

Introduction to Data Science & Machine Learning

Master's programme

Prof. Dr. Nils Strodthoff
Dr. Iva Bacic

06.10.2026



Master Data Science and Machine Learning



2-year English-taught interdisciplinary programme with many international students

Get to know, apply and develop state-of-the-art machine learning methods across a broad variety of different data modalities

Specialize in one of three areas of specialization (theoretical foundations, healthcare, hearing science) and learn how to address data-bound problems in these domains

Gain knowledge of ethical, legal and security-related boundaries

Develop expertise that is sustainable and relevant to society

The Schools & Departments/Institutes involved in the programme

- School VI Medicine and Health Sciences

- Department of Health Services Research
- Department of Psychology
- Department of Medical Physics & Acoustics
- Department of Human Medicine

- School II Computing Science, Business Administration, Economics, and Law

- Department of Computing Science

- School V Mathematics and Science

- Institute of Mathematics
- Institute of Physics
- Institute for Chemistry and Biology of the Marine Environment

Three areas of specialization

- Data Science and Machine Learning in Medicine and Health Care
- Data-driven Speech and Hearing Sciences
- Theoretical Foundations of Machine Learning in Mathematics and Natural Science

No need to worry about specialization choices right now, specialization modules start in semester 2.

Exemplary study plan for the specialisation „Data Science and Machine Learning in Medicine and Health Care“

Semester 1				
inf040 Introduction to Data Science (6 CP)	inf5408 Applied Deep Learning (6 CP)	gsw550 Interdisc. Lect. Series Data Science & Data Ethics (6 CP)	psy300 Statistical Learning (6 CP)	phy730 Machine Learning (6 CP)
Semester 2				
inf525 Medical Data Pipelines (6 CP)	inf5406 Medical Data Analysis with Deep Learning (6 CP)	inf527 Big Data Analytics and Clinical Decision Support (6 CP)	compulsory elective specialisation (6 CP)	compulsory elective core (6 CP)
Semester 3				
gsw575 Group project Data Science in Medicine and Healthcare (12 CP)		compulsory elective specialisation (6 CP)	compulsory elective specialisation (6 CP)	compulsory elective core (6 CP)
Semester 4				
Master thesis (30 CP)				

Exemplary study plan for the specialisation „Data-driven Speech and Hearing Sciences“

Semester 1				
inf040 Introduction to Data Science (6 CP)	inf5408 Applied Deep Learning (6 CP)	gsw550 Interdisc. Lect. Series Data Science & Data Ethics (6 CP)	psy300 Statistical Learning (6 CP)	phy730 Machine Learning (6 CP)
Semester 2				
phy605 Data Signal Processing (6 CP)	phy976 Algorithms for Speech Processing (6 CP)	compulsory elective specialisation (6 CP)	compulsory elective specialisation (6 CP)	compulsory elective core (6 CP)
Semester 3				
phy977 Group project Data-Driven Speech and Hearing Science (12 CP)		phy975 Hearing and Communication Acoustics (6 CP)	compulsory elective specialisation (6 CP)	compulsory elective core (6 CP)
Semester 4				
Master thesis (30 CP)				

Exemplary study plan for the specialisation „Theoretical Foundations of Machine Learning in Mathematics and Natural Science“

Semester 1				
inf040 Introduction to Data Science (6 CP)	inf5408 Applied Deep Learning (6 CP)	gsw550 Interdisc. Lect. Series Data Science & Data Ethics (6 CP)	psy300 Statistical Learning (6 CP)	phy730 Machine Learning (6 CP)
Semester 2				
compulsory elective specialisation (6 CP)	compulsory elective specialisation (6 CP)	additional compulsory elective core (6 CP)	compulsory elective core (6 CP)	compulsory elective core (6 CP)
Semester 3				
phy971 Group project Theoretical Foundations of Machine Learning in Mathematics and Natural Science (12 CP)		phy970 Theoretical Foudnations of Machine Learning and Data Science (6 CP)	compulsory elective specialisation (6 CP)	additional compulsory elective core (6 CP)
Semester 4				
Master thesis (30 CP)				

Compulsory modules (30 CP): 1st semester

Introduction to Data Science (6 CP)

Applied Deep Learning (6 CP)

Machine Learning (6 CP)

Statistical Learning (6 CP)

Interdisciplinary Lecture Series Data Science & Data Ethics (6 CP)



1. Semester schedule

	Monday	Tuesday	Wednesday	Thursday	Friday	
08:00						08:00
09:00						09:00
10:00				psy300 Statistical Learning: 6.07.300_L Lecture	gsw550 Interdisciplinary Lecture Series Data Science and Data Ethics: 6.07.550 Lecture	10:00
11:00						11:00
12:00	inf5408 Applied Deep Learning: 6.07.5408_E2 Exercise II	gsw550 Interdisciplinary Lecture Series Data Science and Data Ethics: 2.01.964 Seminar	phy730 Machine Learning: 5.04.4213 Lecture		inf5408 Applied Deep Learning: 6.07.5408_L Lecture	12:00
13:00						13:00
14:00	psy300 Statistical Learning: 6.07.300_S Seminar	inf040 Introduction to Data Science: 2.01.040 Lecture + Exercise		inf040 Introduction to Data Science: 2.01.040 Lecture + Exercise		14:00
15:00						15:00
16:00		phy730 Machine Learning: 5.04.4213 Exercise	inf5408 Applied Deep Learning: 6.07.5408_E1 Exercise I			16:00
17:00						17:00
18:00			in addition inf5408 Applied Deep Learning: BUT: wendensdax 12 -14 6.07.5408_E3 Exercise III	choose 1 exercise from inf5408		18:00
19:00						19:00

Compulsory elective modules (12 CP): 2nd & 3rd semester

Exploring Research Data Management (6 CP)

Trustworthy Machine Learning (6 CP)

Machine Learning II (6 CP)

Advanced Topics in Applied Deep Learning (6 CP)

Time Series Analysis (6 CP)

Introduction to IT-Security (6 KP)

Designing Explainable Artificial Intelligence (6 CP)

Applied AI- Multimodal-Multisensor Interfaces I: Foundations, User Modelling, and Common Modality Combination (3 KP)

Applied AI - Multimodal-Multisensor Interfaces III: Language Pro-cessing, Software, Commercialisation, and Emerging Directions (3 KP)

Internship (6 KP)

Current topics in Data Science and Machine Learning (6 CP)

Language courses (6 KP)

Specialisation in Data Science and Machine Learning in Medicine and Health Care: starting 2nd semester

Compulsory modules (30 CP)

Medical Data Pipelines (6 KP)

Medical Data Analysis with Deep Learning (6 CP)

Big Data Analytics and Clinical Decision Support (6 CP)

Group Project Data Science in Medicine and Healthcare (12 CP)

Compulsory elective modules (18 CP from the following)

Special Topics in 'Medical Informatics' II (6 CP)

Medical Technology (6 CP)

Medical Basics (6 CP)

Bioinformatics & Omics (6 CP)

Current Topics in Data Science in Medicine and Healthcare (6 CP)

Specialisation in Data-Driven Speech and Hearing Sciences: starting 2nd semester

Compulsory modules (30 CP)

Digital Signal Processing (6 CP)

Hearing and Communication Acoustics (6 CP)

Algorithms for Speech Processing (6 CP)

Group Project Data-Driven Speech and Hearing Sciences (12 CP)

Compulsory elective modules (18 CP from the following)

Information Processing and Communication (6 CP)

Introduction to Neurophysics (6 CP)

Processing and Analysis of Biomedical Data (6 CP)

Human Computer Interaction (6 CP)

Current Topics in Data-Driven Speech and Hearing Sciences (6 CP)

Specialisation in Theoretical Foundations of Machine Learning in Mathematics and Natural Sciences: starting 2nd semester

Compulsory modules (18 CP)

Theoretical Foundations of Machine Learning and Data Science (6 CP)

Group Project Theoretical Foundations of Machine Learning in Maths and Natural Sciences (12 CP)

Compulsory elective modules (18 CP from the following + additional 12 CP from the core area)

Mathematical Foundations of Statistical Learning (6 CP)

Introduction to Numerical Methods for Partial Differential Equations (6 CP)

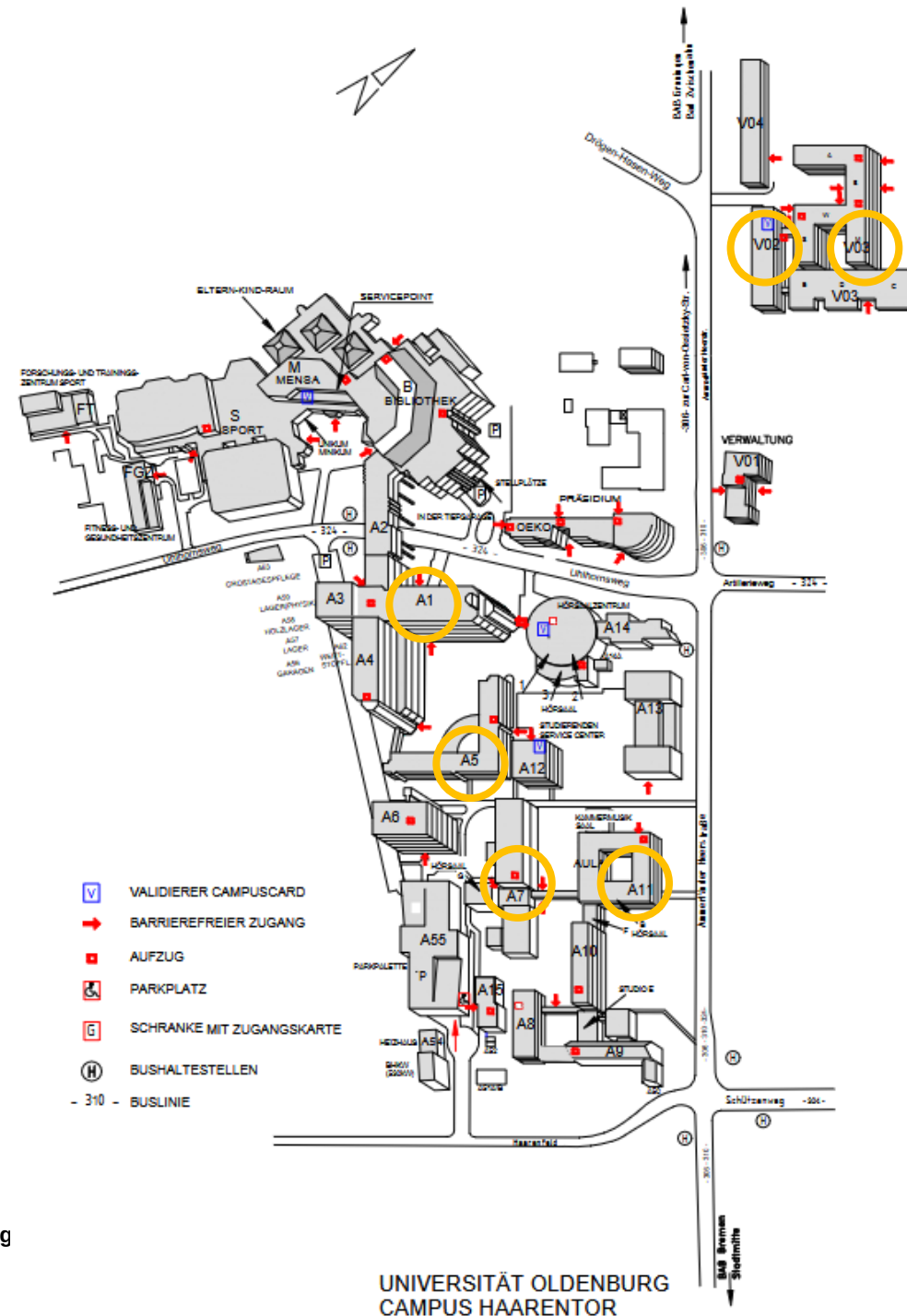
Computational Physics (6 CP)

Modelling of Complex Systems (6 CP)

Current Topics in Theoretical Foundations of Machine Learning in Mathematics and Natural Sciences (6 CP)

Information Processing and Communication (6 CP)

Campus Haarentor



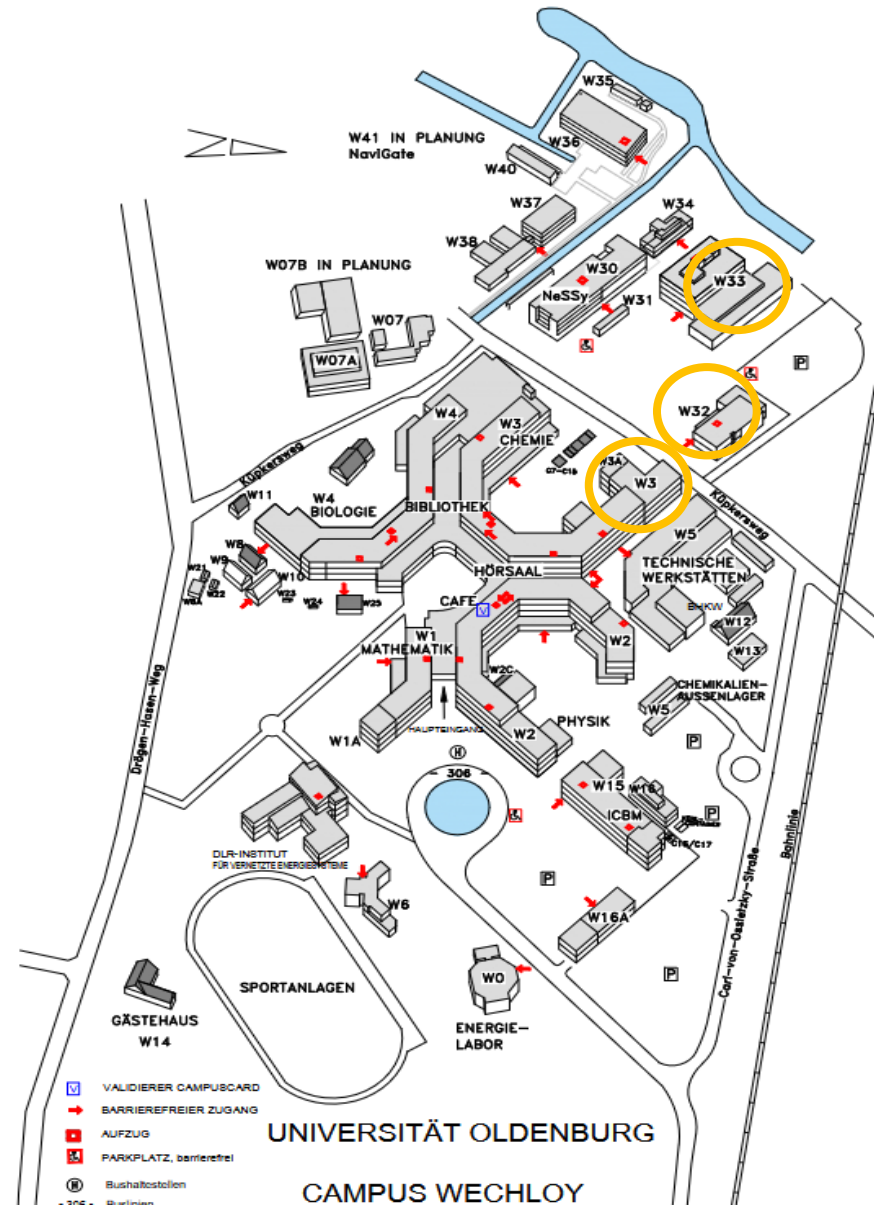


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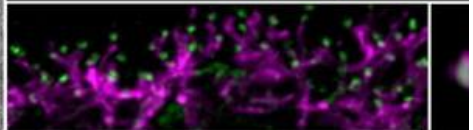
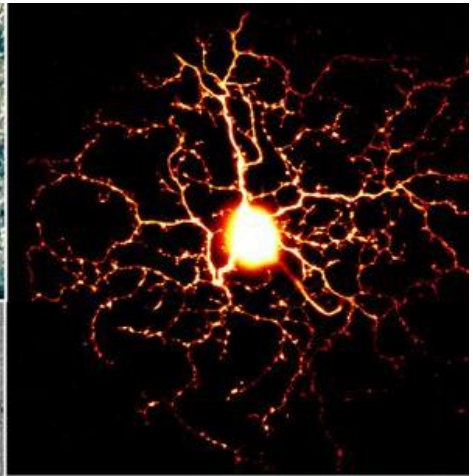
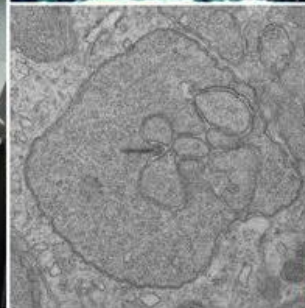
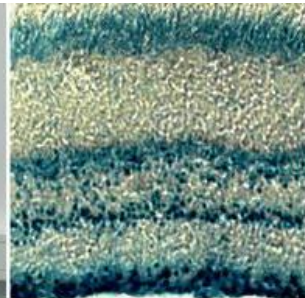
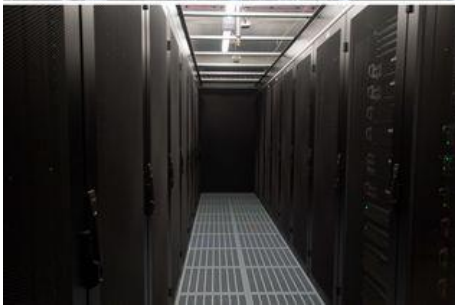
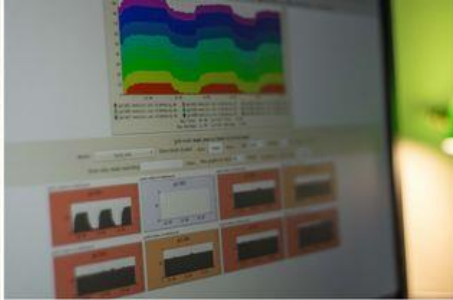




W e c h l o y







Organizational Topics

Dr. Iva Bacic

*Read the information package for new students,
the module handbook and examination regulations*

General Issues

The module:

A module is a thematic building block of your degree. It is a package that usually bundles multiple courses.

Every module is worth a fixed number of credit points (usually 6 CP). These points measure your total workload, including classroom time and self-study: 1 CP represents a workload of about 30 hours.

The courses:

Within a single module, you will encounter different types of classes:

Lectures, exercises (tutorials), seminar, practical/lab courses.

Register in Stud.IP to participate in a course: <https://elearning.uni-oldenburg.de/>



The exams:

You only pass a module and receive the credit points once you have successfully completed all associated courses and assessments and passed the exams assigned to the module.

Registering for a course in Stud.IP does not automatically register you for the exam (this has to be done in EXA)! (More information about this will be available on Friday.)

Individual study plans can be generated in StudIP

Stud.IP Uni Oldenburg

Support Webmail What are you looking for?

Start Courses **Work place** My Campus Messages Community Profile Planner Search Admin Modules Notice board Campus Examination administration Thesis topics

Overview Courseware Files Announcements Questionnaire Evaluations Tasks Diploma Supplement Meine Blogs URL Shortener Chargeable courses **Studienverlaufsplan**

Studienverlaufsplan

Overview
Platzhalter Module

Actions

Plan bearbeiten
Plan exportieren

Study plan

Title Example Neurocognitive Psychology

Description

Notes

Studienbeginn in Wintersemester 2023/2024

Credit points 120

Semester	1	2	3	4	5	6
6 Sem. (0 KPs)						
5 Sem. (0 KPs)						
4 Sem. (36 KPs)	psy181 - Neurocognition KP: 6	mam - Master's Degree Module KP: 30				
3 Sem. (33 KPs)	psy141 - Minor KP: 6	psy181 - Neurocognition KP: 6	psy210 - Applied Cognitive Psychology KP: 6	psy251 - Internship KP: 12	psy260 - Practical project KP: 9	
2 Sem. (27 KPs)	psy112 - Research methods II - Statistics KP: 6	psy126 - Test Theory and Test Construction KP: 6	psy240 - Computation in Neuroscience KP: 9	psy170 - Neurophysiology KP: 6	psy210 - Applied Cognitive Psychology KP: 6	
1 Sem. (24 KPs)	psy111 - Research methods I - Statistics KP: 6	psy125 - Neuropsychological Diagnostics KP: 6	psy240 - Computation in Neuroscience KP: 9	psy130 - Communication of scientific results KP: 6	psy170 - Neurophysiology KP: 6	psy201 - Neuropsychology KP: 6

The course website (for all important information)



<https://uol.de/en/dsml>

You will find important information, w.g. :

- Course organisation
- Supporting resources for acquiring entry-level and baseline skills: Mathematics and Python

Introduction Master Data Science and Machine Learning

Research Master

FAQ

Information for applicants and students

Contact

If you have any questions about your studies:

Prof. Dr. Nils Strodthoff

dsml@uol.de

Download

Course flyer

Application form (specific eligibility form)

Module handbook

You can find the module descriptions and the offered courses directly in the campus management system Stud.IP. You can also download a PDF version of the module handbook.

→ [Module descriptions and offered courses](#)

Facts and Data

- Duration: 4 semesters
- Degree Award: Master of Science
- Language: English
- admission limited (30 students/year)
- Special admission requirements

Languages: All modules are taught in English.

Official university information about the Data Science and Machine Learning programme:

Data Science and Machine Learning M.Sc.



photo collage: iStock and University of Oldenburg

The new Data Science and Machine Learning programme concentrates on data science research activities with a focus on life and natural sciences, including medicine.

Students in the programme acquire professional and interdisciplinary skills to meet the challenges of digital transformation in society and at the university. They master the methodological foundations of complex data analysis with a strong focus on machine learning methods and develop a comprehensive understanding of developing, implementing, and analysing data-driven algorithms on both technical and conceptual levels. The programme enables students to gain specific expertise in applying analytical methods across three specialization areas and effectively communicate insights to domain experts. We offer the following three specializations:

- 'Theoretical Foundations of Machine Learning in Mathematics and Natural Sciences'
- 'Data Science and Machine Learning in Medicine and Health Care'
- 'Data-Driven Speech and Hearing Sciences'

Students will experience a high proportion of guided but independent research directly in the laboratories of the university.

Welcome aboard new first-year students!

Reasons to study Data Science and Machine Learning

Goals of the study programme

Career perspectives

Course organisation

Study plans

Additional admission requirement: statistics and/or algorithms

- Admission is conditional! See your acceptance letter. If you do not pass the exam(s) until 30 September 2027, you will not be allowed to continue your studies.
- Statistics:



- You have to pass Introductory Course Statistics in addition to the standard curriculum.
- If you missed the course, study the contents in a self-study. It will not be offered in the summer term.

- Contact Andrea Hildebrandt and let her know that you have a conditional admission and need to pass the Introductory Course Statistics: andrea.hildebrandt@uol.de



Additional admission requirement: statistics and/or algorithms

- Admission is conditional! See your acceptance letter. If you do not pass the exam(s) until 30 September 2027, you will not be allowed to continue your studies.

- Algorithms:



- You have to pass module inf962 in addition to the standard curriculum.
- Winter term: Lecture: Monday 10-12, room A04 2-221 & Wednesday 14-16, room A04 2-221



- Tutorials Tuesday 8-10, room A04 2-221 or
Tutorials Thursday 8-10, room A03 4-403

- Contact Ute Vogel-Sonnenschein: ute.vogel@uol.de



How can I learn German and do I have to?

- No German needed for study programme, but
- Social and work life (outside university labs) in Germany is in German. German classes at the language centre:
 - During semester (registration for winter term has already passed!)
 - In semester break as intensive course
 - Count towards your electives: Module gsw565 language courses (6 CP)



Housing issues?



- ACCOMMODATION SUPPORT: International Office
 - As every year, the search for accommodation is extremely difficult. We cannot change the situation, but we can provide information, provide tips and assistance in finding accommodation, generally listen to students and prevent false expectations.
 - Weekly sessions, every Friday 18-20h until 13.11.
online: <https://meeting.uol.de/rooms/nq6-sjk-m27-wo8/join>
 - For immediate help: The AStA offers short term housing options for the beginning:
wohnen@asta-oldenburg.de

disadvantage compensation („Nachteilsausgleich“)

- Students with disadvantages can request individual compensations
- <https://uol.de/en/autonomous-office-for-students-with-a-disability-or-chronic-illness/nachteilsausgleich>
- Request compensation formally via examinations office well in time



To whom do I address my questions?

Iva Bacic dsml@uol.de

General programme-related questions



Nils Strodthoff nils.strodthoff@uol.de & **Antje Wulff** antje.wulff@uol.de

study advice Data Science and Machine Learning in Medicine and Health Care

Gerald Enzner gerald.enzner@uol.de & **Bernd Meyer** bernd.meyer@uol.de

study advice Data-driven Speech and Hearing Sciences

Peter Ruckdeschel peter.ruckdeschel@uol.de & **Alexander Hartmann** alexander.hartmann@uol.de

study advice Theoretical Foundations of Machine Learning in Mathematics and Natural Science

examinations office via contact form
examination matters



registrar's office (via study@uol.de)

Admission, registration, semester ticket

the lecturers

Issues with courses

Welcome Service at International Office welcome@uol.de

Issues for international students

Introduction Master Data Science and Machine Learning



Programme Orientation Week 2026

	Monday 05.10.2026	Tuesday 06.10.2026	Wednesday 07.10.2026	Thursday 08.10.2026	Friday 09.10.2026
9:00 AM	Orientation Week Welcome Event (CvO UOL) - official welcome event - Infomarket Time: 9 am Location: Campus Haarentor				
10:00 AM					Introduction to Stud.IP + further information and support Time: 10 am Location: tba
11:00 AM					Lunch together Time: 12 am Location: Mensa, Campus Wechloy
12:00 PM					
1:00 PM		Introduction to M.Sc. Data Science and Machine Learning Time: 2 pm Location: V03 0-E005 and online via: https://meeting.uol.de/rooms/iol-x2c-kvy-zkp/join			
2:00 PM					
3:00 PM					
4:00 PM					
5:00 PM	Campus Tour Wechloy Time: 5 pm Location: Bus stop "Uni / Campus Wechloy"		City rallye - get to know Oldenburg Time: 4:30 pm Location: Julius-Mosen-Platz	PCR: Pizza, chat, relax - get to know your fellow students Time: 4 pm Location: Campus Wechloy, BBQ-place	
6:00 PM	Game evening - Get together, games, snacks Time: 6 pm Location: tba				Bar evening Time: 6:30 pm Location: Bar "Karin's Kneipe"
evening					

Gender equality officers of Faculty VI

We...

– are a team of elected representatives of all status groups of Faculty VI



Gesine Buurman
WM
Department of Health
Services Research



Vanessa Delfs
WM
Department of
Human Medicine



Anne Depping
MTV
Klinikum/Faculty VI



Nina Gaßmann
MTV
Department of
Neuroscience



Cornelia Kranczioch
WM
Department of
Psychology



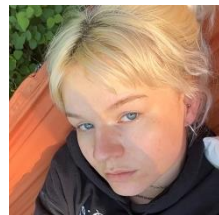
Milena von Kutzleben
WM
Department of Health
Services Research



Janina Leyk
MTV
Faculty VI Office



Esther Maier
WM
Department of
Human Medicine



Ricarda Reinersmann
Student
Medicine



Lena Schell-Majoor
WM
Department of
Medical Physics and
Acoustics



Judith Specht
Student
Medicine



Jasmina Sterz
Professor
Department of
Human Medicine



Verena Uslar
WM
Department of
Human Medicine



We...

- are a team of elected representatives of all status groups of Faculty VI.
- ***promote and support you*** with all issues relating to gender equality,
 - e.g. work-life balance, gender discrimination, sexualized discrimination and violence / sexual harassment, use of discriminatory language, ...
- provide ***confidential*** and, if necessary, ***anonymous advice***
- provide ***contact persons and contacts***
- organize ***workshops and lectures*** on gender- and diversity-sensitive topics

Why focus on gender? German constitution:

Article 3 [Equality before the law]

(1) All persons are equal before the law.

(2) Men and women have equal rights. The state promotes the actual implementation of equal rights for women and men and take steps to eliminate existing disadvantages.

(3) No person shall be favoured or disfavoured because of sex, parentage, race, language, homeland and origin, faith or religious or political opinions. No person shall be disfavoured because of disability.

Activities and measures of the gender equality office

Carl von Ossietzky
Universität
Oldenburg

UniversityStudiesResearchInternational

School VI - Medicine and Health Sciences

About the University

Navigation: Home > About the University > Schools > School VI > Equal Opportunities

Equal Opportunities

News

Equal opportunities office of Faculty VI

Equality measures

External funding opportunities

Important documents and forms

Women in UMO

Contact

Gender and Diversity Management Officer

Dr. Janina Leyk

janina.leyk@uol.de

+49 (0)441 798-4678

Equal Opportunities Officers School VI

gleichstellung.fk6@uol.de

Equal Opportunities



The Carl von Ossietzky University of Oldenburg understands equality, family-friendliness, diversity as an indispensable basis for the creation of equal opportunities and the development of potential in study, teaching and research. The Faculty VI Medicine and Health Sciences adheres to this principle in the performance of its tasks.

News

Writing retreat for female scientists* of Faculty VI

 <https://uol.de/en/school6/equal-opportunities/>

Navigation: [...] > School VI > Equal Opportunities > Gender equality measures

Kontakt

Gender and Diversity Management

Dr. Janina Leyk

janina.leyk@uol.de

+49 (0)441 798-4678

Gender equality officers of School VI

gleichstellung.fk6@uol.de

Gender equality measures

With the following measures, we would like to contribute to improving equal opportunities at the faculty. In addition to the measures designed specifically for Faculty VI, we would also like to refer here to various offers of the university, which include special courses and further education opportunities for women.

Graduate Academy

Staff training (PEOE-Portal, only in German)

We will be happy to advise you on individual matters.

Apply now! Writing retreat for female scientists* of Faculty VI

Funding for congress participation for women scientists and doctors

Support for academics by student assistants during pregnancy, maternity leave, parental leave and care obligations

Symposium for active recruitment of (female) professors

Crèche places Kita Kùpkersweg

Coaching for newly appointed professors and other academic leaders

Further support services for students at the University of Oldenburg

- Counseling services for students (<https://uol.de/en/students/service-advice-students>)
- Study and Career Counselling Service (<https://uol.de/en/zskb>)
- Psychological Counselling Service Oldenburg (<https://www.studierendenwerk-oldenburg.de/en/beratung/psychologische-beratung/pbs-oldenburg>)
- conTakt Counselling centre for sexualized discrimination and violence issues (<https://uol.de/en/division1/personnel-and-project-planning/counselling-service-for-questions-regarding-sex-discrimination-and-sexual-harassment>)
- Family service (<https://uol.de/en/division1/personnel-and-project-planning/family-service>)
- International Office (<https://uol.de/en/division3/io>)

