the project.
7.3Q	As a team, you can communicate your research in an organized way, appropriate for the audience.
7.3R	Students are able to deliver a solid product demonstration to the stakeholders in which they demonstrate the product and address the main challenges and present a realistic roadmap..

Type of exams:

- *Criteria focused assessment on portfolio*
- *Criteria focused assessment on final project delivery*
- *Presentation*

CU75028 Cloud Computing

Use cloud specific building blocks like serverless functions and different kinds of cloud storage, learn how to connect and monitor them, to let your project scale on a new level.

Learning outcomes the student will work on:

3.3A	Make available a software system based on a Framework for users in a simple hosting environment
3.4A	The student can advise for a given project how it should be adapted to be able to use the functionalities of a cloud provider.
3.5A	The student can select and employ and react accordingly on the generated metrics for a cloud application control tools.

Type of exams:

- *Research proposal*
- *Research report & proof of concept*

CU75074 Data Science / AI

In this course you will work on a Data Science project for a client, again using the CRISP-DM methodology. The emphasis is on business understanding, data preparation and algorithmic modelling, with the aim of creating simple predictive modes with machine learning. You will learn the difference between Data Science and AI, and the different types of approaches and applications. There will also be a focus on security and ethics, as well as the part played by cloud-computing and visualisation.

Learning outcomes the student will work on:

6.1F	You define data mining goals success criteria.
6.1G	You describe data mining activities based on choice of a basic machine learning model and relevant required activities.
6.1H	You add extra self-organised and/or external data sources to the data science process.
6.2G	You (re-)validate data after model generated assumptions.
6.2H	You clean data by imputing and scaling relevant data.
6.2I	You construct data by one-hot-encoding, defining targets & labelling relevant data.
6.2J	You integrate relevant data by merging multiple data sources.
6.2K	You convert data formats as prerequisite for relevant model(s).
6.3D	You split data into test & train sets to generate a test design.
6.3E	You build & train relevant model(s) and create predictions using the model(s) on test data set.
6.3F	You assess the model(s) on chosen metrics of the defined success criteria.
6.4E	You evaluate and match success criteria with business objectives of the data science process.
6.4F	You determine next steps and setup an advisory report for follow-up.
6.4G	You produce a deliverable for customer.
6.4H	You review the data science process and collect lessons learned on process & product.
7.3P	Students can present their project, the content of their portfolio and their process considerations in a sound way making plausible the equal contribution of each project member to the project.

7.3Q	As a team, you can communicate your research in an organized way, appropriate for the audience.
7.3R	Students are able to deliver a solid product demonstration to the stakeholders in which they demonstrate the product and address the main challenges and present a realistic roadmap.

Type of exams:

- *Criteria focused assessment on final project delivery*
- *Presentation*

CU75027 Data Visualization

In this course, you will learn about the role and importance of data visualisation, together with the various forms of visualisation and their applications. You will be introduced to a range of tools and techniques and guided in their proper use. As well as being able to 'see the wood for the trees' within Big Data environments, you will learn about the role of data analytics and the importance of effective communication.

Learning outcomes the student will work on:

1.4A	You can draw up a data vision goal based on the project context and business goal taking into account the goal, the target group and the message.
1.4B	You can make a sound choice for a data visualisation type suitable for the data vision goal.
1.4C	You can make a sound choice for visual elements suitable for the data visualisation goal.
1.4D	You can realise a data visualisation based on sound research.

Type of exams:

- *Research proposal*
- *Research report & proof of concept*

CU75060 IT Personality

IT Personality content is based on the HZ-wide programme HZ Personality that stimulates skills and attitudes towards personal development and personal leadership. The programme can either have a broadening or a deepening focus when it comes to the curriculum. A prerequisite for starting the HZ Personality-related activities is having obtained a GO from one of the IT Personality coordinators.

Learning outcomes the student will work on:

7.2L	Developing skills and behaviour to achieve personal and professional goals. Carrying out activities that contribute to sustainable development goals, community goals and personal goals.
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Type of exams:

- *Evidence based portfolio*