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Bronvermelding is verplicht.
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Minor Big Data & Design



All these inspiring quotes cast in a delft blue design were created by ChatGPT. and show the power of Big data & Design and the importance of this minor.

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1 Introduction

Welcome in the Minor Big Data & Design!

Data is everywhere! Consider, for example, how you travel with your travel card, how you gain insight into your energy consumption, the data you collect when you register your favorite run or how Netflix makes your recommendations for an evening of binge watching. The data that is then collected is called Big Data.

By analyzing this big data with smart techniques, it is possible to automatically create personal profiles, determine the emotions of readers/viewers and make predictions about their actions. Thanks to new technologies, we can now do this even better than the human brain could do. All this affects the design of applications and user interfaces, which become more sophisticated every day. We can use big data to predict what users want, automatically adapt to their preferences, and create a more natural way of interaction (for example via chat or voice). However, it often remains a challenge to use data properly and design valuable new perspectives.

That is exactly what we want to achieve with the Minor Big Data and Design. We want you to understand the power of big data, develop a critical view of its influence, and use the knowledge you gain to design and develop smart data-driven and user-friendly applications.

1.1 Learning outcomes

During this 30 ECTS programme you learn how to use big data and design products and services to improve user experiences and communicate the resulting information effectively to the people who need it. You will learn to:

1. Critically examine the impact of big data on our society and deploy your expertise for a sustainable society.
2. Use design research to create innovative data-driven concepts.
3. Collect, clean, analyse and visualise data from various sources through tools and basic programming.
4. Create and communicate insights, predictions and actions from data using basic machine learning techniques and statistics.
5. Learn new skills and methods within design research and data science, using a self-directed, experimental, inquisitive learning style.

During the Minor we will work based on your personal interest and motivations to design with big data with the focus on current technologies and looking at future possibilities from a design, technical and ethical point of view. Besides offering practical lessons and workshops, we try to respond as much as possible to your specific questions and what motivates you to learn more about big data and design.

2 Curriculum

2.1 Structure of the minor

To achieve the learning outcomes of this minor, we work in 3 blocks spread over 20 weeks, in addition to a kick-off week and an assessment week. Each block has weekly in-depth lessons and ends with a Design crunch and a feedback week. During the Design crunch you show what you have learned in that block by developing your own research, work for real clients and ultimately even your own start-up idea. Each last week of a block is a feedback week in which you collect feedback, feed up and feedforward to find out in which areas of big data and design you can still improve (see diagram figure 1).

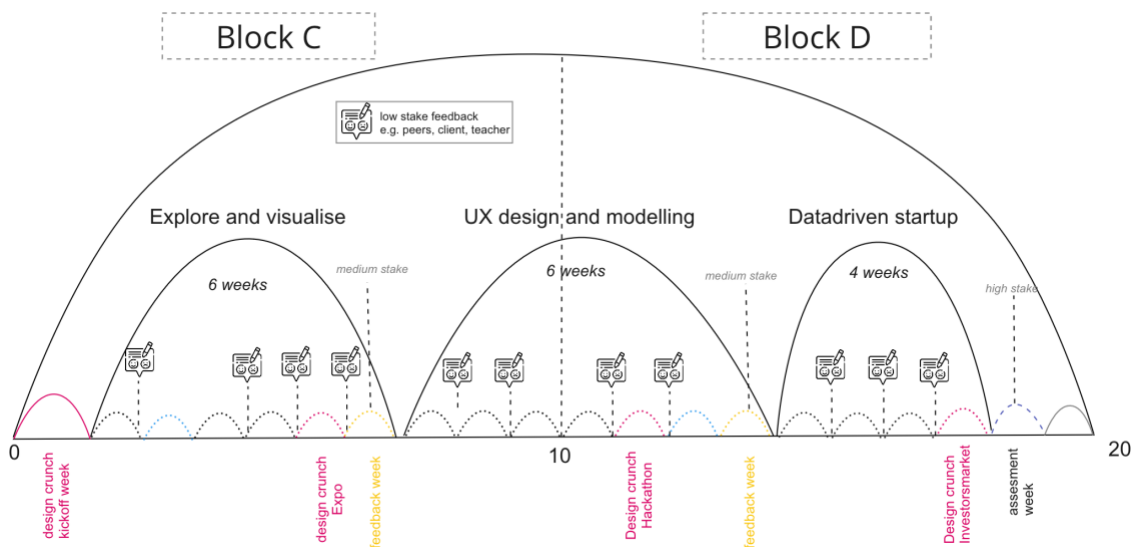


Figure 1 Overview of the minor

2.2 Learning from feedback

In this minor we focus on the entire development of your learning process instead of continuous assessing you. This means that you will only receive a final grade at the end of the minor. During the minor we emphasize the learning outcomes as described in chapter 1.1 and leave it up to you to develop yourself as a professional in the field of Big Data & Design. That's why it's important that you show initiative from day one to collect feedback, so that you can demonstrate what your starting point was at the beginning of the minor, and what steps you have taken to improve yourself. It is also important that you can reflect properly, and act based on the collected feedback that you have received from teachers, fellow students, and professionals in the field. Sometimes you receive feedback on assignments yourself, and sometimes you have to collect it yourself.

2.3 Low, medium, and high-stake feedback

During the minor you work on weekly assignments about which (if you have submitted them on time) you will receive oral or written feedback. Sometimes for teachers, and sometimes from a fellow student. Based on the feedback, you will find out what is going well and where your areas for improvement lie. We call these weekly feedback moments **low-stake feedback**. In addition to low-stake feedback, there are also two **medium-stake feedback** moments. These 'medium stake' feedback moments take place during the feedback weeks at the end of each block. Here you submit a reflection report in which you describe what you have learned and what you would still like to learn. Next to the reflection, you will have a conversation in which your progress is discussed with the teachers and fellow students. This medium-stake moment is an important moment in which you gain insight into how you move towards the learning outcomes of the minor.

The **high-stakes assessment** takes place in week 19, during which you demonstrate through your portfolio and an assessment interview that you have achieved the learning outcomes of the minor. The procedure and conditions for the assessment are described later in this manual.

2.4 Classes

Per block you should expect 9 to 12 hours of lessons spread over three days. The design crunches and feedback weeks are scheduled differently, you will receive information about them in due course.

Design class

Since we focus on data-driven concepts and smart applications in these classes, you will need to gain some elementary design skills. Learn to research similar projects, users, and the context, prototyping your ideas, testing with users and other stakeholders, a Human Centered approach. You will also learn to understand data from multiple perspectives (economical, philosophical, and ethical) and form your own opinion by reading relevant literature, having discussions, and attending workshops. Research is also important in this minor, starting from data informed research and ending with research through design.

Tech class

In these classes you will learn to work with Python to collect, analyze and visualize data using various algorithms, tools, and techniques. From block you will learn to make predictions based on data and explore more advanced technologies such as facial recognition, object detection and language processing.

Combined class (research lab)

Both the technical, and the design teacher are present in these lessons. Here you can continue working on your research and assignments and delve deeper into the tools to get to know the domain of big data and design better.

2.1 Presence

It is not mandatory to be present. You must always be able to show the results of (interim) assignments to the teacher. The assignments are provided and explained during lessons. You will also work on it during class, and you will receive oral feedback, it is therefore important to be present in all lessons. If you are unable to be present, sign off by e-mail. Make sure that you receive missing information through a fellow student.

2.2 Program

The lessons consist of three times three hours, with two teachers guiding you, giving workshops and lectures. We also have separate weeks for a kick-off, feedback, design crunches and assessments. In week 13 we participate in the Hackathon, a mandatory part of the minor in which you will answer a data and design issue for a real client. The schedule below provides an overview of the 20 weeks during the minor.

Week	Subject
1	Kick off project: <i>develop a new dating app for generation Z</i>
2	During the combined lessons you will work on organizing a workshop on an emerging technology. You will also conduct research into your own chosen topic and create a data story (webpage, dashboard, animation, poster, video, etc.) in which you demonstrate that you can look critically at the impact of data, and that you can analyze and analyse data in Python.
3 (self-study)	
4	
5	
6	Design Crunch 1: Expo of your data story and research
7	Feedback week
8	Learn to build and design data-driven applications. During the design lessons you will learn more about UX research, and in the technology lessons you will learn the basic principles of machine learning. In addition to research and classroom discussion, it also requires a lot of practice and application.
9	
10	
11	
12	Design Crunch 2: Hackathon assignment for a real client
13 (self-study)	No class
14	Feedback week
15	In this final block of the Minor you will work in groups to design and develop your own innovative data-driven application based on everything you have learned in previous blocks.
16	
17	
18	Design Crunch 3: Investors market (Dragon's den) in which you present your data-driven startup.
19	Assessment week
20	No class

For the weekly schedule of all courses, visit mijnrooster.hu.nl. The schedule may sometimes change based on developments during the course and/or availability of teachers.

2.3 Self guided learning

In addition to the 9 to 12 hours of lessons, you should count on approximately 24-28 hours of self-study. You are encouraged to explore further topics important to developing stronger technical and design skills. The teachers will guide you in this by referring you to online teaching materials, but it also requires independence and commitment from you. If you have difficulty with this, please let your teacher know so that we can guide you.

2.4 A sustainable Minor

The Minor Big Data & Design has been designated as a sustainable minor by the [Green office](#) of Utrecht University of Applied Sciences. This means that as a minor we want to contribute to the UN Sustainable Development Goals (figure 2). We do this, among other things, by highlighting ecological, social and

economic sustainability issues in our assignments. In doing so, we hope to enable you to make the necessary transformation towards a world with less inequality and more attention to biodiversity and climate.



Figure 2 De 17 The U.N. sustainable development goals.

2.1 Ground rules

Finally, we find it important to share several ground rules. This minor is intended for people with different experiences and skills. It is important that we create a learning environment in which there is room for everyone. This not only applies to study background, but also to sexuality, ethnic background, age, religion, or gender. To ensure this, both students and teachers are expected to avoid behaviour and language that is considered discriminatory, racist, sexist, homophobic, or transphobic. We do not tolerate any form of hate speech, including freedom of expression or critical thinking exercises.

3 Assessment

The minor is assessed with an assessment in week 19. The assessment consists of **two portfolios** and one **assessment interview**.

- In the **Design portfolio** you describe how you have developed yourself based on the Design learning outcomes of the Minor.
- In the **Technical portfolio** you describe how you have developed yourself based on the Technical learning outcomes of the Minor.
- During the assessment interview you have the opportunity to discuss in more detail what you have learned during the minor with both a design and tech teacher present.

The final grade is calculated based on an average of the three parts from the rubric (see appendix 5.1 and appendix 5.2). Grades are given in whole points according to the following format:

Number of I, P en E*	Margin final grade
III, IIP, IPP, IPE (111,112,122,123)	1 - 5
PPP (222)	6 - 7
PPE (223)	7 - 8
PEE, EEE (233, 333)	8 - 10

* The order of the I's, the P's and the E's is not important.

If all components are at least a pass, you will receive **20 ECTS** for the Design portfolio and **10 ECTS** for the Technical Portfolio.

3.1 Portfolio's

In preparation for the assessment the following is required:

- Both final portfolios (design and technical) are complete and submitted before the deadline.
- The rubrics for the assessments have been looked at (see appendix 5.1 and 5.2)
- You have summarized the given feedback and describe what you did to achieve the learning outcomes
- You have uploaded additional evidence via the appropriate submission box in Canvas
- Share your portfolios (technical and design) with your assessors.

3.2 Assessment interview

Participation in the assessment interview is mandatory and takes place in week 19 by a duo of two teachers according to the four-eyes principle. The pairs are familiar with the students' work because they worked in block 1 or block 2-3.

The basis for the conversations is the submitted portfolios, but you must also be able to hold a professional conversation and reflect on your work process during the Minor. The focus will also be on

the last 4 weeks in which you worked together in a group. The procedure for the assessment interview is as follow:

1. The student submits the portfolios on time via Canvas. If necessary, additional evidence can be uploaded to a separate drop box.
2. If submitted on time, the teacher will independently assess the portfolio (design and technical) using the rubric and note down salient issues and questions.
3. The assessment interview takes place according to the following format:

5-10 min: Student clearly indicates what he has learned in the field of data and UX. Please note that you are not describing what you did, but we mainly want you to look back on the underlying process of tasks related to the design and technical assignments.

5-10 min: Teachers and student have a conversation based on what the student has presented and what is described in the submitted portfolios.

4. After the assessment, the teachers decide whether the student has passed the minor.
5. The feedback is recorded in Canvas and the grades are entered into Osiris.

After the assessors have administratively processed the assessment in Osiris, you will receive a substantiation for the assessment in Canvas. The assessment will be completed within a maximum period of three working weeks, i.e. 15 working days (unless there are justified reasons for extending this period). Once the grade has been entered in Osiris, the assessment is final. If the feedback in the form is not clear, you can ask the teacher for an explanatory meeting.

3.3 Resit

When your design or technical portfolio is assessed as unsatisfactory, that part of the minor will have to be resit. The resit is a specific assignment aimed at the learning outcomes that have been assessed as insufficient. You have one opportunity per academic year to resit the assessment. You must register for this via Osiris. If you register for a resit but do not participate, you will lose a test opportunity in that academic year.

For questions about registering for the resit, please contact STIP (Student Information Point). Failure to submit and/or attend the assessment within the specified period means that the opportunity for an assessment has expired. If you have submitted your portfolios but do not meet the submission requirements, the assessment will be "failed" (NA) and you will miss the opportunity for an assessment. On Canvas you will find more information about how you can resit the assessment.

3.4 Objection

If you disagree with the assessment of your examiners, the first step is to discuss this with the examiners. If that interview does not provide you with sufficient clarity and you continue to disagree with the assessment, you can appeal within six weeks of the assessment. If you want to appeal against your assessment, the period starts from the moment the assessment is registered in Osiris. You must submit your appeal to the HU Student Legal Protection Desk. (EER §7.2) You can find out how to submit your appeal on Ask HU if you search for "Submit an appeal". The formal procedures are described in the Student Legal Protection Regulations, which can be found at www.reglementen.hu.nl.

4 Study essentials

4.1 What do you need for this Minor

A well-functioning laptop with an internet connection where you have administrator rights, so you can install programs yourself and with enough space to work with large data sets. Depending on the speed of your laptop, some analysis and data collection processes will be faster than others.

During the lessons we work with the Python programming language and Spyder IDE and Jupiter notebook as a development environment. Installation instructions are covered during the lessons. For the Design lessons it is useful to have text material with you. Think of a pen, pencil, notebook, and colored pencils, etc.

4.1 Digital learning environment

During this minor we will work with the following digital learning environments:

Canvas: On this platform (canvas.hu.nl/) you will find relevant course material for the minor. All information - about the assessment, assignments, portfolios, lecture preparations, what you need to read, watch or hand in - can be found on canvas.

Teams: Microsoft Teams is used Teams for communication with the class. All major announcements will be made via Teams. We also share the slides of the lessons here.

Datacamp: This is an online platform where you can practice and learn your programming skills. We will let you know which exercises you can do, but you are also encouraged to deepen your knowledge at your own pace.

4.2 Literature

We do not have a mandatory purchase of books for the minor. We do work with short articles that are shared via Canvas. Of course, we can also help you get started with interesting literature in the field of big data and design. Here is a list of books we find relevant:

- Norderman, L. (2023) Het spiegelpaleis van data (Bot Uitgevers)
- Vreekamp, L (2021) The art of AI (Van Duuren)
- Cukier, K., Schönberger, V., de Véricourt, F., Framers (Maven Publishing)

If you've made it this far through the manual, now's the time to reward you for reading through. The list below is an overview of interesting films, documentaries, and series about Big Data & Design for a fun night of binchwatch:

Descriptive analytics:

- Moneyball
- The imitation game
- A beautifull mind

Predictive analytics:

- Minority report
- 21
- The social dilemma

Artificial intelligence:

- Her
- Ex machina
- Black mirror
- Tegenlicht: de toekomst is fantastisch

4.3 Citations and use of source code

Finally, we would like to point out that citations in your documents should always follow APA guidelines.

See: <https://bibliotheek.hu.nl/en/support/quoting-sources/>

Additional rules for documents:

- Documents are neatly and logically organized.
- Documents include name, student number, page numbering and table of contents.

Additional rules for using code (technical portfolio):

- For the text of a Jupyter Notebook, cite sources in APA style and with references at the end.
- For the code, you are allowed to use and modify code fragments that you find on the internet (GitHub / StackOverflow). If you use large chunks of code (e.g. >10 lines), mention the sources (with URL) in the first lines of your code as comments.
- It is not permitted to copy entire programs or large parts of programs/notebooks. Although your work may be inspired by others, your work must contain an original research question and original data (unless otherwise discussed with your teacher).
- If you do not mention the hum or copy entire Notebooks or large parts of a Notebook, this may be considered an irregularity and may be labeled as plagiarism by the Examination Board.

5 Appendix 1: Rubrics

5.1 Rubric design portfolio

LEARNING OUTCOME	EXCELLENT	PASS	INSUFFICIENT
You are able to critically research the impact of data on our society and you can form your own vision from different theories about this subject.	<p>The impact of data on society has been studied into in-dept detail -----</p> <p>The student has a realistic and consistent vision on the impact of data on the society</p>	<p>The impact of data on society has been studied -----</p> <p>The student has a realistic vision on the impact of data on the society</p>	<p>The impact of data on society has not extensively been studied -----</p> <p>The student does not form a realistic vision on the impact of data on the society</p>
You can apply design research to create new innovative data-driven concepts using subject-specific theories showing that you have repeatedly tested and evaluated design choices according to the provided methods.	<p>The student knows how to apply and use the correct UX method to further develop the concept according to the relevant steps of the design process. -----</p> <p>The right methods were used at the right time to validate the design -----</p> <p>The data-driven concept has been developed through multiple interactions into a highly applicable and relevant solution to the problem</p>	<p>The student knows what UX methods to apply to gain valuable insights for developing the concept -----</p> <p>Various methods were used to validate the design (testing, prototyping and experimentation) -----</p> <p>The provided data-driven concepts are developed through multiple iterations</p>	<p>The student doesn't know how to apply relevant UX methods to gain valuable insights for developing the concept -----</p> <p>There is not enough variation inflicted on the used methods to validate the design (testing, prototyping and experimentation) -----</p> <p>The provided data-driven concepts are not enough developed through the use of iterations</p>
You have gained new design / UX skills by experimenting and deepening into theories and you know how to reflect on your learning process and are able to indicate how you have improved yourself.	<p>The student demonstrates an outstanding direction for their own learning process -----</p> <p>The student demonstrates progress with the help of feedback from teachers, peers and experts with great intent -----</p> <p>The student proactively takes responsibility for learning new design / UX skills and demonstrates to have gained very relevant new knowledge</p>	<p>The student demonstrates sufficient direction for their own learning process -----</p> <p>The student can demonstrate progress with the help of feedback from teachers, peers and experts -----</p> <p>The student proactively takes responsibility for learning new design / UX skills.</p>	<p>The student doesn't demonstrate sufficient direction for their own learning process -----</p> <p>The student is not able to demonstrate enough progress with the help of feedback from teachers, peers and experts -----</p> <p>The student didn't proactively enough took the responsibility for learning new design / UX skills.</p>

5.2 Rubric technical portfolio

LEARNING OUTCOME	EXCELLENT	PASS	INSUFFICIENT
You are able to collect, clean, analyze and visualize data from various sources using basic tools and well constructed programming scripts (Python).	<p>The student is able to write complex Python scripts and uses advanced tools to handle large amounts of data -----</p> <p>The supplied scripts are straightforward, well commented and written to minimise errors -----</p> <p>The provided scripts show that the student is highly capable to independently perform data collection, cleaning, analysis and visualisation</p>	<p>The student is able to use basic Python scripts and other basic tools to handle large amounts of data -----</p> <p>The supplied scripts are well constructed -----</p> <p>The provided scripts show that the student is sufficiently able to independently perform data collection, cleaning, analysis and visualisation</p>	<p>The student is not able to use basic Python scripts and other tools to handle large amounts of data -----</p> <p>The supplied scripts contains erros and are not well constructed -----</p> <p>The provided scripts show that the student is insufficiently able to individually perform data collection, cleaning, analysis and visualisation</p>
You can chose and build relevant basic machine learning techniques and statistics, to generate and communicate insights from the data.	<p>The machine learning techniques are well explored and the selected technique is the best option for situation -----</p> <p>The machine learning techniques used are highly relevant to gain insights from the data -----</p> <p>The machine learning insights are excellently communicated</p>	<p>The chosen machine learning techniques are appropriate for the right situation -----</p> <p>The machine learning techniques used are relevant to gain insights from the data -----</p> <p>The machine learning insights are well communicated</p>	<p>The machine learning techniques are inappropriate chosen for the applied situation -----</p> <p>The machine learning techniques used do not provide insights from the data -----</p> <p>The machine learning insights are not well communicated</p>
You have gained new data science skills by experimenting and developing algoritms from data and you know how to reflect on your learning process and are able to indicate how you have improved yourself.	<p>The student proactively takes responsibility for learning new data science skills and demonstrates to have gained very relevant new knowledge -----</p> <p>The student demonstrates an outstanding direction for their own learning process -----</p> <p>The student demonstrates tprogress with the help of feedback from teachers, peers and experts with great intent</p>	<p>"The student proactively takes responsibility for learning new data science skills -----</p> <p>The student demonstrates sufficient direction for their own learning process -----</p> <p>The student can demonstrate progress with the help of feedback from teachers, peers and experts</p>	<p>The student didn't proactively enough took the responsibility for learning new data science skills -----</p> <p>The student doesn't demonstrates sufficient direction for their own learning process -----</p> <p>The student is not able to demonstrate enough progress with the help of feedback from teachers, peers and experts</p>