

## Master Digital Transformation

Fac. Health, Medicine and Life Sciences

### Data and Technology in Healthcare

#### Full course description

This module is the first module within the learning line Data science in Healthcare. It is an introductory module on the foundations of data science and its technologies. It introduces students to an inferential and computational way of thinking and lays the basis for the following modules of the learning line. The module starts with a conceptual discussion about data science and the way it influences healthcare. What is the historical origin of this domain and what do the buzzwords mean (i.e. data science, data analytics, AI, algorithms, machine learning)? Students learn about data, data representation and data interoperability in the healthcare domain, the concepts of existing responsibility frameworks covering topics such as open science and the FAIR (=findable, accessible, interoperable, reusable) data principles. Besides learning about concepts, students are also introduced to common methods used within the field of data science and how it is used within healthcare.

Students learn to distinguish between traditional hypothesis-driven versus data-driven research. The so-called “data science lifecycle” is used to guide students through the different steps of conducting a data-driven approach. Students learn about data, standard data types, formats and their exchange. In this module, students also trained about data privacy and protection (using methods for anonymization and pseudonymisation).

#### Course objectives

**The specific course objectives are:**

*Expert:*

The student is able to:

- know the historical origin of data science
- explain data science buzzwords
- distinguish between data collection methods and data types
- know how health information is stored
- know about data collection and conducting experiments
- know how to tackle issues with regards to ethics, legal compliance, data quality, algorithmic fairness and diversity, transparency of data and algorithms, privacy, and data protection.
- explain the difference between a number of responsibility frameworks
- make their data more FAIR
- know about privacy-preserving approaches and techniques used for data protection (pseudo- and anonymization, data encryption)

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- know how data science influences healthcare

### *Investigator*

The student is able to:

- formulate research questions for data science problems
- query and exchange health data
- work with data types, collections, tables and data standards in Python
- set up data science experiments
- use visualisations for data science storytelling
- ●clean and manipulate data use privacy-preserving techniques and data encryption in practice

## Recommended reading

[This is the link to Keylinks, our online reference list.](#)

HDT4001

Period 1

2 Sep 2024

25 Oct 2024

[Print course description](#)

ECTS credits:

3.0

Instruction language:

English

Coordinator:

- [V. Urovi](#)

Teaching methods:

Lecture(s), Assignment(s), Work in subgroups, Presentation(s)

Assessment methods:

Assignment, Attendance, Written exam

Keywords:

Healthcare data, data pre-processing, data science life cycle, responsibility frameworks, data standards, data cleaning, data anonymization

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## The Multimodality of a Digital Society

### Full course description

Module 'The multimodality of a digital society' is the first module within the learning line Adoption of Digital Technology in Healthcare. The module lays the basis for the learning line on how digital technology has been shaping healthcare systems. The module starts with the complexity of healthcare from an international perspective and some of its challenges, including scarce resources, multiple stakeholders (e.g. patients, medical staff, health insurance, policymakers, and industry) and strict regulations and requirements. Students will then be introduced to digital technology including a historic overview and focusing on its impact regarding different aspects such as end-user characteristics, interface, perceived usefulness and ease of use, workflow, quality of care, ethics,

accessibility, safety, data-driven decision-making and new treatment techniques. For this, module 2 exposes students to various theories, main players (government policies, OMS, healthcare insurance, funding agencies, etc.), medical frameworks and concepts that enable understanding of types of digital technologies and data-driven decision-making strengthening student's position in building bridges from the notion that digital technology is both a technical and social artefact.

Digital technology can increase accessibility but can also create a larger gap within society, e.g. for people with lower digital literacy. Accessibility and quality of care effects of digital technology will be evaluated from the patient's perspective considering an international scenario. The course will then discuss how digital technology affects the workflow and workload (e.g. automation of certain tasks and new treatment modalities) and its impact on the daily routine of medical staff including positive and negative aspects. The implementation of digital technology in healthcare brings about new possibilities related to increasing amounts of data (e.g. data-driven decision-making, Big Data, predictive models) but also challenges regarding data privacy, technical issues and accessibility. This module will discuss the potential of digital technology for research and commercial applications and also its challenges from technical (IT) and economical perspectives using practical cases (e.g. from the university or private companies) to give students a clear overview of the market. The foundation laid in module 2 'The multimodality of a digital society' is further explored in modules 4 and 7; respectively, how via enactment digital technology can produce sense-making solutions in healthcare practices and how digital technology can disrupt the delivery of healthcare by jointly optimising social and technical features effectively.

## Course objectives

### The specific course objectives are:

#### *Expert*

The student is able to:

- outline the health(care) structure
- recognize the role of digital technology in health(care)
- identify technology/knowledge gaps where digital technology and data science could be employed.
- discuss the role of the different stakeholders.
- describe the regulations governing innovation in health(care)
- outline the steps to develop and implement new technologies.
- discuss ethics and privacy aspects.

#### *Investigator*

The student is able to:

- Understand the principles of Big Data, AI, FAIR principles, research data management, data privacy, and high-impact research
- distinguish the role of digital technology in health(care compared) to the other fields
- give examples of applications describing positive aspects and limitations
- discuss the decision-making approaches
- Discuss the scientific contribution to the field and limiting factors
- Propose alternative solutions

## Recommended reading

1. Meskó, B., Drobni, Z., Bényei, É., Gergely, B., & Györfy, Z. (2017). Digital health is a cultural transformation of traditional healthcare. *MHealth*, 3, 38-38.  
<https://doi.org/10.21037/MHEALTH.2017.08.07>
2. Senanayake, Buddhika, et al. "Workforce Readiness and Digital Health Integration." *Opportunities and Challenges in Digital Healthcare Innovation*, edited by Kamaljeet Sandhu, IGI Global, 2020, pp. 170-185.  
<https://doi-org.mu.idm.oclc.org/10.4018/978-1-7998-3274-4.ch010>
3. Socha-Dietrich, K. (2021), "Empowering the health workforce to make the most of the digital revolution", *OECD Health Working Papers*, No. 129, OECD Publishing, Paris, <https://doi.org/10.1787/37ff0eaa-en>.
4. Meyerheim Marcel, Burns-Gebhart Anna, Mirzaie Kasra, Garani-Papadatos Tina, Braun Yvonne, Graf Norbert "Challenges and Pitfalls for Implementing Digital Health Solutions in Clinical Studies in Europe" *Frontiers in Digital Health* (2021): 3: 10.3389/fdgth.2021.730680
5. Sascha Kraus, Francesco Schiavone, Anna Pluzhnikova, Anna Chiara Invernizzi "Digital transformation in healthcare: Analyzing the current state-of-research", *Journal of Business Research* (2021) <https://doi.org/10.1016/j.jbusres.2020.10.030>
6. Cummins Nicholas, Schuller Björn W. "Five Crucial Challenges in Digital Health", *Frontiers in Digital Health* (2020) DOI=10.3389/fdgth.2020.536203
7. Marc Mitchell & Lena Kan (2019) *Digital Technology and the Future of Health Systems*, *Health Systems & Reform*, 5:2, 113-120, DOI: 10.1080/23288604.2019.1583040

HDT4002

Period 1

2 Sep 2024

25 Oct 2024

[Print course description](#)

ECTS credits:

3.0

Instruction language:

English

Coordinator:

- G. Paiva Fonseca

Teaching methods:

Assignment(s), Lecture(s), Work in subgroups, Paper(s), PBL, Presentation(s)

Assessment methods:

Assignment, Written exam, Attendance

Keywords:

Digital health systems, digital transformation, digital challenges, implementation

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## Technical Evaluations of AI Algorithms

### Full course description

This module is the second module within the learning Data science in Healthcare, and builds on module 1 'Data and technology in healthcare'. The module is organised around a real-life clinical example/ problem. Students are trained to obtain and process "rich data" based on relevant (medical) data and data sources in healthcare: to choose and implement machine learning algorithms: to solve clinical or health problems and challenges. Given a specific question, students will first look at what types of data are needed and what requirements must be set to assure good

data quality. Based on the fundamentals from Module 1, AI algorithms are discussed and their specific advantages, disadvantages and most appropriate use cases are presented. The focus will be on the thorough understanding of methods as opposed to an exhaustive list of all available algorithms.

Students learn how to select an appropriate artificial intelligence algorithm. Particularly for healthcare settings, limitations and usefulness must be carefully weighted to ensure the best possible outcome while preserving trust by clinicians and patients. Students learn details of various principles of data processing and various tests to determine data quality (such as dealing with missing data and various forms of bias). Concepts such as repeatability, generalisability, transferability, accuracy, reliability, sensitivity and specificity and the difference between training, testing and validating algorithms will become part of the students' vocabulary. Students learn various validation methods to determine the internal and external validity of AI algorithms and determine the performance on the basis of international reporting standards.

## Course objectives

**The specific course objectives are:**

*Expert:*

The student is able to:

- Identify a type of learning problem for realistic clinical application Propose a good first strategy to develop an AI approach for a clinical application
- Judge the reliability of the benchmarks performed for an AI healthcare solution
- Evaluate the trustworthiness of AI claims.
- See how choice for algorithms and training data might produce biases
- Propose solutions to bridge AI ideas to clinical relevance

*Investigator*

The student is able to:

- Know when advanced algorithms are likely to bring added benefit.
- Interpret differences in various metric for their realistic impact
- Ask critical questions about evaluation strategy and hyperparameter choices

## Recommended reading

[This is the link to Keylinks, our online reference list.](#)

HDT4003

Period 2

28 Oct 2024

20 Dec 2024

[Print course description](#)

ECTS credits:

3.0

Instruction language:

English

Coordinator:

- [C.E. Herff](#)

Teaching methods:

Assignment(s), Lecture(s), Work in subgroups, PBL, Research

Assessment methods:

Assignment, Attendance, Written exam

Keywords:

Healthcare data analysis, classification algorithms, data science in healthcare, validation of AI models, deep learning models

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## Making Sense of Digital Technology in Healthcare

### Full course description

The module 'Making sense of digital technology in healthcare' is the second module within the learning line Adoption of Digital Technology in Healthcare of the Master Health and Digital Transformation. The module builds around real-life digitalization developments and related realisation and implementation trajectories in healthcare. The development of informed tools, such as patient portals, virtual reality movies and shared decision-making digital tools are used as illustrative examples to challenge students to reflect on and apply the various lenses from the previously given module 2: The multimodality of a digital society. These challenges include real-life projects on supporting individuals (patients, health care personnel, clients or citizens) on lifestyle, health care or self management options, with the goal of providing high-quality and personalised healthcare solutions. The underlying notion is that the value of digital tools is determined by the sense-making it produces for those who are using the tool and/or are affected by the tool. For example, digital tools could have beneficial effects on processes and outcomes. A digital tool is not a goal in itself. It should build on the needs of the various stakeholders affected by it, including end users, organisations, (local) government, insurance companies, patient organisations. To clarify the crucial role of stakeholder involvement, students will be confronted with organising effective methods for stakeholder involvement, including citizen or patient participation, taking into account issues of inequity of underserved citizens or patients, e.g. due to low health literacy or/and low digital literacy. Barriers and facilitators of effective dissemination and implementation of digital innovations, such as ownership and care pathway integration, will also be discussed. Through these learning activities, students will gain a helicopter view of relevant approaches and health transformations to increase acceptability and impact of digital technology from a sense-making perspective of end-users (citizens, clients, patients, and professionals).

### Course objectives

**The specific course objectives are:**

*Expert*

The student is able to:

- Understand the term framing, ambidexterity, resistance, health equity and literacy. Able to describe and discuss innovation and implementation frameworks.
- Identify ethical and privacy concerns. Interprets and illustrates organisational and societal

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aspects facilitating and preventing digital use. Aware of cultural differences and how to influence policy.

### *Investigator*

The student is able to:

- Use a prediction model and assess the outcome. Distinguishes different kinds of research approaches to study digitalization in healthcare. Able to summarise the pros and cons of a research design.
- Evaluate stakeholders' interests in multiple dimensions and propose improvements towards results or course of development.

### *Communicator*

The student is able to:

- Re-formulate a scientific piece of text into communication which is understandable for laymen, in the form of text and in the form of visuals.

## **Recommended reading**

[This is the link to Keylinks, our online reference list.](#)

HDT4004

Period 2

28 Oct 2024

20 Dec 2024

[Print course description](#)

ECTS credits:

3.0

Instruction language:

English

Coordinator:

- L.M.J. Hochstenbach

Teaching methods:

Assignment(s), Lecture(s), Work in subgroups, Paper(s), PBL, Presentation(s), Working visit(s)

Assessment methods:

Assignment, Attendance, Written exam

Keywords:

Sense-making, Health literacy, implementation frameworks, organisational readiness, ethical considerations, patient participation, Innovation Implementation

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## **Research Methods**

### **Full course description**

The goal of this unit is twofold. First, the unit teaches students how to prepare a good-quality

research proposal for the execution of a research project. The preparation of a research proposal is an important first step for developing trustworthy evidence not only for academic purposes but also within health care settings for guiding practices and improving health and quality of life of patients. Second, the unit teaches students how to critically assess the quality of research papers and evidence reported in such papers. This is also an important skill not only in academia but also on the work floor when research evidence needs to be translated into practice.

During lectures, thesis group meetings, workshops and study team assignments, students acquire knowledge of the qualitative and quantitative research methods, which are frequently used in the fields that are covered by the master program. Several elective (non-compulsory) skills trainings are also offered.

Furthermore, the unit prepares the students for the execution of their individual research project at the end of the master program and writing their thesis about that project. Specifically, during the unit, students prepare a research proposal. If possible, this research proposal will be executed during the thesis research project. For the preparation of this proposal, students have selected their own topic in consultation with their thesis supervisor and the placement coordinator, making sure that the chosen topic fits one or more key topics of the master program. These topics also match with the research topics of the CAPHRI Care and Public Health Research Institute. Students can select the theory, design and methods from a range of research approaches.

### Course objectives

**Knowledge and understanding:** Students will acquire knowledge of and insight into:

- Research methodologies and research designs that are common in the fields of the master program.
- Methods for data collection and data analysis that are key in the fields of the master program.
- Reporting research results.

**Applying knowledge and understanding:** Students will be able to:

- Use knowledge of theories and issues from other units to write a research proposal.
- Select or develop a problem statement, a theoretical framework, the research methodology and research methods for their master thesis research project.

**Making judgments:**

- Students develop a scientific attitude.

**After having completed this unit, the students are able to:**

- Critically assess the applicability, strengths and weaknesses of the research methodologies and methods that are taught and discussed during the unit.
- Form opinions about the proper use of research methods in research articles.

**Communication:**

- Students are able to communicate effectively by discussing research methods, doing presentations, giving feedback to the work of others, and by writing a research proposal.

**Learning skills:**

- The students are trained to draw up a research proposal in a collaborative setting.



## Recommended reading

[This is the link to Keylinks, our online reference list.](#)

HPI4005

Period 3

6 Jan 2025

31 Jan 2025

[Print course description](#)

ECTS credits:

6.0

Instruction language:

English

Coordinator:

- R.M.W.A. Drost

Teaching methods:

Assignment(s), Work in subgroups, Lecture(s), Research, Training(s), Paper(s), Presentation(s), Skills

Assessment methods:

Final paper, Portfolio

Keywords:

Research methods, qualitative research, Quantitative research, mixed methods, critical reading, writing skills

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## Digital Technology as a Medical Device

### Full course description

The emergence of digital technologies, mainly conceived outside healthcare, is impacting the traditional way of thinking about the delivery of care. Automation, Analytical, and digitalization technologies will transform medicine into a data-driven learning healthcare system. Nevertheless, the pacing of the above-mentioned technologies is much faster in our daily activities than in healthcare. This is because healthcare is a particular de-centralized ecosystem where different “actors” (healthcare providers) produce data and interact with it to perform clinical decisions that impact delivery of care. While the introduction of hardware technologies such as newer medical devices is well established by regulations and with pre-defined professional roles in charge of it, understanding the complexity of the introduction of newer digital technologies in healthcare is still an open issue. This complexity will only be broken down by re-thinking any digital technology as a medical device, whose introduction impacts the workflow and processes of the above-mentioned actors. Successful “bridge builders” in healthcare need to go beyond the knowledge of algorithms used to extract knowledge from data and they must place these technologies in the context of healthcare actors, impact, innovation, and regulations.

The digital technology as a medical device course covers the definition and placing of digital technologies as medical devices within the healthcare providers. This module is designed around the

fundamental steps that need to be evaluated when considering the introduction of a newer digital technology within healthcare. Students will gain knowledge on how to formulate an implementation plan or a feasibility analysis for the introduction of a newer digital technology within healthcare. Students will become familiar with the concepts of data usage / re-usage, medical devices, clinical trials, impact and innovation. Next to that, the students will learn soft skills related to the ability of presenting data and data analytics prototype to the broader audience represented by the healthcare actors. The students will interact directly with the healthcare providers during the lectures and the practical labs.

### Course objectives

The specific course objectives are:

#### *Expert*

The student is able to:

- Understand the different stakeholders that are involved in clinical decisions, data (re)usage, and the evaluation of digital technologies.
- Understand the lifecycle of a digital technology: from data, to impact and innovation and to surveillance / monitoring.
- Understand that digital technologies do not leave in a “vacuum”, but they should be associated with the different stakeholders
- Understand digital technologies as a medical device and place it in the context of clinical trials, European regulations, and clinical applicability.

#### *Investigator*

The student is able to:

- Evaluate stakeholders’ interests in multiple dimensions and propose improvements towards results or course of development.
- Understand the technical and operational barriers and facilitators for the introduction of digital technologies in healthcare

#### *Communicator*

The student is able to:

- Re-formulate a scientific piece of text into communication which is understandable for laymen, in the form of text and in the form of visuals.

### Recommended reading

● Pattern Classification, Hart, Peter E.; Stork, David G. ● Fundamentals of Clinical Data Science <http://www.clinicaldatasciencebook.com/> ● TRIPOD Guidelines: <https://www.acpjournals.org/doi/full/10.7326/M14-0698> ● Supervised Machine Learning: A Review of Classification Techniques, S. B. Kotsiantis ● Fundamentals of Data Visualization, Claus O. Wilke <https://clauswilke.com/dataviz/index.html> ● Machine Learning in Python: Main Developments and Technology Trends in Data Science, Machine Learning, and Artificial Intelligence S. Raschka , J. Patterson and C. Nolet

- J.P.A. van Soest

Teaching methods:

Assignment(s), Lecture(s), Work in subgroups, Paper(s), PBL

Assessment methods:

Assignment, Attendance, Written exam

Keywords:

Medical device, Data Management plan, Data quality, Digital technology, health technology assessment, big data

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## Digital Strategies For Disrupting Healthcare Systems

### Full course description

The module 'Digital Strategies for Disrupting Healthcare Systems' is the third module within the learning line Adoption of Digital Technology in Healthcare. In this module, students will zoom out to adopt a digital driven socio-technical systems perspective and learn how to design digital strategies for innovating systems delivering healthcare. This module builds on the learning of digital transformation (module 2) and sense-making by organisations and users (module 4) and extends this knowledge to an ecosystem level. The module is based on the fact that the disruptive and transformative nature of digital technologies blur traditional boundaries of organisations and individuals and disrupt the delivery of healthcare services. To take advantage of these opportunities, students need to develop a wider perspective, i.e., of the entire ecosystems, in which new actors might appear or existing relationships erode, and reimagine the ways of organising health services.

Digital technologies offer novel opportunities for intertwining healthcare organisations but also for involving patients in care processes and in the workflow, enabling horizontal and feedback coordination. Machines are replacing professionals in routine and non-routine work and new types of health professions are emerging. To fully exploit these opportunities, organised systems in healthcare must be able to cope with these technical features by optimising technical and social features.

The module employs design theory of socio-technical systems to integrate both social and technical aspects, resulting in more effectively digital driven organised systems. Digitalization is ambivalent with regard to management and decision-making capability. On the one hand, digital technology allows for systematic monitoring and power-related control; on the other hand, they allow for decentralised decision-making and trust-based control. Considering these trade-offs, the module 'Digital Strategies for Disrupting Healthcare Systems' enables students to develop digital strategies for disrupting healthcare delivery systems. For strategy development, students adopt the role of an

actor such as a hospital provider, medical equipment or a start-up and develop strategic options to operate in the ecosystem. Role plays of board room decisions facilitate learning about resources, capabilities, customer value propositions, revenue streams, policy changes, competitors and partners and their implications for decision making.

## Course objectives

### The specific course objectives are:

#### *Expert:*

The student is able to:

- Identify and discuss different stakeholders, their capabilities and potential conflicts as well as their interaction within the healthcare ecosystem.
- Understand the concept of corporate culture and its importance for digital health.
- Understand and use knowledge on potential organisational structures (e.g., platform economy) and newly established roles for the successful transformation into a digital healthcare organisation.
- Recognize the role of top management for developing a digital strategy and transforming the healthcare organisation.
- Describe how the co-creation process can guide the innovation management within (digital) health organisations.

#### *Investigator*

The student is able to:

- Evaluate and consider different stakeholder perspectives when developing a digital innovation strategy.

## Recommended reading

● Hovenga, Evelyn (2022), "Transforming Health Care," in: Roadmap to Successful Digital Health Ecosystems, Evelyn Hovenga and Heather Grain (eds.), 1st ed., 1-16, Cambridge, MA: Academic Press. <https://doi.org/10.1016/C2020-0-00424-X> ● Schiavone, Francesco, Daniela Mancini, Daniele Leone, Domenica Lavorato (2021), "Digital Business Models and Ridesharing for Value Co-creation in Healthcare: A Multi-stakeholder Ecosystem Analysis," Technological Forecasting & Social Change, 166 (2021), 120647. <https://doi.org/10.1016/j.techfore.2021.120647> ● Blumenthal, David (2017), "The Critical Skills for Leading Major Change in America's Health System," Harvard Business Review. <https://hbr.org/2017/10/the-critical-skills-for-leading-major-change-in-americas-health-system> ● Pedersen, Carsten Lund (2022), "Cracking the Culture Code for Successful Digital Transformation," MIT Sloan Management Review. <https://sloanreview.mit.edu/article/cracking-the-culture-code-for-successful-digital-transformation/> ● Lobschat, Lara, Benjamin Mueller, Felix Eggers, Laura Brandimarte, Sarah Diefenbach, Mirja Kroschke, and Jochen Wirtz (2021), "Corporate Digital Responsibility," Journal of Business Research, 122, 875-888. <https://doi.org/10.1016/j.jbusres.2019.10.006>

HDT4007

Period 4

3 Feb 2025

4 Apr 2025

[Print course description](#)

ECTS credits:

3.0

Instruction language:

English

Coordinator:

- [L.C. Lobschat](#)

Teaching methods:

Assignment(s), Lecture(s), Work in subgroups, Paper(s), PBL, Presentation(s), Working visit(s)

Assessment methods:

Assignment, Attendance, Written exam

Keywords:

Digital Ecosystems, Digital Business Models, Policy making, Corporate digital responsibility, leadership, strategy

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## Placement and Thesis

### Full course description

During the final stage of the program, master students will execute an individual master thesis research project. The research is executed according to the research proposal that is written during module 5 'Research Methods and thesis preparation'. During the research project, the student will collect and analyse data (qualitative, quantitative or both), draw conclusions and report on the research findings by writing an individual master thesis. As a general rule, full-time master students execute their thesis research project from April to July, part-time students from April to July in year 1 and in year 2.

For their research proposal and thesis project, and in consultation with their thesis supervisor and the placement coordinator, students can select their own topic, provided that the chosen topic fits with one or more key topics of the master program. In addition, the students can select the theory, design and research methods from a range of accepted approaches. The thesis must be written according to the guidelines that are determined by the Faculty Education Office (see Student Portal).

### Course objectives

The specific course objectives are:

*Expert:*

The student is able to;

- Integrate research methodologies and research designs in research proposals common in the fields of the master program.
- Integrate methods for data collection and data analysis in research proposals common in the fields of the master program.

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- Report research results and discuss the results in the view of existing theories, previous research and policy and practice.

### *Investigator:*

The student is able to;

- Use knowledge of theories and issues from other units to execute the master thesis research project and to write the master thesis.
- (Further) Develop a problem statement, a theoretical framework, the research methodology and research methods for their master thesis research project.
- Execute the thesis project and write the master thesis according to the requirements determined by the FHML.

*After having completed the thesis project, the student is able to:*

- Have a scientific attitude and judgement
- Critically assess the strengths and weaknesses of the applied theory and research methods as well as the quality of the conducted research and relevant ethics aspects.
- Form opinions about the proper use of theory and research methods.
- Communicate and present research results effectively by discussing theory and research methods, and by writing a master thesis.
- Conduct research and to write a research report, as well as to lead and manage their master thesis research project.

## Recommended reading

● Creswell J.W. & Creswell J.D. 2018. Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. 5th edition. Sage Publications Inc. ● Guthrie, G. 2010. Basic Research Methods: An Entry to Social Science Research. New Delhi, India: Sage Publications. E-book Accession Number: 340339. ● Ross, T. 2012. A Survival Guide for Health Research Methods. Maidenhead: McGrawHill Education. E-book Accession Number: 442876. ● Cals, J. W., & Kotz, D. 2013. Effective writing and publishing scientific papers, part I-III, VII-VIII. J Clin Epidemiol, 66(6), 585. ● Liberati, A. et al. 2009. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. Journal of Clinical Epidemiology, 62(10):e1-34. ● Hsieh, H.F. and Shannon, S.E. 2005. Three approaches to qualitative content analysis. Qualitative Health Research, 15(9): 1277-1288. ● Creswell J.W. & Plano Clark V.L. 2017. Designing and Conducting Mixed Methods Research. 3rd edition. Sage Publications Inc.

HDT4051

Period 5

7 Apr 2025

4 Jul 2025

[Print course description](#)

ECTS credits:

18.0

Instruction language:

English

Coordinator:

- [J.G.E. Verbeek](#)

Teaching methods:

Assignment(s), Work in subgroups, Paper(s), Research

Assessment methods:

Attendance, Final paper, Participation, Portfolio

Keywords:

research proposal, Thesis, Scientific writing, executing (literature) research

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## Interdisciplinary Project

### Full course description

During period 1, 2 and 4 HDT students will work on a module overarching interdisciplinary project in parallel to ongoing modules. Within this project they work for a longer period of time (24 weeks) in groups of 3-4 students on authentic cases within learning communities and living labs of healthcare institutions, the industry or research institutes. By means of these authentic cases, students build upon the knowledge and skills they have acquired in the modules and put these into practice.

The authentic cases within the learning communities and living labs all address interdisciplinary challenges related to a (data-driven) digital technology in healthcare. By working on these assignments, students will learn how to actually apply the technical knowledge (learning line 1) as well as the frameworks and models for digital technology adoption and implementation (learning line 2). Students will learn to collaborate in teams and communicate effectively towards different stakeholders. In addition, they will learn how project findings can be disseminated and shared in a comprehensive way to the proper audience. In doing all this, the module overarching interdisciplinary project aims to prepare students in practice for an interdisciplinary professional career as bridge builder.

The project will be accompanied by supporting practical training covering different topics, including programming in Python, design thinking, co-creation, project management, business modelling, and stakeholder communication and engagement. Students have to reflect on their strengths and weaknesses and report on their progress on the development of the competencies in a portfolio, using multi-source feedback.

### Course objectives

The specific project objectives are:

#### Expert

The student shows to:

- Apply theories and frameworks related to health(care) and to technology and data science to their project assignment and can readily apply this in the correct context as a bridge-builder between these fields;
- Conduct a project assignment within a healthcare organization, research, institute or industry bridging the gap between healthcare and digital technology and data science to improve health and access to healthcare for clients/patients;
- Take into account the role of culture for a successful digital health innovation;

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- Apply the regulatory framework (national vs. international) with respect to data and technology;
- Consider ethical challenges arising from conducting their project assignment.

### **Investigator**

The student shows to:

- Formulate research question(s) that align with the assignment;
- Choose and describe the appropriate research approach and appropriate measurements/instruments to assess the formulated research question(s);
- Apply existing norms and guidelines and their application for digital innovations in conducting the assignment;
- Evaluate critically which facilitates the digital innovation of the assignment;
- Evaluate and consider different stakeholder perspectives when conducting an assignment;
- Apply co-creation techniques to gain insight into different interests of stakeholders.

### **Communicator**

The student shows to:

- Play in their project a bridge builder role in communication and cooperation between the domains of health, data science, information technology and between healthcare professionals, clients/patients within the organization;
- Clearly formulate and justify the project decisions when conducting the project;
- Unite different stakeholders using appropriate and understandable language;
- Possesses excellent communication skills in spoken and written language with fellow experts, stakeholders, laymen and other third parties about elements of, developments within and research concerning the project.
- Bridge between different perspectives using appropriate matters of communication;
- Convince different stakeholders with well-founded and appropriately formulated arguments;
- Establishes effective relationships and networks, including interdisciplinary and intercultural relationships and networks, with data scientists, healthcare professionals, IT experts, lawyers, managers, administrators, clients/patients and other parties and shows to tailor the form of communication to the receiver;
- Take the lead in project to take decisions in an effective manner in collegial, interdisciplinary and intercultural partnerships;
- Respect and account for social and cultural diversity in written and oral communication.

### **Professional**

The student shows to:

- Be aware of personal learning objectives, strengths, weaknesses, values and beliefs and biases, including the ability to reflect on these and adapt them where necessary;
- Integrate an attitude of life-long learning and knows how to act upon this, meaning knowing what is required and where this can be learned;
- Use the acquired skills in the field of health and digital transformation throughout the professional life.



## **Recommended reading**

Depends on the project and will be provided by the hosting organisation.

HDT4050

Year

2 Sep 2024

4 Apr 2025

[Print course description](#)

ECTS credits:

18.0

Instruction language:

English

Coordinator:

- L.M.J. Hochstenbach

Teaching methods:

Assignment(s), Lecture(s), Work in subgroups, Paper(s), PBL, Presentation(s), Research, Training(s), Working visit(s)

Assessment methods:

Attendance, Final paper, Portfolio

Keywords:

collaboration, communication, design-thinking, training, lifelong learning.