



Course offer Information & Communication Technology

Autumn Semester 2022-2023

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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 Autumn semester, the ICT programme for incoming exchange students like you consists of a single ICT package (Digital Innovation & Transformation) 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.

- Introduction week: **29-08-2022**
- First classes: from Monday **05-09-2022**

YOUR CONTACT PERSONS AT HZ



Mr. Greg Elliott
Dept of ICT
elli0006@hz.nl
Office GW3.14



Ms. Evelien Clemminck
Incoming exchange coordinator
evelien.clemminck@hz.nl
Office L1.06

DIGITAL INNOVATION & TRANSFORMATION

Course Code	Course Name	ECTS	Quarter	Year of HZ ICT Curriculum
Core Subjects	Design Thinking	7.5	1	2
	Continuous Integration	5.0	1/2	2
	Digital Innovation Project	7.5	1	2
	Digital Transformation Project	5.0	2	2
	Sub-total:	20.0		
SE Track	<i>(Software Engineering)</i>			
	Software Design	5.0	2	2
DS/BIC Track	<i>(Data Science & Business Consultancy)</i>			
	Data-Driven Business	5.0	2	2
	Data Management	5.0	2	4
	Sub-total:	10.0		
Other	<i>(Professional Development)</i>			
	Dutch Language & Culture	2.0	1	2
	IT Personality 3 & 4	2.5	1/2	2
	Project Week	1.25	1	2
	Sub-total:	5.75		

COURSE DESCRIPTIONS

Overall study package description

Semester 1 of Year 2.

CU75019 Design Thinking

Enterprises are faced with challenges related to environmental and social sustainability. For some, issues such as worker satisfaction, alternative supply chains, and mitigating the effect of climate change are business opportunities. Others need to find ways to change the way in which they do business in order to align with the UN's Sustainable Development Goals. In this course, current issues related to sustainability are addressed. Students are presented with the tools they need to be a change agent for sustainable business (or, as a minimum, to address the most important issues in an intelligent way).

The final test is a portfolio & presentation

Learning outcomes the student will work on:

4.1H	You can develop empathy for all parties involved in a complex problem.
4.1I	You can define a problem through an analysis of all available data.
4.1J	You can generate a range of (innovative) ideas for a defined problem.
4.1K	You can make a prototype of a chosen idea.
4.1L	You can carry out tests based on the prototype and thus generate new insights.

CU75016 Continuous Integration

Students develop a thorough understanding of a version control system (VCS) and learn strategies to incorporate a VCS as part of effective team collaboration. They setup a complete CI pipeline with an automated build for a given project, adding tests and metric tools, such as code coverage, to control the software quality. Course assessment is based on a structured set of deliverables. Course planning is based on various types of releases. Improved by feedback, each deliverable becomes part of the final portfolio.

The final test will be a portfolio-based assessment

Learning outcomes the student will work on:

4.5F	Master the advanced features of the distributed version control system (DVCS), using Git to enable effective collaboration on a software project.
4.5G	Achieve manageability of your software project releases by choosing a branching model and corresponding workflow.
4.5H	Design a deployment pipeline that runs an existing open-source software application and generates an automatic build.
4.5I	Prove your solution by performing a complete release from a change in code that generates corresponding executables, thereby running all the steps of a release management cycle.
4.5J	Guarantee software quality by enabling quality tools and executing unit tests.

CU75011 Digital Innovation Project

This project is focused on digital innovation. In the design phase, student teams work on delivering the IT solution they formulate for their clients. During Sprint 0, the students build the project structure. Deliverables are epics, user stories, definition of done, and the project backlog. Students verify all these deliverables with their stakeholders and discuss their impact and the technologies proposed. This process leads to modified user stories and priorities. Students learn to draw-up structured and clear (functional) specifications. The methodology leverages an agile approach.

During the following sprints, students further develop their project as a team in an Agile way, eliciting feedback in order to improve their effectiveness as a team and as individuals, to deliver a suitable solution to the client. (This feedback also forms part of the Professional Skills course). Students use various methods to verify their ideas with stakeholders, together with the associated user stories. (Verification thereby becomes a continuous process). During the project, students also continually evaluate and report their progress to stakeholders and their study coach. In Sprints 1 & 2, students are also introduced to User Experience – UX –theory and principles (which also forms part of the follow-on Digital Transformation Project).

Students deliver their solution as a product demo (20% of the grade). They also deliver an innovation clip/video (20% of the grade). In this, students address the technological innovations they have used or researched, and share the technical knowledge gained. During the course, some of the theory is tested via the online learning environment. (Students need a 70% pass of the quizzes before taking their final assessment). The final portfolio (60% of the grade) sets out the project deliverables and outcomes.

Learning outcomes the student will work on:

1.1A	You can define important consequences for the UX based on the characteristics of a target group.
1.3F	You can take into account suitable design guidelines in UX.
1.3G	You can take into account human factors in UX.
1.3H	You can take into account emotional design in UX.
4.2F	You can solve a problem occurring in the market and involve the right stakeholders.
4.2G	You generate new insights by translating a solution into an MVP, testing it, and analysing the metrics (results).
4.2I	You make a first overview of a business model.
4.2J	You describe the needs of the users of the software system to be developed.
4.2K	You draw up a functional design for a complex part of a software system.
4.2M	You demonstrate the quality of the solution in an organized way through the metrics developed.
7.5C	As a team, you can deep-dive into a new and innovative technique/technology, gaining new knowledge by researching the way that it works, and validating it by using both an expert and reliable scientific resources.

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, address the main challenges, and present a realistic roadmap.
7.3P	Students can present their project, the content of their portfolio and their process considerations in a sound way, demonstrating the equal contribution of each team member to the project.

CU75071 Digital Transformation Project

Continuing the project from block 5, students work agile, report progress, improve their effectiveness as a team, and deliver a suitable solution to the client. During the project they continuously evaluate their progress and report the results to their stakeholders and study coach. Students develop their solution with a special focus on its business impact (stakeholders, company, or process). Students deliver their solution as a product demo, incorporating knowledge transfer and handover. In their final presentation, students again address the impact of their solution, while the associated deliverables are documented within a professional portfolio. The final product is graded for innovation, appropriateness, business benefit, quality, and deployment.

Students are also introduced to User Experience (UX) principles and learn how to apply them correctly within their project. Students formulate a UX improvement report, in which they demonstrate their ability to improve the user experience via requirements analysis and system testing (formulation, planning, execution and evaluation). This is supplemented with a demo (live or videoed) of the UX test technique used.

During the course, some of the theory is tested via the online learning environment. (Students need a 70% pass of the quizzes before taking their final assessment). The final portfolio (80% of the grade) sets out the project deliverables and outcomes, while the accompanying demo (20% of the grade) showcases the project summary.

1.2A	You can formulate a suitable UX research approach
1.3F	You can take into account suitable design guidelines in UX
1.3G	You can take into account human factors in UX
1.3H	You can take into account emotional design in UX
1.3I	You can test and improve on your digital solution's UX aspects
1.3J	You can design a test plan report for your digital UX solution
4.2J	You describe the needs of the users of the software system to be developed.
4.2K	You draw up a functional design for a complex part of a software system.
4.2N	You write a report that can be transferred to third parties.
4.2L	You determine the quality of the design, for example through testing or prototyping, taking into account the formulated quality characteristics (ISO 25010).
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, address the main challenges and present a realistic roadmap.
7.3P	Students can present their project, the content of their portfolio and their process considerations in a sound way, demonstrating the equal contribution of each project member to the project.

Optional courses

CU75020 Software Design

Make software robust! Learn how to detect weak spots in programming code (code smells) and how to solve them (refactoring) with proven solutions like design patterns. Students learn to identify design patterns using an open-source tool and report the results (including a class diagram) in a short report. Students also learn how to apply refactoring using an open-source tool and report their findings and reflections in a blog. Working in pairs, students create a working program housing multiple design patterns. (For grading purposes, the report counts for 30%, the blog for 30% and the program for 40%).

Learning outcomes the student will work on:

4.3J	Indicate for a given code example/class diagram which design patterns were applied. [B5]
4.3K	Apply a suitable design pattern for a given situation and work it out in both a class diagram and actual code. [B5]
4.3L	Recognise weak points in code, so-called code smells, and apply an appropriate standardised remedy, so-called refactoring. [B5]

CU75072 Data Driven Business

“How to become a data driven organization”. Students learn the definition of Data Driven Business and why companies want or need to change their business. Students are given tools to determine which companies are data driven. Furthermore, they gain an understanding in what is needed for companies to become data driven. From a maturity point of view, students are introduced to an exemplary roadmap describing a pathway to becoming data driven. In addition, students are given insight into common flaws, failures and ‘don’ts’ on the data driven journey. All aspects of the courses are backed by real-life cases, wherever possible. Finally, the connection to Data Strategy & Architecture is explained, ensuring that students understand the end-goals in a broader business context. Students work in groups of 3 or 4 (depending on the number of students taking the course). The final assessment is a report and a presentation.

Learning outcomes the student will work on:

2.1K	Students are capable of understanding the need for businesses to embrace data and can report their maturity in this regard.
2.4E	Students understands how a company’s data maturity fits into the broader context of data strategy, and can therefore advise on the future perspective of data driven business.

CU75046 Data Management

In this course, students are introduced to the field of Data Management & Governance. They learn the importance of such aspects as data quality, provenance, mediation and authority. They also gain an understanding of the need to formulate and validate data semantics using meta, reference and master data, as well as the role of information modelling and encoding. Students learn to address issues of data integration/interoperability and privacy/security. Particular attention will be paid to the question of data legitimacy, ethics, and law, and how to correctly interpret and communicate algorithmic/analytic outputs.

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 visualisation 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.
2.1D	You assess a given situation on various security aspects.
2.1K	Students are capable of understanding the need for businesses to embrace data and can report their maturity in this regard.
2.2C	You understand the ETL and the matching report process. (B14)
2.4A	You submit a sound analysis report based on a company organization analysis.
2.4E	You assess a given situation on various security aspects.
4.2I	You make a first overview of a business model.

6.1C	You can define business objectives and are aware of the need of information by the business
6.1E	You describe collected and needed data by data types and metadata.
6.1I	You describe data mining activities based on choice of the best applicable machine learning model and relevant required activities.
6.2B	You create a basic quality description to validate relevant data.

CU34638 Dutch Culture & language

This course is especially for Exchange Students, providing them with basic Dutch language skills and introducing them to Dutch culture and history.

CU75059 IT Personality 3 and/or CU75060 IT Personality 4

IT Personality content is based on the HZ-wide programme HZ Personality that stimulates attitudes and skills aimed at personal development and personal leadership. The programme can either have a broadening or a deepening focus vis-a-vis the core curriculum. A prerequisite for starting HZ Personality-related activities is obtaining a GO from one of the IT Personality coordinators. Final test is an individual portfolio.

Learning outcomes the student will work on:

7.2L	Developing skills and behavior to achieve personal and professional goals. Carrying out activities that contribute to sustainable development goals, community goals and personal goals.
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CU75058 IT Personality Project Week 2

This course can be followed 3 times during the study programme. Each year, the ICT program organizes a project week with real life cases, (if possible) in cooperation with other programs. The Project Week course can be selected as a (1.25 ECT) element of IT Personality. This course is already approved for IT personality, students only need to define their personal goals within the given context. Final test is an individual portfolio.

Learning outcomes the student will work on:

7.2M	Developing skills and behavior to achieve personal and professional goals. Carrying out activities that contribute to sustainable development goals through participation in a project week.
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TIMELINE COURSES, BREAKS AND TESTS AT HZ AUTUMN 22/23

Calendar week	Nr	Type of week	Starts Monday the...
35	-	Introduction week	29-8-2022
36	B1	Class	5-9-2022
37	B2	Class	12-9-2022
38	B3	Class	19-9-2022
39	B4	Class	26-9-2022
40	B5	Class	3-10-2022
41	B6	Class	10-10-2022
42	B7	Class	17-10-2022
43	B8	Wk 43 is study and project week without classes	24-10-2022
44	B9	Course: interdisciplinary Projectweek	31-10-2022
45	B10	Tests	7-11-2022

46	B1	Class	14-11-2022
47	B2	Class	21-11-2022
48	B3	Class	28-11-2022
49	B4	Class	5-12-2022
50	B5	Class	12-12-2022
51	B6	Class	19-12-2022
52	-	Christmas Break	26-12-2022
1	-	Christmas Break	2-1-2023
2	B7	Class	9-1-2023
3	B8	Tests	16-1-2023
4	B9	Tests	23-1-2023
5	B10	Tests	30-1-2023