

UNIVERSITY AND SURROUNDINGS

FAU's Faculty of Engineering



Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU) offers a range of subjects that is unique in its diversity in Germany. The Faculty of Engineering is one of FAU's five faculties and has an excellent reputation in science and industry. For nearly 50 years, highly-qualified engineers and computer scientists have been graduating from more than 20 modern and interdisciplinary degree programmes and six Master's programmes taught in English.

Facts and figures on FAU (WS 2015/16)

- 39,414 students, including 4,150 from abroad
- 244 degree programmes
- 22 international degree programmes
- 5 international doctoral programmes in the Elite Network of Bavaria
- ~ 500 international university partnerships in 70 countries

Facts and figures on the Faculty of Engineering (WS 2015/16)

- 10,983 students, including 1,658 from abroad
- 21 degree programmes
- 6 Master's degree programmes taught in English
- 3 Elite study programmes taught in English
- ~220 co-operations in 48 countries

Erlangen and the region

Erlangen is a cosmopolitan, economically strong and vibrant student city, located in the Nuremberg Metropolitan Region. With more than 100,000 inhabitants (a third of which are students), Erlangen has the ideal size for social life, studies and relaxation. The diversity of events and leisure activities in the region leaves nothing to be desired by night owls, culture connoisseurs and sports fans.

More information available at: www.erlangen.de and www.nuernberg.de

INFORMATION

Student counseling

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International Students

- **Administrative fees:** Students at FAU are required to pay Student Services fees of 107 euros per semester, which must be paid at the beginning of each semester.
- **Visa (non-EU students):** Before coming to Germany you need to check your individual visa requirements. For further information you can consult the visa information provided by DAAD: www.daad.de.
- **Work permit:** Your residence permit will include a work permit for student jobs or internships. For further information contact the MAOT office.
- **Health insurance:** In Germany you will generally need to be covered by health insurance. Several major insurance companies have branch offices in Erlangen. For more information on the types of insurance offered and your eligibility please consult the MAOT office.
- **Scholarships:** There are some scholarships provided by the MAOT. Students can also be employed as research or teaching assistants at the University.
- **Student accommodation places:** The University's accommodation service can help you find accommodation in Erlangen. You will receive the necessary information from the MAOT office.

Location



www.aot.uni-erlangen.de



www.tf.fau.de

FIELD OF STUDY

About Advanced Optical Technologies

Optical technologies – which use light as a tool – are key technologies for industry and society in the 21st century. They are the foundation of information infrastructure in the modern world and their diverse applications in metrology and material processing can be found in many areas of large industries such as automotive manufacturing, semiconductor production, medical engineering, and many more. As a relatively new area, optical technologies are experiencing constant innovation. Work in the field is highly interdisciplinary, involves a great deal of international collaboration, and relies on the high level of individual expertise of everyone involved. This makes optical technologies a pioneering example of collaborative work in modern industry.

Applications

- Optical data transmission – essential for the Internet
- Solar cells – a crucial part of modern energy technology
- Lasers – a versatile and indispensable tool e.g. for processing materials
- High-precision optical measuring technologies – microscopy, (laser) spectroscopy and many more
- Medicine – precise, less invasive diagnosis and treatment using light

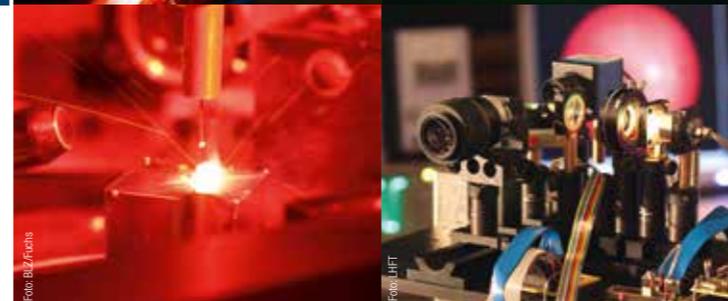
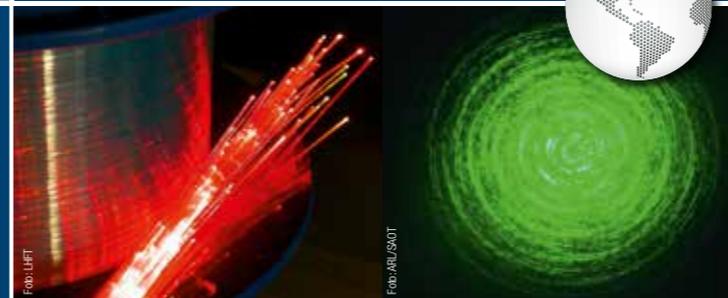
Experts in optical technologies can find a particularly wide range of career opportunities in research and development, as well as in production and distribution. In addition to the optical industry – with many smaller, highly specialised technology companies – there are many areas in more traditional industries that require knowledge of optical technologies.

Advanced Optical Technologies in the Erlangen-Nuremberg region

Erlangen has been well-known as a centre for optics and optical technologies for decades. Optics is one of the University's research focus areas. Optical technologies research is carried out by all departments at the Faculty of Engineering, as well as the Department of Physics and the Faculty of Medicine, and is consolidated in SAOT – the Erlangen Graduate School in Advanced Optical Technologies – as part of the German government's Excellence Initiative. The Max Planck Institute for the Science of Light was established in Erlangen in 2009. Optical technologies are also important areas of application at the Cluster of Excellence 'Engineering of Advanced Materials' (EAM), Helmholtz Institute Erlangen-Nürnberg and Medical Valley. MAOT therefore offers its students opportunities for unique interdisciplinary collaboration and has contacts with a range of experts in optical technologies outside the University.

Elite Master's Degree Programme

Advanced Optical Technologies (MAOT)



PROGRAMME INFORMATION

Application and admission

1. Good Bachelor's degree in engineering or physics.
2. Previous experience with optical technologies desirable but not mandatory.
3. Proof of sufficient English language proficiency (no specific certificate required).
4. Pass in the qualification assessment process which includes a short interview.
5. Application deadline: 15 April for international applicants, 15 July for German applicants; programme can only be started in the winter semester.

Degree programme structure

■ REQUIRED BACHELOR'S DEGREE:

- Degree in engineering – e.g. electrical engineering, mechanical engineering or medical engineering – or physics
- Type of degree: Bachelor of Science (BSc) /Bachelor of Engineering (BEng)

■ MASTER'S DEGREE PROGRAMME: 4 semesters

- 1st semester: foundations of optics and laser technology, numerical tools, applications of optical technologies
- 2nd and 3rd semester: courses in two of seven possible majors (see below), project work, placement
- 4th semester: Master's thesis. Degree: Master of Science

■ DOCTORAL STUDIES:

- Graduates may pursue doctoral studies, for example at SAOT

Master's degree programme

You will start by studying the foundations of optics and laser theory, preparing you to study 2 of the following 7 majors: Optical Metrology, Optical Material Processing, Optics in Medicine, Optics in Communication, Optical Materials and Systems, Computational Optics and Physics of Light.

The degree programme is highly interdisciplinary, giving you the opportunity to develop your knowledge in a wide range of different areas. It is an international programme with courses in English and students from many different countries, allowing you to develop your language and intercultural skills.

ELITE MASTER'S DEGREE PROGRAMME IN ADVANCED OPTICAL TECHNOLOGIES (MAOT)

Study plan for the Master's degree programme

Semester 1	Semester 2	Semester 3	Semester 4
Fundamentals of Optics	Major Topic 1 (22.5 ECTS)		Master's thesis
Basics of Laser Technology	Major Topic 2 (17.5 ECTS)		
Numerical Tools	Free electives (10 ECTS)		
Topics of Optical Technologies	Project work		

Examples of core subjects and majors

Optical Metrology	Optical Material Processing	Optics in Medicine
Light Scattering	Laser Technology	Photonics in Medical Engineering
Optical Manufacturing Metrology	Optical Lithography	Clinical Applications and Associated Fundamentals of Anatomy
Biosensing	Light-Tissue Interaction	Diagnostic and Interventional Medical Image Processing
Optics in Communication	Optical Materials and Systems	Computational Optics
Linear and Non-Linear Fiber Optics	Optical Properties of Modern Materials	Computational Optics
Advanced Optical Communication Systems	Advanced Electromagnetism	Image Processing in Optical Nanoscopy
Quantum Communication	Advanced Laser	Pattern Recognition

The majors are interdisciplinary by nature and there is some overlap. Many courses can be taken as part of two majors.

For example, in 'Optics in Medicine', optical metrology is used for diagnosis (see 'Biosensing' in 'Optical Metrology'), optical material processing is used for therapy (see

'Light-Tissue-Interaction' in 'Optical Material Processing') and image processing is used as in 'Computational Optics'.

In the major 'Physics of Light', students specialise in areas such as geometrical and wave optics, Fourier optics and nonlinear optics.

WHY SHOULD YOU CHOOSE MAOT?

Contents of the degree programme

The degree programme is open to students from all disciplines of engineering as well as physics. The compulsory curriculum in the first semester ensures all students obtain the same basic knowledge.

In the second and third semester you can compile your own study plan from a wide range of courses that can be combined flexibly. You can choose to focus on one major in detail or study several majors to gain broader knowledge. It is possible to continue studying the subject of your Bachelor's degree or to explore new areas. It is also possible to decide whether you wish to study a balanced mix of engineering and physics or focus more on one of the two disciplines.

Career opportunities

A significant proportion of the people who work in the optical industry have a university education, meaning there are many opportunities for highly qualified Master's graduates. Furthermore, thanks to the many applications and increasing use of optical technologies in almost all areas of technology, graduates can pursue careers in many different areas of industry.

Germany is one of the world leaders in optical technologies alongside Japan and the United States. Erlangen is one of the leading centres for optics and optical technologies in Germany.

The constant innovation and many open research questions in this new area of technology mean that there are many opportunities for those wishing to pursue doctoral studies.

Since 2007 more than 60% of MAOT graduates have started a doctoral degree in Erlangen, at a German university or at an international university. Approximately 75% of graduates were from countries other than Germany. MAOT is an ideal starting point for a career in Germany for international applicants.