

University of Stuttgart
Germany

WE STUDY THE FUTURE!



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VISIONS



OVERALL VISIONARY ORIENTATION

Basic research at the highest level combined with excellent teaching and a comprehensive quality management system, integrated in an extensive network of research establishments and business enterprises, guarantee the University of Stuttgart its outstanding international position as a research university. The integration of Engineering, the Natural Sciences, the Humanities, Social Sciences, Management and Economics in a shared profile permits complex approaches to solutions for the global challenges that confront the society of the 21st century.



The continuously interdisciplinary cooperation of an extremely wide range of research areas guarantees the success of the research and the quality of training at the University of Stuttgart. It is reflected, for instance, in the Cluster of Excellence "Simulation Technology", in numerous special research areas and Graduate Colleges, the Graduate School "Advanced Manufacturing Engineering" and the research campus "ARENA2036". The University of Stuttgart has thus

positioned itself as an internationally recognized centre for science and research. And as a reliable partner for the business enterprises and the cultural and political institutions of the City of Stuttgart, the State of Baden-Württemberg, Germany, Europe and the world – today and in the future.

COOPERATIVE RESEARCH CAMPUS



VISIONS

1911: First Chair of Aeronautical Engineering

In this year, Alexander Baumann became the first Professor of "Airship Aviation, Flight Technology and Motor Vehicles" in Germany. These beginnings were to evolve into the present-day focus on aviation and aerospace technology, as well as on automotive research.

1972: Discovery of the tobacco mosaic virus

In 1972, Karl-Wolfgang Mundry was involved in the discovery of the tobacco mosaic virus, in the course of which he helped to answer fundamental questions of molecular biology. He was one of the fathers of the study program "Technical Biology", which today is one of the most successful specialties in the field of German biology.

1967 University of Stuttgart

1957 Construction of the Vaihingen campus started

1945/46 Reconstruction of buildings by lecturers and students; reopening

1848: The Fehling sample

Hermann C. Fehling was a professor of chemistry at the Polytechnische Schule Stuttgart from 1839 to 1883. He discovered the "Fehling solution" to determine sugar content. But the name of Fehling stands for much more than a solution. He made chemistry in Stuttgart a showcase field that was attractive to the public.

1944 Destruction of almost all the buildings

1905 First female student

1900 Gained the right to award doctorates

1890 College of Technology

1876 Polytechnic

1840 Pre-vocational School

1829 Founded as the School of Trades and Crafts

1886: First motorized carriage

From 1857 to 1859, Gottlieb Daimler studied mechanical engineering in Stuttgart. In 1886, he was the first to install an engine in a carriage, thus effectively becoming the inventor of the automobile – a milestone in history.

2014 "Joint Degree Program" with GeorgiaTech
2014 Around 26,500 students

2012/13 First Research Campus
ARENA 2036

1996: High-end computing

As early as the 1950s, Stuttgart mainframe computers were performing at a comparatively high level in order to meet the requirements of aerospace technology. In 1997, the High Performance Computing Centre (HLRS) became the Federal Computing Center, representing another step on the way to today's focus on simulation technology.

2012 System Accreditation

2010 MINT College

2007 Excellence Initiative successful

2012: Europa's largest driving simulator

The innovative driving simulator permits the research and development of intelligent driver assistance systems that aim to reduce both fuel consumption and the number of road casualties.

1983 Introduction of the international
English-language Master study programs

1973/74 Around
10,000 students

2005: 1. Transregional Special Research Field

The Transregio program "Quantum Control in Customized Matter" focuses on the development of new states of matter and dynamic quantum states. Here, scientists from the Universities of Stuttgart, Tübingen and Ulm as well as from the Max Planck Institute for Solid State Research in Stuttgart intend to combine aspects of quantum optics with solid state physics.

1969 Charter of the University

1962: Lightweight construction

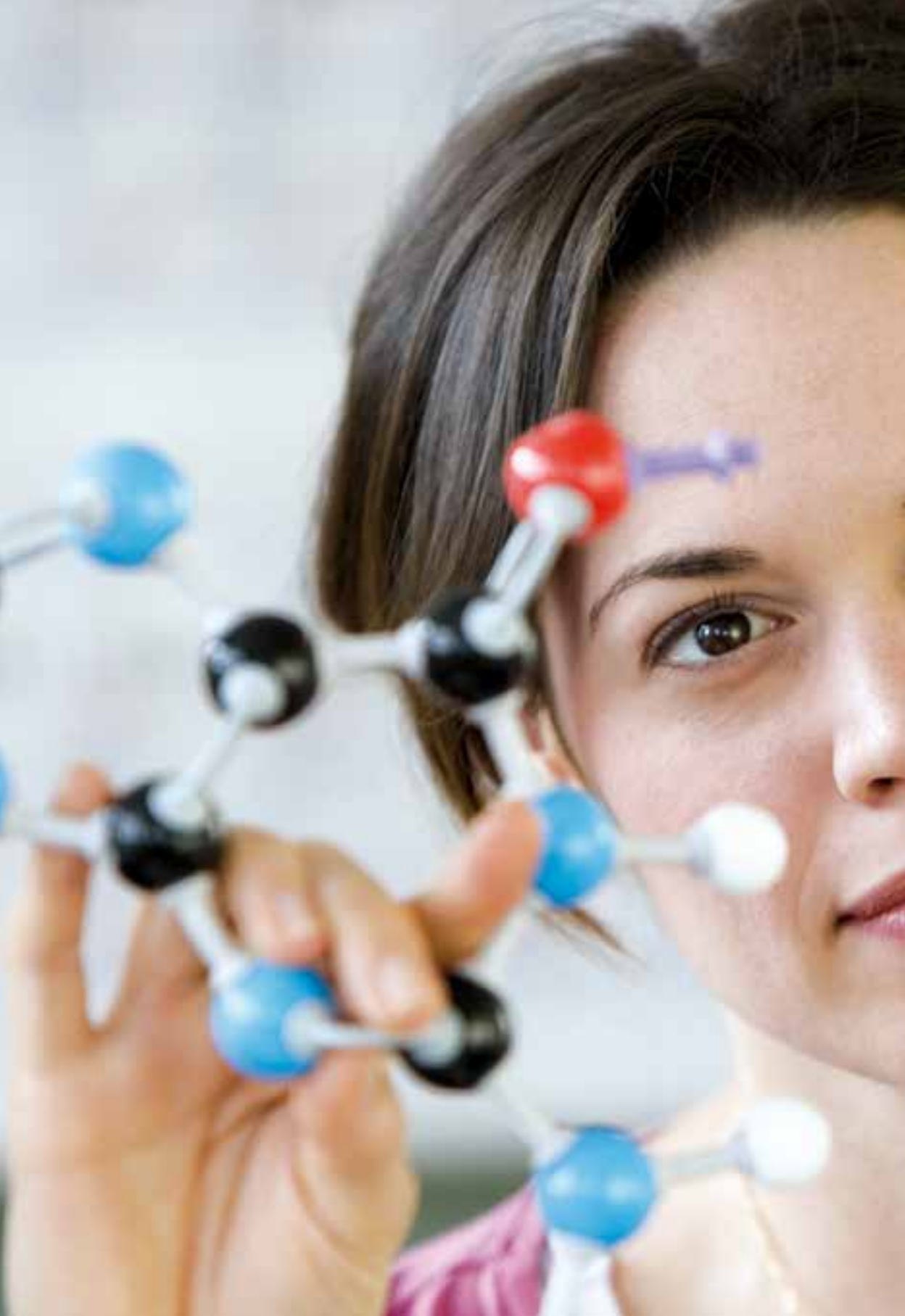
Beginning in the 1960s, the University of Stuttgart increasingly turned into a center of lightweight construction. Natural constructions and supporting structures were developed based on examples taken from nature (Frei Otto and others).

1996: Towards the sun

The solar glider Icaré II is a project of the Faculty of Aerospace Engineering. It is a masterpiece of lightweight construction. In 1996, Icaré II succeeded in its attempt at the world record. The solar glider covered 350 kilometers, the greatest uninterrupted flight distance at the time.

1938: Invention of Perlon

From 1915 to 1922, Paul Schlack studied chemistry at the Stuttgart College of Technology, working as an assistant at the Institute of Chemistry until 1924. In 1938, Schlack's experiments led him to the discovery of the polymerizability of caprolactam, based on which he developed a polyamide fiber, later known as Perlon.



A close-up photograph of a woman with dark hair and eyes, looking thoughtfully at the camera. She is holding a ball-and-stick molecular model in her hand, which is positioned near her face. The model consists of various colored spheres (white, blue, black, red, purple) connected by grey rods, representing atoms and bonds in a chemical structure. The background is a soft, out-of-focus grey. A blue horizontal bar is overlaid on the right side of the image, containing the word "RESEARCH" in white, bold, uppercase letters.

RESEARCH

INTERDISCIPLINARY RESEARCH PRIORITIES

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RESEARCH



The research activities of the University of Stuttgart focus on interdisciplinary specialties, which comprehensively research the entire product development and product lifecycle: beginning with the modeling at the atomic, molecular, material and process level, by way of design, production, utilization and recycling, and integrating energy and material conversion processes. Three research specialties concentrate predominantly on basic research and address methodological, materials as well as process and system-technical questions. The area of Digital Humanities deepens insights into the humanities as previously studied, integrating advanced information technology in many areas such as Linguistics and Philosophy.

The networking of the vertical structure of the faculties with a horizontal research structure results in various types of interdisciplinary cooperation which, depending on the degree of closeness to their practical relevance for and cooperation with business enterprises and non-university research establishments such as the Max Planck Society, the Fraunhofer Society, the German Aerospace Centre and the Marbach Literary Archive, are organized as research or transfer centres. Forward-looking research centres are, for example, the "Research Centre Simulation Technology (SimTech)", the Transfer Centre "Automotive Simulation Centre Stuttgart (ASCS)", the Project House Nanobiomatter or the Center the Centre for Interdisciplinary Risk and Innovation Research of the University of Stuttgart (ZIRIUS), which has a holistic approach to investigating technological-social processes of change, especially in the generation and use of energy.

From isolated numerical approaches to an integrative systems science – the guiding principle of the Stuttgart Cluster Simulation Technology (SimTech) describes a major challenge of the 21st century. Computer-assisted simulation and modeling are permeating the entire field of science and also, to an increasing extent, applications in industry and in everyday life. The Stuttgart Cluster received an award from the Excellence Initiative of the Federal Government and the Länder, thus underlining the importance of this research initiative, which in the meantime enjoys a unique reputation worldwide. Embed-

ded in the Stuttgart Research Centre for Simulation Technology, SimTech opens up interesting perspectives, especially for the younger generation of scientists. Roughly a dozen junior professorships, an elite program of studies and above all the Graduate School with almost 100 postgraduate students working for a doctorate set the standard for young researchers in the promising field of simulation technologies.

SIMTECH – CLUSTER OF EXCELLENCE



RESEARCH ACTIVITIES – KEEPING PACE WITH THE TIMES

Special research areas (SFBs) are characterized by the close, interdisciplinary cooperation of various institutes from the fields of Engineering, the Natural Sciences, the Humanities, the Social Sciences and Economics with a shared research objective. In addition to this, Transregio (TRR) projects are located at various sites. The structural

objective of these projects is the regional and transregional networking of interdisciplinary research interests and material resources.

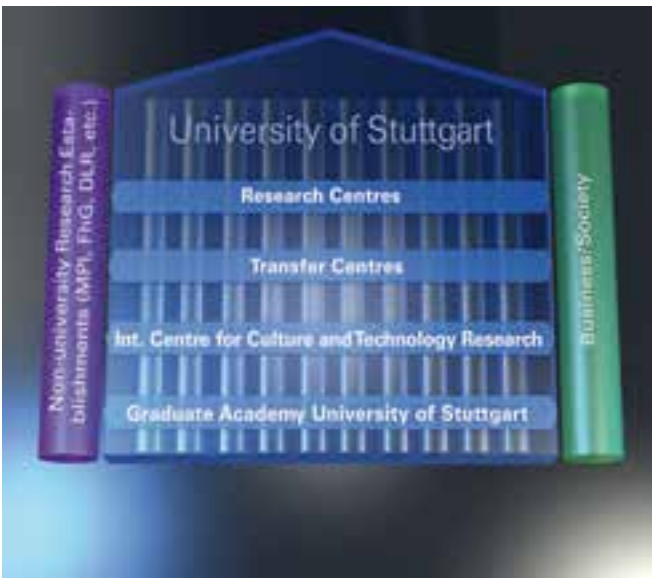
The German Research Foundation (DFG) supports and funds various special research areas at the University of Stuttgart. For example, in SFB 716 scientists from 13 institutes at the University of Stuttgart are working together on the dynamic simulation of systems involving large numbers of particles. In SFB 732 the researchers are investigating ambiguities and polysemy in language.

In addition, the DFG also funds Transregio projects. In TRR 21, scientists are researching various phenomena of quantum physics in customized matter. The aim of TRR 75 is to understand processes of droplet dynamics, which often take place at the physical level under extremely ambient conditions. Since 2014, the endeavor of the new TRR 141 has been to transfer construction principles from biological structures to an engineering sciences model and to make them available for construction-related and technical areas.

In order to promote the up-and-coming generation of scientists, the University of Stuttgart as the Coordination University of the Graduate College of the DFG offers numerous other doctoral programs. The university is the German operations center of the German-American project SOFIA (Stratospheric Observatory for Infrared Astronomy), where scientists observe the birth of stars and solar systems. The centerpiece of the project is a Boeing 747SP equipped with a high-performance reflector telescope.

A further highlight at the University of Stuttgart is the largest driving simulator in Europe operated at a research es-

RESEARCH



establishment. The simulator enables the research and development of intelligent driver assistance systems to reduce fuel consumption and to optimize safety.

In the High Performance Computing Centre Stuttgart (HLRS) the computer system Hermit, one of the most powerful supercomputers in Europe and the world, helps the scientists to research solutions for the crucial challenges of today. The system, which is outstanding in the competitive field of international data processing, is also designed for research tasks in the industrial environment. The supercomputer is supplemented by a 3D visualization centre incorporating a CAVE with five projection surfaces and an edge length of 2.7 meters.



TECHNOLOGY TRANSFER AND ENDOWED PROFESSORSHIPS

At present there are eleven endowed professorships at the University of Stuttgart. This clearly demonstrates the importance of the University for the economy, which by sponsoring these professorships is bringing practical experience to the University, and which at the same time benefits more rapidly from the latest scientific knowledge. Biomedical Engineering, Wind Energy, Automotive Mechatronics and Hydroelectric Power – the research areas of the endowed chairs are very diverse and always related to current scientific tasks.

Students, the staff and alumni from the University of Stuttgart, from universities in the area and the research establishments of the Stuttgart Region directly convert the latest scientific findings into added economic value

creation by setting up new businesses. The Technologie Transfer Initiative GmbH, a subsidiary of the University of Stuttgart, actively supports them in this.

The interface contactUS! helps the University of Stuttgart expand its contacts with the business world. Thus, small and medium-sized enterprises in particular find assistance when seeking to directly contact the right person at the university. In addition to an overview of the university's key research areas, contactUS! also provides the appropriate technical contacts with the university's scientists and/or facilities.





$$f(x) = a_0 + a_1 \cdot x + a_2 \cdot x^2 + \dots + a_n \cdot x^n = \sum_{k=0}^n a_k x^k$$

$$\frac{y}{b} + \frac{z}{c} = 1 \Leftrightarrow z = f(x, y) = c \cdot \left(1 - \frac{y}{b}\right)$$

$$n^2 = x^n \quad f(x) = \frac{1}{x^2+1} + \frac{1}{(x^2+1)^2}$$

$$x^2 + z^2 = R^2 \Rightarrow z = \sqrt{R^2 - x^2 - y^2}$$

$$\int_0^{\sqrt{R^2-x^2}} \int_0^{\sqrt{R^2-x^2-y^2}} dz \cdot dy \cdot dx$$

$$\frac{R}{R} = \frac{A_{11}}{x-x_1} + \frac{A_{12}}{(x-x_2)}$$

$$\frac{R}{\sqrt{x^2+a^2}}$$

$$c(t) = \int_{-\infty}^x \frac{\cos t}{t}$$

$$\int_0^a e^{-t} \cdot t^{x-1} \cdot dt \quad x < 0$$

$$\frac{n^+ \cdot n!}{\Gamma(x+k)} \neq f(t) f(t)^2 \cdot (t)^2 \cdot dt$$

$$\Gamma(x+k) \quad T = f^{-1} T \quad \Leftrightarrow A$$



TEACHING

$(t - z_x)$ $\int \frac{P(t)}{Q(t)}$ $y = t$

$(\frac{y}{b})$ $\int \frac{1}{t}$ $\rightarrow d \ln t$

$x - a$ $y - b(1 - \frac{x}{a}) + 0$

$x - c$ $A = \int_c^a$ $\int_a^c C(1 - \frac{x}{a} - \frac{y}{b})$

$y - 0$ $\int_a^c C(1 - \frac{x}{a} - \frac{y}{b})$ $\frac{bc}{2} \int_0^1 (1 - \frac{x}{a})$

y^2 $y - b(1 - \frac{x}{a})$ $\frac{bc}{2} \int_0^1 (1 - \frac{x}{a})$

$y - 0$ $\int_0^1 (1 - \frac{x}{a})$

$(t_0)^+$ $dt = \sum_{t_0}^x [\int_0^x (a_1 - (x - t_0)^n) \cdot dx] = \sum_{t_0}^x$

$x - \int_{-x}^x \frac{1 \cos t}{t}$ $dt = (t \ln x +$

$(x - t) \cdot dx + |f(t) \cdot t| \rightarrow \frac{d \text{ erf}(x)}{dx} =$

$\text{erf}(x) = \Phi(\sqrt{2} \cdot x) = \frac{2}{\sqrt{\pi}} \int_0^x e^{-t^2} \cdot dt = \frac{2}{\sqrt{\pi}} \cdot \left[\frac{1}{2} \right]$

$\begin{pmatrix} v \\ - \end{pmatrix} = \underline{a} \quad x \cdot v = \begin{pmatrix} a_1 \\ a_2 \end{pmatrix} \times \begin{pmatrix} v_1 \\ v_2 \end{pmatrix}$



A WIDE RANGE OF STUDY PROGRAMS

18

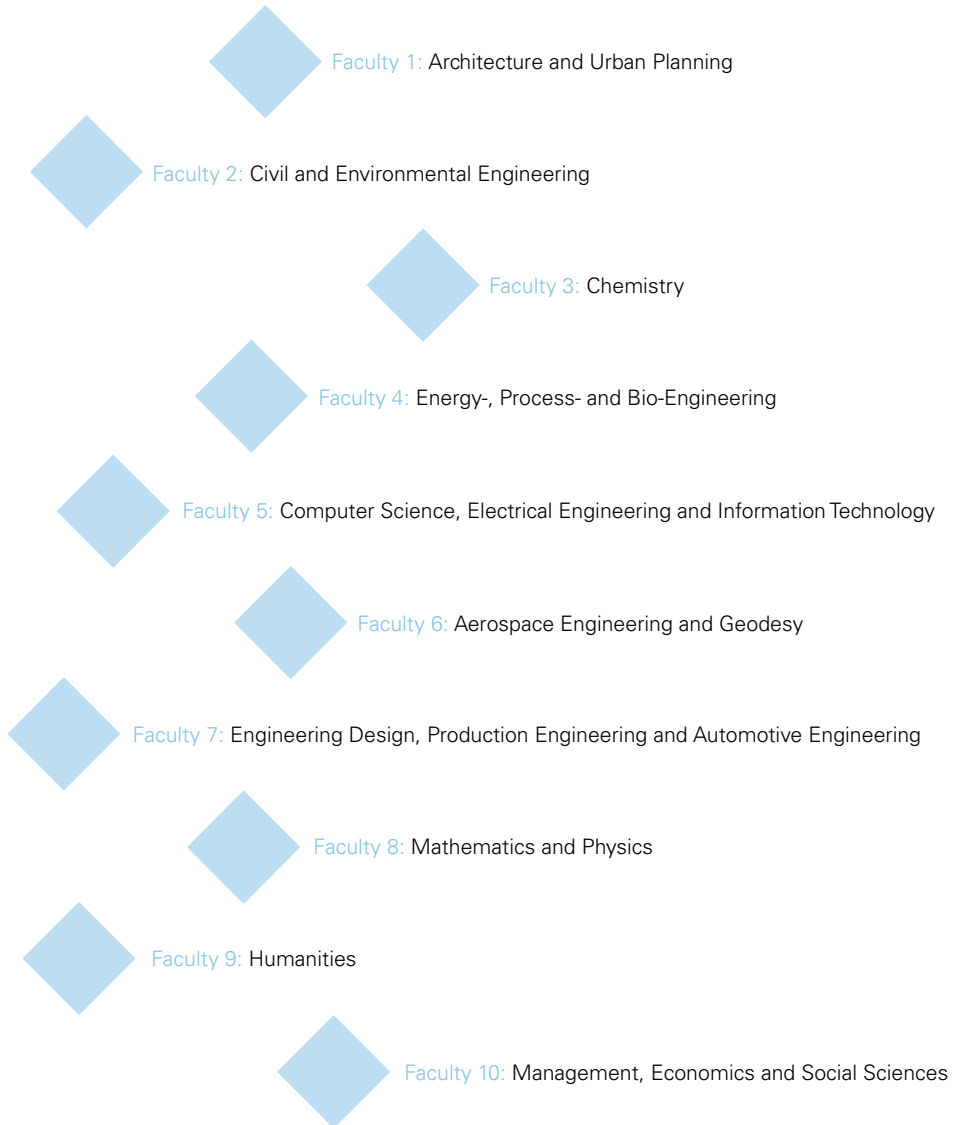
TEACHING

The University of Stuttgart offers over 150 undergraduate and graduate study programs that can be completed with a Bachelor/Master of Science or of Arts degree or, in the case of the teacher training programs, with a state examination. The Master's programs build on a Bachelor degree. With the successful completion of the Master's course of study students acquire the right to study for a doctorate.

A special feature at the University of Stuttgart is the possibility of combining the humanities and the natural sciences. The courses offered by the University of Stuttgart are characterized by an abundance of interdisciplinary programs, some of them in English or French. In 2012 the University of Stuttgart received the Certificate of System Accreditation. System accreditation assesses quality management throughout the fields of study and teaching.



THE FACULTIES OF THE UNIVERSITY OF STUTT GART





EXCELLENCE-ORIENTED STUDY PROGRAMS

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TEACHING



The close cooperation between the technological and engineering disciplines, the natural sciences, the humanities, and the social sciences has always been one of the special strengths of the University of Stuttgart. This active exchange among the academic disciplines proves it to be a modern, excellence-oriented full-range university with its main focus on the technological and natural science disciplines. In addition to the large number of students from the region, the outstanding reputation of the University of Stuttgart attracts applicants not only from all over Germany but nowadays even from all over the world. A fifth of international students hail from over 100 countries, from every continent. Naturally, English-language courses are hugely popular.

THE OVER 150 STUDY PROGRAMS ARE DIVIDED INTO FOUR AREAS:

ENGINEERING

This includes long-established courses of study such as Architecture and Urban Planning, Civil Engineering, Electrical Engineering and Information Technology, Computer Science, Simulation Technology, Vehicle and Engine Technology as well as new courses such as Electromobility, Integrated Urbanism and Sustainable Design or the Pedagogics of Technology.

NATURAL SCIENCES AND MATHEMATICS

This field of study includes many scientific fundamentals such as Mathematics, Physics, Chemistry, Biology, as well as specialized courses such as Food Chemistry or Technical Biology.

LINGUISTICS AND CULTURAL STUDIES

Here, the classical fields of study like English Studies, German Studies, the Philosophy of Technology, Art History, or Romance Languages and Literature have been broadened to include exciting courses such as the Theory of Language and Comparative Linguistics, Natural Language Processing, Computational Linguistics, or Practice Based Philosophy of Culture.



MANAGEMENT, ECONOMICS AND THE SOCIAL SCIENCES

The University of Stuttgart covers an ample diversity of courses of study relevant to society, ranging from Business Management and Economics, Empirical Political Science and Social Sciences and Sports Research, the Science of Sports and Social Sciences, to Business Information Systems.



QUALIFIED PROMOTIONAL AREAS

At the University of Stuttgart the wide range of projects for schoolchildren are grouped under the umbrella of the School Research Campus. Here the University of Stuttgart invites children and young people on a fascinating voyage of discovery into the world of science. Whether Architecture, Sport, the Humanities, the Natural Sciences such as Physics, Chemistry, Mathematics and Biology or fields of engineering such as mechanical engineering, civil and environmental engineering, computer science, electrical engineering and process technology – the young people experience science you can “feel and touch”! Numerous workshops, practicals, lectures and hands-on introductions to experimenting and research are available for schoolchildren of any age who are eager to learn.

The aim of the project “Quality Pact Teaching – Individuality and Cooperation in Stuttgart Studies (QuaLiKiSS)” funded by the Federal Ministry of Education and Research insures the continuation of the Bologna Reform, in particular enhancement of the introductory phase of studies in the MINT subjects (Mathematics, Informatics, Natural Sciences and Technology) and also optimization of the teacher training courses offered at the University of Stuttgart.

The MINT College Baden-Württemberg is a joint institution of the University of Stuttgart and the Karlsruhe Institute for Technology, and was recognized by the Expert Group for System Accreditation as the “Best Practice Example” anywhere in Germany. The College offers university entrants courses in the subjects Mathematics, Informatics, the Natural Sciences and Technology that facilitate the transition from school to university studies. The MINT College Baden-Württemberg is the largest of its kind anywhere in Germany.

Internationality is playing an ever increasing role in all areas affecting the university. Numerous partnerships, agreements between institutes, along with exchange programs with universities all over the world, are all part of global networking. They also attest to the university's commitment to internationalize training and education by actively helping to shape the Bologna process as well as by offering English-language courses. The holistic strategy of internationalization at the University of Stuttgart promotes the global dimension found in all areas of university life, i.e., in teaching, research, postgraduate training, and administration. Its aim is to achieve an extension of the double-degree Master programs beyond the cooperation programs currently in place.

Thus in 2014, a joint degree program in mechanical engineering was launched with the Georgia Institute of Technology (Georgia Tech) in Atlanta. Six courses

that are completed with a German-Swedish double (binational) degree are offered in partnership with Sweden's Chalmers University of Technology in Gothenburg (Göteborg). This cooperation serves as a model to be adopted in other university partnerships.

Internationalization is also the aim of the eight international courses of study that are held exclusively in English; they are offered in the fields of Engineering, the Natural Sciences, Linguistics, and Cultural Studies. Environment Water (ENWAT), the international program for doctoral candidates, is also aimed at young top-notch academics from all over the world, thus pooling skills and talent at the University of Stuttgart.

INTERNATIONALIZATION







**ADVANCED TRAINING
AND EDUCATION**

COMMITMENT TO FURTHER TRAINING AND EDUCATION



The University of Stuttgart fulfills society's demand for lifelong learning with a broadly diversified range of advanced training courses.

The University of Stuttgart offers the Master: Online-Akademie part-time online Master study programs in the fields of Construction Physics, Integrated Gerontology and Logistics Management. This will be followed in the coming years by the Master course in "Climate-optimized and Culturally Appropriate Building" as well as a course in "Intra- and Entrepreneurship" designed in conjunction with the Stuttgart Media University (Hochschule der Medien). All of the Academy's offers are designed to run parallel to employment and, in addition to initial professional qualification,





require at least one year's professional experience. Within the scope of so-called "contact studies", students can also participate in individual modules awarded with a university certificate. The credits earned count towards a Master study program.

The Centre for Advanced Training coordinates and bundles the activities of the university institutions for further education and is the starting point when looking for a suitable further training and education courses.

The Coordination Centre for Advanced Academic Training in the Centre for Teaching and Further Education transfers current research findings to precisely matching programs for

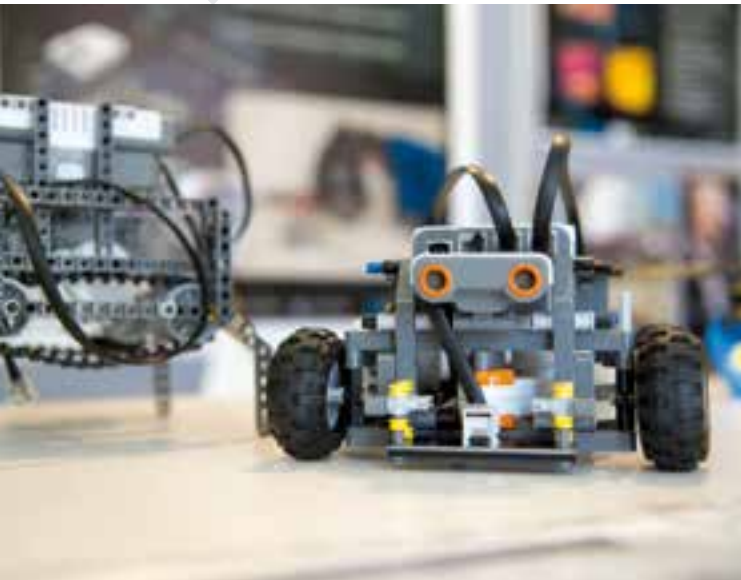
clearly defined university and non-university target groups. In close cooperation with the Institutes, scientific findings are incorporated into the courses offered and are made available to a broad public in line with the idea of lifelong learning.

The central task of the "Studium Generale" is to encourage interdisciplinary further education within the University. The "Studium Generale" therefore creates a special program of courses, seminars and lectures that are suitable for students of all fields of study and for guest students. This very varied program encourages students to broaden their horizons beyond the boundaries of their own discipline. At the same time the "Studium Generale" addresses members of the public who are interested in scientific questions and who, with their guest student status, have access to the University.





AT A GLANCE



RESEARCH INSTITUTION OF INTERNATIONAL STANDING

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The University of Stuttgart is situated at the heart of a highly dynamic economic region with a worldwide reputation in the specialties Simulation Technology, Mobility, Information Technology, Production and Manufacturing Engineering, Energy Research and Digital Humanities. Today, its outstanding position as a research university and the wide range of its subject areas make it an internationally recognized and future-oriented centre for science and research.

One of the largest employers with around 5,000 employees the University is an important economic factor in the region: professors, researchers and administrative staff work here. However, the University is also a training establishment for an extremely wide range of professions offering young people a good start in their professional life. Researchers and students are in the very best of hands at the University of Stuttgart. The University was awarded the certificate "Family-friendly University", under



lining its central concern of making it easier to combine studying with a job and/or family. The University of Stuttgart's gender equality strategy is just as much a matter of course. Equal opportunities and diversity are important prerequisites for optimum studying and working conditions in all areas of science and research. The University of Stuttgart understands equality of opportunity and diversity not only as decisive features of an innovative and vibrant university, but also as important instruments of quality development and quality management.

As a campus university with two locations conveniently linked by public transportation, attractive nearby recreation facilities and integration in the cultural life of the state capital, the University of Stuttgart insures the very best conditions for study and work, and a wide range of career opportunities for its graduates. Comfortable dormitory accommodation, guest houses for visiting lecturers, the nearby institutions of the

Max Planck Society, the institutes of the Fraunhofer Society, the German Aerospace Centre, the German Institute for Textile Research, the Materials Testing Institute and the Institute for Microsystems Technology – together with state-of-the-art information technology – provide fertile ground for intensive scientific exchange and innovation.

Those who feel the urge to go out into the wider world are also actively supported. The University prepares its graduates for international competition with stays abroad and a growing number of English-language Master's and Bachelor's programs.



THE UNIVERSITY OF STUTTGART IN THE MARKETPLACE



© Stuttgart-Markting GmbH, Selig-Fotodesign

A variety of cooperation programs in a wide range of fields emphasize the importance of the university for the economy: third-party funding in 2013 amounted to € 193 million – roughly a quarter of which came from industry. The University of Stuttgart occupies a leading position compared to the rest of Germany. The large number of endowed professorships and other cooperation programs also attest to the standing and the expertise of the university's institutes.

However, students in Stuttgart do not just study and do research – cultural activities also play a major role. Delightfully nestled in one of Germany's largest wine-growing regions, the city's magnificent panorama, its numerous parks and gardens, but also the cultural diversity it offers inspire enthusiasm.

The student scene in Stuttgart is really impressive. Besides numerous clubs and lounges downtown, there are cozy pubs. Festivals and many events in the vicinity of the university campuses invite people to relax or to exchange ideas. An outstanding feature of Stuttgart's cultural life is the "Staatstheater Stuttgart" with its

renowned theater, its world-famous ballet, and the opera, "Großes Haus", which has been designated Opera House of the Year several times. The theater scene, including many alternative venues such as the "Theaterhaus", likewise offer a wide variety of attractions for the culturally inclined. Stuttgart also has plenty to offer in the visual arts.

The "Staatsgalerie Stuttgart" (State Gallery) and the "Kunstmuseum" (Art Museum) Stuttgart have extensive permanent exhibitions as well as frequently changing world-class special shows. The music scene in Stuttgart is extremely diverse – classical and modern highlights of outstanding quality tend to be the rule not the exception.





Stiftung zur Akkreditierung von Studiengängen in Deutschland

Akkreditierungsrat ■■

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