

Information for applicants for the W3 profes- sorship in Software Engineering

at the Faculty of Computer Science

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1. The University of Duisburg Essen (UDE)

We are a young, innovative university located in the heart of the Ruhr metropolis. We pride ourselves on outstanding research and teaching, think in terms of opportunities rather than limitations and develop ideas with a view to the future. Diversity is an integral part of our culture as we promote potential and are committed to upholding genuine equity in education.



Essen campus

Located in the heart of the Ruhr metropolis, the University of Duisburg-Essen (UDE) is one of Germany's youngest universities and also among its strongest in research. The courses range from the humanities, social sciences and educational sciences via economics and business studies all the way to the engineering sciences, computer sciences and natural sciences (including medicine).

UDE embodies responsibility for the future. Our values – openness and internationality, diversity, equal opportunity and sustainability – guide our actions, research, teaching and learning.

UDE's research profile is distinguished by the strategic identification, consistent promotion and systematic advancement of promising, innovative ideas – and this is true of both fundamental and applied research and extends to the transfer of knowledge into industry and society. Our many internal and affiliated institutes also bear witness to this.

The cornerstones of UDE's research profile are the University-wide strategic research areas, which are shaped and advanced by numerous researchers in twelve faculties and fourteen inter-faculty research centres. Cooperative research projects have just as vital a place here as excellent individual research.

With innovative and digitally supported teaching and learning concepts, UDE enables research-based learning from the start. The University offers around 38,000 students from 130 countries a wide range of courses of study, including teacher training.

UDE is considered a paradigm throughout Germany of how equity in education can be implemented at a university with a strong track record in research. Numerous measures and projects are in place to support talented young people and offer them prospects. UDE considers itself a vibrant environment of diversity and openness where students, researchers and staff can realise their potential and willingness to perform.

In a strategic partnership, UDE is affiliated with Ruhr University Bochum (RUB) and TU Dortmund University. Together, they form the University Alliance Ruhr (UA Ruhr) and collaborate closely to achieve excellence in research and teaching together. With more than 110,000 students and almost 14,000 researchers, the UA Ruhr is one of the largest and best-performing academic hubs in Germany. The UA Ruhr's top-level international research on pressing issues of the future has been consolidated under the umbrella of the Research Alliance Ruhr.

In addition, the UDE maintains partnerships with over 100 universities around the globe and is a founding member of the Aurora European university network, which offers cross-border study programmes.

Learn more: https://www.uni-due.de/imperia/md/content/dokumente/im-age_broschuere_en.pdf

UDE as an employer

Seal of quality from the German Association of University Professors and Lecturers

The University of Duisburg-Essen bears the German Association of University Professors and Lecturers' (DHV) seal of quality for the fair and transparent nature of its appointment proceedings; this seal was first earned in August 2014, with successful re-audits in 2017 and 2022.

Learn more: <https://www.uni-due.de/verwaltung/berufungsmanagement/>

Family-friendliness

UDE systematically promotes and improves the ability of all its members to balance family life with research, work and studying, which it underscored as early as 2010 with its successful participation in the family-friendly university audit (*audit familiengerechte hochschule*). In 2022, UDE joined the *Verein Familie in der Hochschule e.V.* (family in higher education association) and established the UDE-wide *Netzwerk Familie** (family network). This was followed in 2024 by participation in the *North Rhine-Westphalia state programme Vereinbarkeit Beruf & Pflege* (reconciling work and care).

The Diversity Support Center at UDE offers support through the Family Service Office. Its offerings include personalised consultation on topics related to care, its own daycare facilities, flexible caregivers in emergencies and a holiday activity programme.

Learn more: <https://www.uni-due.de/diversity/en/>

Onboarding and Dual Career Service

The Onboarding team within the Appointment Management Department provide advice for getting started at UDE and can connect you with UDE's other consultation services. They also organise the Dual Career Service, which offers career assistance for both you and your partner.

Learn more: https://www.uni-due.de/en/dual_career.php

Coaching and further training

We see ourselves as a university of potential and work to ensure that all UDE members can contribute and develop their talents and abilities. This includes a wide range of opportunities to develop leadership skills along with coaching for line managers.

Learn more: <https://www.uni-due.de/pe/personalentwicklung>

Promoting good health in the workplace

UDE's occupational health management service works to provide a healthy and pleasant work environment as well as a culture of cooperation and trust. Staff at UDE can take advantage of a broad spectrum of in-person and online options to promote good health, comprehensive sport and fitness offerings provided by the University sport services, balanced meals in the canteens for good nutrition on campus, and many other opportunities.

Learn more: <https://www.uni-due.de/pe/gesundheitsmanagement>

2. Faculty of Computer Science

The newly established Faculty of Computer Science comprises the following departments:

- Foundations of Computer Science
- Human-Centered Computing and Cognitive Science
- Software Engineering
- Information Systems

It has nearly 40 professors. The Faculty of Computer Science places its strategic focus on foundational and topical questions in technology and software-based digitalisation. Its departments bring the following key disciplines together:

a) *Foundations of Computer Science*: Solid computer science foundations are the basic prerequisite for software-based innovations, and thus also for digitalisation. In addition to traditional key competencies (such as formal methods, AI basics, networks and distributed systems), foundations also include forward-looking topics (e.g., quantum computing and data analytics/science).

b) *Human-Centered Computing and Cognitive Science*: For innovations to be successful, sufficient account must be taken of the interactions between software-based solutions and individuals. This calls for systematically analysing and understanding these interactions and building the resulting insights into the system design process. This involves core capabilities in areas including the foundations of psychology, the design of interactive systems and media as well as the evidence-based user experience analysis.

c) *Software Engineering*: Software-based innovations must be developed and operated systematically. In addition to the traditional core competencies (such as requirements analysis, architecture design, specifications, development and quality assurance), this also requires in particular key aspects associated with digital transformation (e.g. explainability of system behaviour, embedding AI processes, privacy/trust, security, resilience).

d) *Information Systems*: Software-based innovations result in significant changes in companies, markets and value chains. The interaction between software-based innovations, companies and organisations must be factored in, which requires core competencies in areas including digital business models, digital transformation, the development and implementation of enterprise systems, application management and IT management.

The combination of these four disciplines and their core competencies gives the Faculty of Computer Science at the University of Duisburg-Essen a profile that is unique in Germany.

Research focus areas at the Faculty of Computer Science:

In addition to the fundamentals of computer science, the faculty's general approach to its research focus is to examine the environment – i.e. the context – in which the systems are to be developed. This notably includes interactions with people and other systems as well as their integration into the economic and social framework. The faculty's interdisciplinary makeup enables it to examine these key aspects as part of its research. To that end, the faculty's research has been grouped into three focus areas:

- Human-Centered Digital Technology
- Software Technology
- Rhine Ruhr Institute of Information Systems

Human-Centered Digital Technology

Considering the widespread nature of digital technologies today, it is clear that they will grow even more ubiquitous in future, becoming people's constant companions in their environment, in the workplace and at home, and even on their bodies. Against this backdrop, the question arises as to how the constant accessibility and impact of digital technologies is reshaping individuals' lives on multiple levels (experience, behaviour, opinions, knowledge, and biological and brain functions) and in many facets.

Today's online technologies are impacted and expanded by intelligent algorithms in such a way that they can be considered interactions with artificial intelligence. As a general rule, cyber-physical systems are intertwined, increasingly blurring the boundaries between web technologies, interactive intelligent systems and devices. Users are faced with systems that are acting with growing autonomy, evidencing their own agency and controlling users' actions by suggesting certain actions or performing them outright. Research must address these new varieties of human-AI interactions to be able to take people's needs better into account and ensure that control is not transferred entirely to the technological systems. Furthermore, it is already clear today that while technology influences people, people also influence technology. The way Internet technologies such as social media are used defines their further development, and the same applies to the provision (or withholding) of data to be fed into software applications and AI systems. Technology development is thus an emergent effect of a large group of people (consisting of users and developers). In future, even more reciprocity and dynamic interactivity can be expected here. In addition, learning algorithms will also incorporate human behaviour and align themselves with it.

This research focus area brings together researchers from various institutes who bring their psychological and IT expertise to the table. Interdisciplinary synergies are generated by a) joining forces to focus on understanding human behaviours in the online environments described earlier, and b) developing measures and technological solutions that enable people to use the intelligent systems to their advantage. On this basis, the research focus area aims to improve intelligent digital technologies in such a way that they are truly human-centred.

Software Technology

Today, software systems are omnipresent and have permeated virtually all aspects of our lives. In addition, advances in information technology, such as the Internet of Things (IoT) and cloud/edge computing, produce innovative, software-based systems that are being adopted at an unprecedented pace and will influence our daily routines more significantly than ever before.

As the main driver of digitalisation, these technologies are changing the world – the way people work, learn, do business, produce, communicate and travel. These software-based technologies trigger leaps in the evolution of all industries and unlock new ways to use technology that are impacting business models in established industries ever more rapidly and more intensively, creating new markets and affecting all facets of our lives. They are making software systems possible that were not conceivable or feasible previously (i.e. without the technological innovations available today). These innovative software systems offer immense potential for disruptive, innovative possibilities in automation, new business models and new software-based services. The software systems based on these innovations are the driving force behind the digital transformation.

Engineering such systems (i.e. their scoping, development and operation) poses enormous new challenges for computer science in general and software engineering in particular. That is why research in software technology focuses on the challenges raised by digital transformation itself, including restructuring in industries that have already digitalised most of their operations as well as those that are still in the process of doing so. In these contexts, it is particularly challenging to find the right balance between complexity, security and usability. In addition, software-intensive systems, traditional information systems and embedded systems are merging and continuously adapting their behaviour through the Internet of Things, Data and Services. Such systems are increasingly becoming self-adaptive and using data-based approaches to recognise the need to adapt and choose suitable options for doing so.

The Faculty of Computer Science's Software Technology research focus area is pooled and coordinated at the research organisation paluno – The Ruhr Institute for Software Technology. paluno ranks among Germany's largest software technology research institutes. Eleven professors and more than 100 academic staff members pursue excellent applied and fundamental research here in innovative software systems, digital key technologies, information and system security, human-computer interaction, development methods and tools, and digital education. The institute has a high level of third-party funding. This encompasses fundamental research (German Research Foundation/DFG, EU), application-oriented research (including Federal Ministry of Education and Research/BMBF, EU) and technology transfer projects.

Please find further information about paluno at <https://paluno.uni-due.de/en/>

Rhine Ruhr Institute of Information Systems

All types of data and media are now stored, transferred and processed in entirely digital form, and all varieties of devices are connected globally. With this transformation completed, information and communication technology has laid the foundations for new technological concepts and applications that have altered every aspect of our lives and will continue to do so.

The miniaturisation and enhanced performance of devices together with the unlimited mobility enabled by wireless technologies and economic scaling have enabled entirely new, ubiquitous and multimedia systems and applications.

Particularly the combination of the basic technologies and infrastructures for digitalisation – such as the traditional Internet, which is evolving into an Internet of Things (IoT) – with the substantial advances in areas such as artificial intelligence and big data analytics has led to disruptive technology approaches that are altering the behaviour of companies and other organisations on a long-term basis. While efficiency goals were previously the main factor in process automation and decision-making support, the new technologies are making innovations in processes, products, services and business models feasible. This is resulting in significant changes in companies, markets (with new markets emerging and existing market structures transforming) and value chains. All of this is playing a role in companies' continuous expansion of the services they offer; commercial enterprises in particular are increasingly turning into service providers and platform operators. This research focus area pools research endeavours that explore digitalisation in the service domain. This also includes smart city research projects, which are strongly linked to trade and services. On the one hand, numerous challenges arise in trade and services that are rooted in an urban context (e.g. the last mile problem). On the other, many solutions to urban challenges are service-like in nature (e.g., mobility solutions).

In the search for solutions, it is essential in research to sufficiently consider the inherent software-related artifacts, their integration in a social and organisational context as well as the economic questions that are also a factor. Basically, the research focuses on three key questions: firstly, it explores ways in which selected disruptive technology approaches can be developed and used to generate innovations in service companies. Secondly, it examines how companies can be sure that these innovations contribute to their overall success. The third question deals with understanding their impact on the organisation (internally: acceptance and adoption of the artifacts by the organisation's social actors and structural changes within the organisation as a whole; externally: evolution of the competition structures and value chains). The element linking these research questions is the matter of how technologies – and which ones – can be developed that can make a (positive) impact on organisations. The resulting insights can be used to determine targeted ways to implement these technologies. In this context, organisations may be commercial companies, public sector institutions or NGOs, although in order to tie in with the research focus, the nature of the business activity should be services.

Study Programmes and Teaching

The faculty's current strategic research areas are also related to the study programmes it offers. With our wide range of elective and development options and teaching that offers real-world relevance, our graduates leave us with a solid education and very good perspectives on the job market. In addition, the electives offered as part of our study plan give students a wide range of courses from the large variety of teaching units to choose from.

The Faculty of Computer Science offers an attractive and diverse range of courses that is unique in the region. It comprises a multifaceted full computer science programme with

various master's options, first cycle bachelor's and master's programmes in Software Engineering, and the interdisciplinary, consecutive degree programmes Business Information Systems and Applied Cognitive and Media Studies. In addition to the necessary knowledge in core informatics, the scope always also extends to the environment in which the information systems exist and the surroundings – such as technical systems, humans and (business) organisations – with which they interact. We also offer teacher training courses for secondary schools.

3. The Department of Software Engineering

The Department of Software Engineering covers classic core competencies such as requirements analysis, architecture design, specification, development and quality assurance, as well as core competencies related to digital transformation such as explainability of system behaviour, embedding of AI processes, privacy/trust, security and resilient systems. The Department of Software Engineering comprises a total of nine chairs.

The main research areas in the Department of Software Engineering are:

- Software-intensive systems
- Software engineering, requirements engineering
- Software quality and specification
- Technologies for digitalisation
- Explainable systems, big data analysis
- Resilient systems
- Networks and protocols
- System modelling, simulation, reliability and security
- System security
- Human-computer interaction

The Department of Software Engineering offers the following degree programmes:

- Bachelor's in Software Engineering
- Master's in Software and Network Engineering

The newly designed Bachelor's degree programme in Software Engineering has been expanded to include modern software engineering-related topics such as cloud/edge computing, application management and machine learning, with a focus on data-driven processes and their IT applications. The Bachelor's degree programme has a consecutive Master's degree programme.

4. Information about the open position

University Professor for Software Engineering (W3 salary level as defined in the North Rhine-Westphalian regulations for the W salary range (Landesbesoldungsordnung W))

Research

The advertised position offers scientifically outstanding and nationally as well as internationally visible scientists in the field of Software Engineering a permanent perspective in an attractive and research-strong environment. Therefore, the position seeks a person who has demonstrated high scientific potential and innovative strength in their previous academic career.

The position is embedded in an excellent research environment within the Department of Software Engineering of the newly established Faculty of Computer Science, which participates in numerous research initiatives at national and international level. Applicants should demonstrate their scientific excellence and identify possible links to existing working groups in the Department of Software Engineering and the Faculty of Computer Science.

Publications in high-ranking, peer-reviewed journals are expected. Applicants should represent in research and teaching a forward-looking field in the area of software engineering. This includes, in particular – but not exclusively – the following research areas with a clear connection to the development and operation of software-intensive systems: AI for software engineering, software engineering for AI, software analytics, software architecture and design, software dependability, security and safety, software evolution, human and social aspects, software testing and analysis, formal aspects in software engineering. It is expected that the research area represented will constitute a meaningful addition to the already existing research areas in the Department of Software Engineering and at the Faculty of Computer Science.

Teaching

The focus of teaching is on the Bachelor's programme in Software Engineering and the current Master's programme. A willingness to contribute to the further development of the faculty's programmes and course content is expected.

The Faculty of Computer Science attaches particular importance to the quality of teaching. Applicants should therefore describe their teaching ideas and concepts and, if possible, provide evidence of their teaching skills (results of course evaluations, teaching awards, etc.).

Additional Requirements

The acquisition of third-party funding is of particular importance. This includes both public funding (DFG, BMBF, EU) and funds from cooperation partners in industry. Applicants should have experience in successfully acquiring third-party funding appropriate for the position. Experience in implementing research results in an industrial context is also desirable.

The formal requirements are stipulated in Section 36 of the North Rhine-Westphalian Higher Education Act (Hochschulgesetz NRW). This act requires candidates to have a university degree and a particular aptitude for research work, as is generally demonstrated by outstanding results in doctoral studies in a relevant field. The successful candidates are also expected to

have demonstrated further academic achievements as part of a junior professorship, a habilitation or a role as a research fellow at a higher education institution or at a non-university research institution or through research work in industry, administration or another public sector field in Germany or abroad.

Scope and time commitment of the activities associated with this position

The advertised professorship is a full-time position. As stipulated in the legal regulations, it includes nine hours of teaching per week. These are to be conducted mainly in the bachelor's and master's programmes in Software Engineering as well as in the faculty's other degree programmes.

In addition, appropriate involvement in academic self-governance at the department and faculty levels is expected.

Information about resources to be offered

The advertised professorship includes resources appropriate to the salary band. Details regarding these resources will be determined during the appointment negotiations.

5. Legal framework

Universities are state-funded bodies under public law with legal capacity. State funding is based on the university's tasks, the obligations agreed upon in university contracts and the university's performance. They have a global budget and are not subject to individual instructions from the Ministry for Culture and Science of the state of North Rhine-Westphalia.

If the legal requirements are met, professors are appointed as permanent civil servants as a rule. Professors can also be appointed on the basis of an employment contract under private law.

When awarding a junior professorship, it is to be noted that individuals who already meet the hiring requirements for a university professorship due to having completed a habilitation or another reason cannot be considered.

Further information (in German):

- Contacts
www.uni-due.de/verwaltung/organisation/peo_professoren.php
- Regulations on the appointment proceedings
www.uni-due.de/imperia/md/content/zentralverwaltung/bereinigte_sammlung/2-10-mai12.pdf
- Information on the appointment and hiring process
www.uni-due.de/verwaltung/berufungsmanagement/

6. Salary

The salary of university teaching staff is stipulated by the North Rhine-Westphalian system for the remuneration of civil servants. These staff members fall under the W salary range, which contains the bands W1, W2 and W3.

Basic salaries can be supplemented with (performance) bonuses in bands W2 and W3. These performance-based salary components can be awarded

- as a result of appointment and retention negotiations (appointment and retention bonuses),
- for special achievements in research, teaching, art, further education and supporting early career researchers (special achievement bonuses),
- for assuming functional or special responsibilities as part of the University's self-governance or University management (functional bonuses).

In certain circumstances, so-called teaching and research bonuses may be paid from private third-party funds.

During appointment and retention negotiations, performance bonuses can also be agreed for a fixed period of time if they are linked to target and performance agreements.

Appointment bonuses are to be negotiated on an individual basis with the Rector of the University of Duisburg-Essen as part of appointment negotiations.

Please find a table showing the current remuneration (in North Rhine-Westphalia) for the salary bands W1, W2 and W3 at:

- https://www.finanzverwaltung.nrw.de/sites/default/files/asset/document/grundgehaelter_a_b_r_und_w.pdf

You can find information on the W salary range (in North Rhine-Westphalia) and the legal foundations for it on the following webpages:

- www.uni-due.de/verwaltung/organisation/peo_links.php
- <https://www.research-in-germany.org/en/jobs-and-careers/info-for-senior-researchers/career-paths/professorship/professor-university.html>

Further information (in German) can be found in the regulations on awarding performance-related bonuses:

- www.uni-due.de/imperia/md/content/zentralverwaltung/bereinigte_sammlung/3_60.pdf