

University of Stuttgart



M.Sc. Electrical Engineering University of Stuttgart

Introductory Lecture Summer Term 2023

Ingmar Kallfass

Dean of Studies

E²
M.Sc.



Institute of
Robust Power
Semiconductor Systems

University of Stuttgart

- 24,500 students enrolled at 10 faculties
- 265 full professors
- About 5300 international students from more than 100 countries
- More than 500 partner universities throughout the world
- Head offices and manufacturing sites of global players, such as Bosch, Daimler, Porsche, and IBM
- Industry investment in Research and Development: 2nd place in Europe (Eurostat 2017)



Cultural Highlights

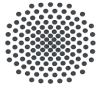


- The castles of the former kings of Württemberg and Europe's biggest zoological and botanical garden
- The Stuttgart Opera – repeated winner of the “Best Opera of the Year”
- The legendary Stuttgart Ballet – founded by John Cranko

Hightech and Innovations - The Stuttgart Region



- Head offices and manufacturing sites of global players, such as Bosch, Daimler, Porsche, and IBM
- Region with the strongest innovation index in Baden-Württemberg (Federal Statistical Office 2020)
- Industry investment in Research and Development: 2nd place in Europe (Eurostat 2017)



Support for managing many issues and when facing problems



Overview: www.student.uni-stuttgart.de/beratung/

Examples:

- **Student Counseling Center**
Organizing the study program, reorientation, change of study program, improving study skills, contact point for all unclear issues.
We can also direct you to the relevant institution.
www.uni-stuttgart.de/zsb in Vaihingen: House of Students
- **Students with a disability or chronic illness**
Advice and support to students with disabilities or chronic illnesses concerning all questions ranging from accessibility to organization of the course of studies. Commissioners: Ms Eicken und Ms von Wolff
www.uni-stuttgart.de/studium/beratung/behinderung/
in Vaihingen: House of Students
- **Studying and family**
We are a family-friendly university and support you!
Service Uni & Family, Ms. Alvermann
www.uni-stuttgart.de/studium/beratung/studieren-mit-familie/

Milestones of Your University Studies

Tutored Laboratory Courses



Exams



Lectures and Tutorials



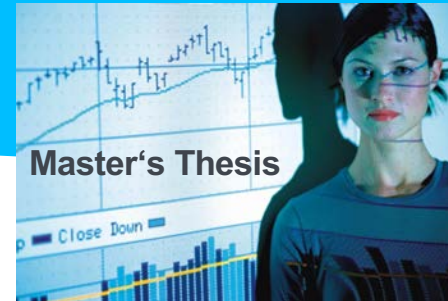
Research Project



Student Jobs „HiWi“



Master's Thesis



Challenges and Opportunities of University Studies



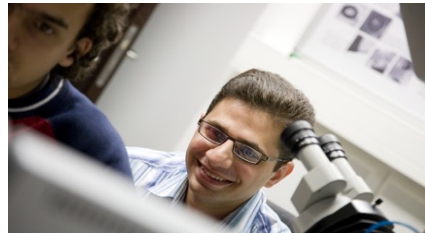
High Degree of Self-Reliance



Large Range of Electives



Studies Abroad



Early Integration in Research

a.m.m.



IIS Prof. Dr.
Jens Anders



INT Prof. Dr.-Ing.
Manfred Berroth



IPV Prof. Dr.-Ing.
Peter Birke



INES Prof. Dr.-Ing.
Joachim Burghartz



IGM Prof. Dr.-Ing.
Norbert Frühauf



IHF Prof. Dr. sc. techn.
Jan Hesselbarth



ILH Prof. Dr.-Ing.
Ingmar Kallfass



IKR Prof. Dr.-Ing.
Andreas Kirstädter



IAS Prof. Dr.-Ing.
Andrey Morozov



IEW Prof. Dr.-Ing.
Nejila Parspour



IEH Prof. Dr.-Ing.
Krzysztof Rudion



IPV Prof. Dr.
Michael Saliba



ILEA Prof. Dr.-Ing.
Jörg Roth-Stielow



INÜ Prof. Dr.-Ing.
Stephan ten Brink



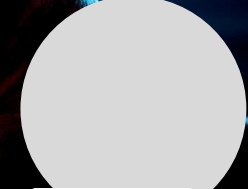
IEH Prof. Dr.-Ing.
Stefan Tenbohlen



IAS Prof. Dr.-Ing.
Michael Weyrich



ISS Prof. Dr.-Ing.
Bin Yang

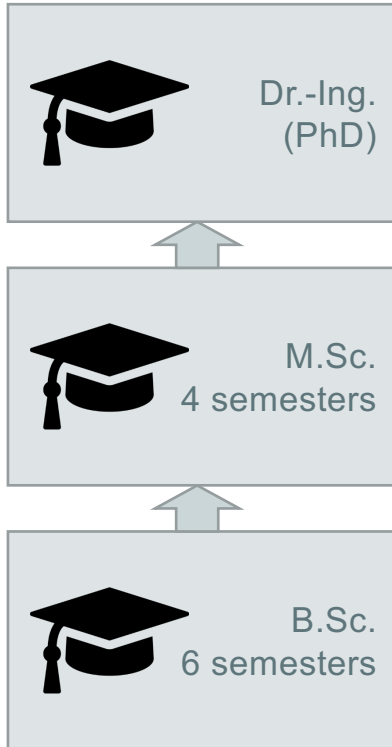


IHT vacant

DEGREE PROGRAMS



University of Stuttgart
Germany



M.Sc. Elektrotechnik und Informationstechnik
M.Sc. Elektromobilität
M.Sc. Nachhaltige Elektrische Energieversorgung
M.Sc. Electrical Engineering
M.Sc. Information Technology

EIT 
EMOB 
NEE 
EENG 
InfoTech 

B.Sc. Elektrotechnik und Informationstechnik

IMPORTANT LINKS

PROF. DR.-ING. INGMAR KALLFASS

DEAN OF STUDIES AND HEAD OF EXAMINATION COMMITTEE

STUDIENDEKAN@EI.UNI-STUTTGAERT.DE

PD DR.-ING. MARKUS GAIDA

STUDY MANAGER

INFO@EI.UNI-STUTTGAERT.DE

DEPARTMENT OF ELECTRICAL ENGINEERING AND INFORMATION
TECHNOLOGY

[HTTP://WWW.F05.UNI-STUTTGAERT.DE/EI/](http://WWW.F05.UNI-STUTTGAERT.DE/EI/)

C@MPUS (MODULE DESCRIPTIONS, EXAM REGISTRATION, ...)

CAMPUS.UNI-STUTTGAERT.DE

ILIAS (STUDY MATERIAL)

ILIAS.UNI-STUTTGAERT.DE



STRUCTURE M.SC. EENG

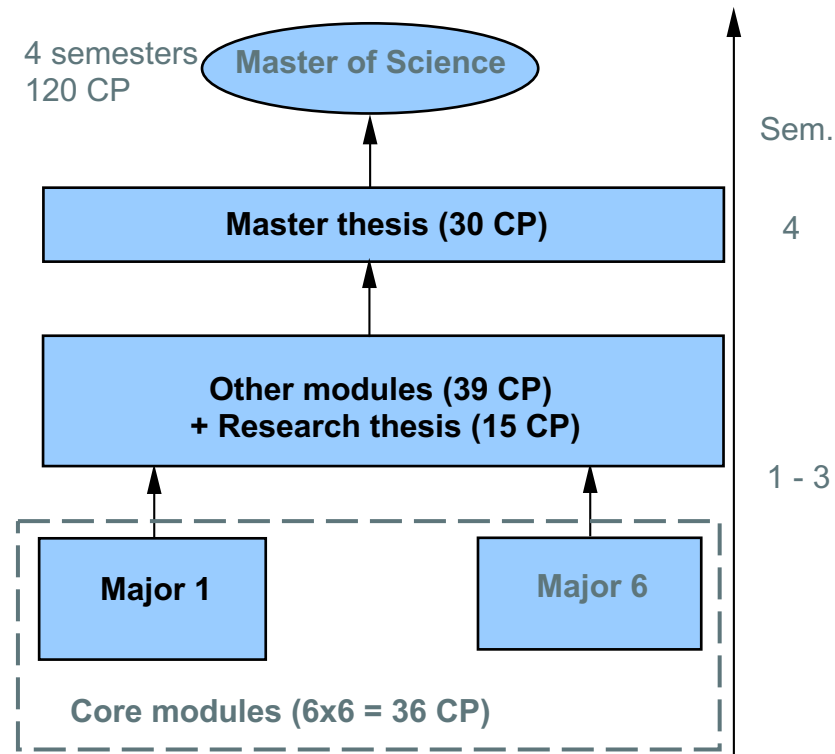


University of Stuttgart
Germany

120 Credits according to ECTS

Master's Thesis	30 credits	Typ. 6 months min. 78 credits required to register
Research Thesis	15 credits	In any R&D institution incl. industry
Interdisciplinary Key Qualifications	3 credits	rf. Campus catalogue
Lab	6 credits	1x 6 credit lab
Elective Courses	30 credits	From full department portfolio
Compulsory Courses	36 credits	6 out of topical major catalogue

4 semesters
120 CP



MAJORS IN M.SC. EENG AND M.SC. ETIT



University of Stuttgart
Germany

M.Sc. EENG

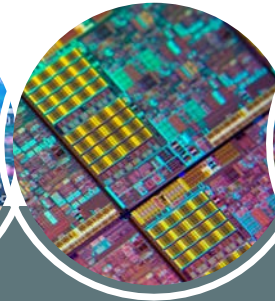
Smart Information
Processing



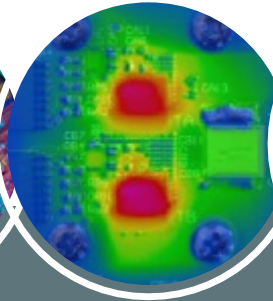
Ubiquitous
Communication
Systems



Nano- and Opto-
Electronics



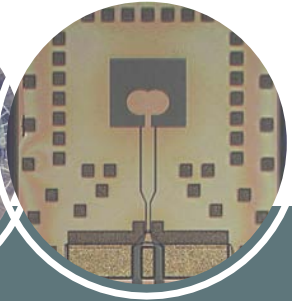
Power Electronics
Systems and
Technologies



Smart
Systems



Electro-Magnetics
Applications



Intelligente
Informations-
verarbeitung



Universelle
Kommunikations-
systems

Nano- und Opto-
elektronik

Leistungs-
elektronische Systeme
und Technologien

Intelligente
Sensoren

Hochfrequenz-
technik

Elektrische
Energiesysteme

M.Sc. ETIT

Automatisierungs- und
Regelungstechnik



ELEKTROTECHNIK UND INFORMATIK

MAJOR 1: SMART INFORMATION PROCESSING

RESPONSIBLE PROFESSOR: PROF. DR-ING. BIN YANG



University of Stuttgart
Germany

Smart Information
Processing



[-] [992-2019] Electrical Engineering	
[-] ▲ [100] Core Modules	
[-] ▲ [101] Major Smart Information Processing	
[+] M [21790] Communication Networks Architecture and Design	
[+] M [21820] Statistical and Adaptive Signal Processing	
[+] M [21830] Communications III	
[+] M [21860] Optical Signal Processing	
[+] M [22190] Detection and Pattern Recognition	
[+] M [72200] Information Theory	
[+] M [74670] Communications II	
[+] M [75960] Deep learning	
[+] M [77910] Advanced Mathematics for Signal and Information Processing	
[+] M [79260] Sensor principles and integrated interface circuits	
[+] M [101950] Semiconductor Engineering IV – Intelligent Sensors and Actors (SE IV)	

MAJOR 2: COMMUNICATION SYSTEMS

RESPONSIBLE PROFESSOR: PROF. DR.-ING. ANDREAS KIRSTÄDTER



University of Stuttgart
Germany

Ubiquitous
Communication
Systems



[-] [992-2019] Electrical Engineering		
[-] ▲ [100] Core Modules		
[+] ▲ [101] Major Smart Information Processing		
[-] ▲ [102] Major Communication Systems		
[+] M [21770] Radio Frequency Technology		
[+] M [21790] Communication Networks Architecture and Design		
[+] M [21820] Statistical and Adaptive Signal Processing		
[+] M [21830] Communications III		
[+] M [21920] Physical Design of Integrated Circuits		
[+] M [35920] Performance Modelling and Simulation		
[+] M [74670] Communications II		
[+] M [77910] Advanced Mathematics for Signal and Information Processing		
[+] M [100320] Mixed-Signal Integrated Circuits		

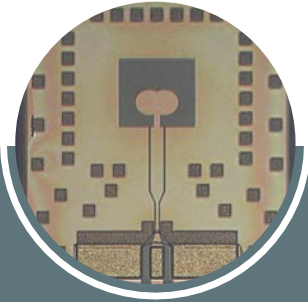
MAJOR 3: ELECTROMAGNETICS APPLICATIONS

RESPONSIBLE PROFESSOR: PROF. DR.-ING. JAN HESSELBARTH



University of Stuttgart
Germany

Electro-Magnetics
Applications



[-] [992-2019] Electrical Engineering [book icon]	
[-] ▲ [100] Core Modules [clock icon] [calendar icon]	
[+] ▲ [101] Major Smart Information Processing [clock icon] [calendar icon]	
[+] ▲ [102] Major Communication Systems [clock icon] [calendar icon]	
[-] ▲ [103] Major Electromagnetics Applications [clock icon] [calendar icon]	
[+] M [21770] Radio Frequency Technology [clock icon] [calendar icon]	[book icon]
[+] M [21830] Communications III [clock icon] [calendar icon]	[book icon]
[+] M [21920] Physical Design of Integrated Circuits [clock icon] [calendar icon]	[book icon]
[+] M [22190] Detection and Pattern Recognition [clock icon] [calendar icon]	[book icon]
[+] M [41650] Optoelectronic Devices and Circuits II [clock icon] [calendar icon]	[book icon]
[+] M [68200] Microwave Analog Frontend Design I [clock icon] [calendar icon]	[book icon]
[+] M [74670] Communications II [clock icon] [calendar icon]	[book icon]
[+] M [74770] RF CMOS [clock icon] [calendar icon]	[book icon]
[+] M [77910] Advanced Mathematics for Signal and Information Processing [clock icon] [calendar icon]	[book icon]
[+] M [79330] Microwave Engineering [clock icon] [calendar icon]	[book icon]

MAJOR 4: SMART SYSTEMS

RESPONSIBLE PROFESSOR: PROF. DR.-ING. JENS ANDERS



University of Stuttgart
Germany

Smart
Systems



[-] [992-2019] Electrical Engineering	
[-] ▲ [100] Core Modules	
[+] ▲ [101] Major Smart Information Processing	
[+] ▲ [102] Major Communication Systems	
[+] ▲ [103] Major Electromagnetics Applications	
[-] ▲ [104] Major Smart Systems	
[+] M [21710] Power Electronics II / Leistungselektronik II	
[+] M [21770] Radio Frequency Technology	
[+] M [22190] Detection and Pattern Recognition	
[+] M [56470] Software Engineering for Real-Time Systems	
[+] M [58290] Industrial Automation Systems	
[+] M [74780] Circuit Design in Nanometer Scaled CMOS	
[+] M [77910] Advanced Mathematics for Signal and Information Processing	
[+] M [79260] Sensor principles and integrated interface circuits	
[+] M [101950] Semiconductor Engineering IV – Intelligent Sensors and Actors (SE IV)	

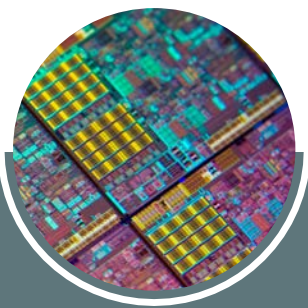
MAJOR 5: NANO AND OPTO ELECTRONICS

RESPONSIBLE PROFESSOR: PROF. DR.-ING. NORBERT FRÜHAUF



University of Stuttgart
Germany

Nano- and Opto-
Electronics



[-] [992-2019] Electrical Engineering [book icon]	
[-] ▲ [100] Core Modules [clock icon] [calendar icon]	
[+] ▲ [101] Major Smart Information Processing [clock icon] [calendar icon]	
[+] ▲ [102] Major Communication Systems [clock icon] [calendar icon]	
[+] ▲ [103] Major Electromagnetics Applications [clock icon] [calendar icon]	
[+] ▲ [104] Major Smart Systems [clock icon] [calendar icon]	
[-] ▲ [105] Major Nano and Opto Electronics [clock icon] [calendar icon]	
[+] M [21770] Radio Frequency Technology [clock icon] [calendar icon]	[book icon]
[+] M [21860] Optical Signal Processing [clock icon] [calendar icon]	[book icon]
[+] M [21880] Advanced CMOS Devices and Technology [clock icon] [calendar icon]	[book icon]
[+] M [21920] Physical Design of Integrated Circuits [clock icon] [calendar icon]	[book icon]
[+] M [29160] Photovoltaics III [clock icon] [calendar icon]	[book icon]
[+] M [68200] Microwave Analog Frontend Design I [clock icon] [calendar icon]	[book icon]
[+] M [74750] Thin Film Technology [clock icon] [calendar icon]	[book icon]
[+] M [74760] Engineering Materials [clock icon] [calendar icon]	[book icon]
[+] M [100320] Mixed-Signal Integrated Circuits [clock icon] [calendar icon]	[book icon]
[+] M [101910] Quantum Electronics I – Tunneling and Quantum Well Devices (QE I) [clock icon] [calendar icon]	[book icon]

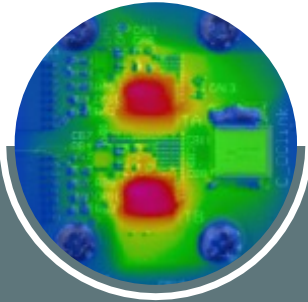
MAJOR 6: POWER-ELECTRONIC SYSTEMS AND TECHNOLOGIES






















































University of Stuttgart
Germany

RESPONSIBLE PROFESSOR: PROF. DR.-ING. INGMAR KALLFASS





Power Electronics
Systems and
Technologies



<input type="checkbox"/>  [992-2019] Electrical Engineering 	
<input type="checkbox"/>  [100] Core Modules  	
<input type="checkbox"/>  [101] Major Smart Information Processing  	
<input type="checkbox"/>  [102] Major Communication Systems  	
<input type="checkbox"/>  [103] Major Electromagnetics Applications  	
<input type="checkbox"/>  [104] Major Smart Systems  	
<input type="checkbox"/>  [105] Major Nano and Opto Electronics  	
<input type="checkbox"/>  [106] Major Power-Electronic Systems and Technologies  	
<input type="checkbox"/>  [21710] Power Electronics II / Leistungselektronik II  	
<input type="checkbox"/>  [73410] Applied Numerical Field Computations  	
<input type="checkbox"/>  [74680] Semiconductor Engineering III - Semiconductor Power Devices (SE III)  	
<input type="checkbox"/>  [74690] Semiconductor Engineering II - Nano-CMOS Era (SE II)  	
<input type="checkbox"/>  [74760] Engineering Materials  	
<input type="checkbox"/>  [74790] Robust Power Semiconductor Systems I  	
<input type="checkbox"/>  [79340] Robust Power Semiconductor Systems 2  	

Program Structure

https://www.uni-stuttgart.de/studium/studienangebot_assets/electrical-engineering/pdf/Studienverlaufsplan_MSc_Electrical_Engineering.pdf

1. Term (Winter)	2. Term (Summer)	3. Term (Winter)	4. Term (Summer)
Core Module EENG 1 6 CP	Core Module EENG 3 6 CP	Core Module EENG 5 6 CP	Master Thesis 30 CP
Core Module EENG 2 6 CP	Core Module EENG 4 6 CP	Core Module EENG 6 6 CP	
Supplementary Module 6 CP	Supplementary Module 6 CP	Supplementary Module 6 CP	
Supplementary Module 6 CP	Supplementary Module Key Competences 3 CP	Research Project 15 CP	
Supplementary Module 6 CP	Master Lab Course 6 CP		
Sum: 30 CP	Sum: 27 CP	Sum: 33 CP	Sum: 30 CP
Total count for credit points (CP): 120			
(University of Stuttgart, Version 01.10.2018)			
Legend:			
 : Core Modules		 : Supplementary Modules	
 : Key Competences (non-technical)		 : Master Thesis	

Major Power Electronic Systems and Technologies

Weekly schedule / Core Modules only (choose 6)

- Winter term

	Montag, 25.10.2021	Dienstag, 26.10.2021	Mittwoch, 27.10.2021	Donnerstag, 28.10.2021	Freitag, 29.10.2021
07:00					
08:00					Power Electronics II - Exercise PWR 47 - V 47.05 (PF47/EG0) Abhaltung; Übung;
09:00					
10:00		Power Electronics II - Lecture PWR 09 - V 9.32 (PF09/03/V) Abhaltung; Vorlesung;	Battery modelling and Energy Management - Exercises 4.282 (PF47/04/4.282)	Engineering Materials - Lecture PWR 57 - V 57.06 (PF57/EG0) Abhaltung; Vorlesung;	
11:00	Robust Power Semiconductor Systems 1 - Lecture PWR 09 - V 9.32 (PF09/03/V)	Engineering Materials - Exercise PWR 09 - V 9.32 (PF09/03/V) Abhaltung; Übung;			
12:00					
13:00					
14:00		Battery modelling and Energy Management	Robust Power Semiconductor Systems 1 -		
15:00					
16:00					
17:00					
18:00					
19:00					

- Summer term

	Montag	Dienstag	Mittwoch	Donnerstag	Freitag
07:00					
08:00			Semiconductor Engineering III - Semiconductor Power Devices (SE III) - Lecture		Semiconductor Engineering II - Nano-CMOS Era (SE II) - Exercise Abhaltung; Übung;
09:00			Semiconductor Engineering III - Semiconductor Power Devices (SE III) - Exercise	Robust Power Semiconductor Systems 2 - Exercises Abhaltung; Übung;	
10:00					
11:00	Applied Numerical Field Computations - Lecture with Exercise Abhaltung; Vorlesung mit		Semiconductor Engineering II - Nano-CMOS Era (SE II) - Lecture Abhaltung; Vorlesung;		
12:00					
13:00					
14:00		Robust Power Semiconductor Systems 2 - Lecture Abhaltung; Vorlesung;		Applied Numerical Field Computations - Lecture with Exercise Abhaltung; Vorlesung mit	
15:00					
16:00					
17:00					
18:00					
19:00					

+electives
+ labs

Build your individual weekly schedule using Campus
(rf. separate introduction to Campus)

Major Power Electronic Systems and Technologies

Recommended Electives

Semiconductor Engineering - Bipolar Technology (SE I)	Michael Oehme	6	WS
Battery Modeling and Energy Management	Peter Birke	6	
Physical Design of Integrated Circuits	Manfred Berroth	6	SS
Software Engineering for Real-Time Systems	Christof Ebert	6	WS

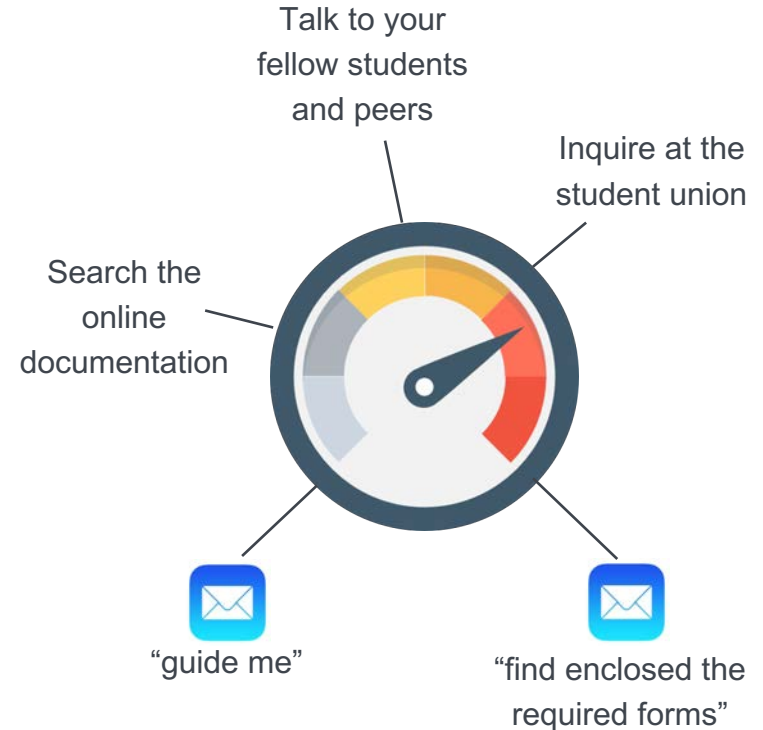
Build your individual knowledge profile using electives

Choose from

- All courses offered in the EIT department and selected associated courses
- Core modules of other majors
- Approved courses from other universities, e.g. in the frame of Erasmus

In Case of Questions / Inquiries / Applications

- General questions on immatriculation, visa, legal issues etc.
 - Contact the admissions office: <https://www.uni-stuttgart.de/en/study/application/admissions-office/>
- Issues concerning the course of studies
 - Contact the Study office of Electrical Engineering and Information Technology: info@ei.uni-stuttgart.de
 - Check out <https://www.f05.uni-stuttgart.de/en/ei/study-programs/> first!
- Applications for recognition of elective courses from other degree programmes, (justified) prolongation of bachelor/master theses, ...
 - Contact the chair of the examination board: pav@ei.uni-stuttgart.de
 - Note: such applications require a justification: <https://www.f05.uni-stuttgart.de/en/ei/departement/forms/>



Dean's Lunch

- Meet and discuss with the dean of students over lunch
- Date: Wednesdays, 13:00-14:00, see table below
- Room: ILH meeting room (Pfaffenwaldring 47, ET11, 1.160)
- Infos will be shared on ILIAS course [Introduction M. Sc. Electrical Engineering](#)
- Sessions

Session	Focus topics	Date
1	Course registration, weekly schedule, introduction to Campus and ILIAS	Wednesday, April 19
2	Exam registration	Wednesday, May 17
3	Finding topics and places for research projects and master's thesis	Wednesday, July 12



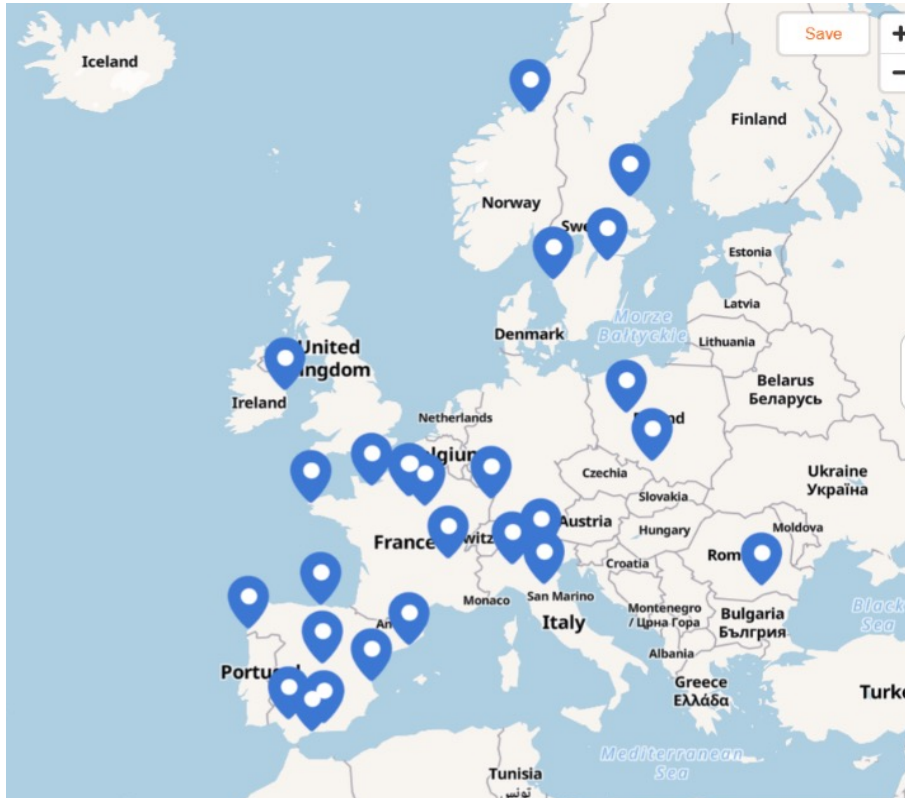
International

On the following pages you will find information on the international activities in the Department of Electrical Engineering and Information Technology.

- Students of the University of Stuttgart can participate in **exchange programs** (Europe and beyond)
- No tuition fees abroad, specific support before and during the stay
- Application deadlines: about one year before the planned stay abroad
- Financial support (Erasmus+ scholarship...)

Partner universities of the Department (within Erasmus+)

32 partner universities in 9 countries



Erasmus coordinators at the Department:

Dr. Markus Gaida, Virginie Herbasch

erasmus@ei.uni-stuttgart.de

Tel: +49 711 67248

Office 4.115, Pfaffenwaldring 47

<https://www.f05.uni-stuttgart.de/en/ei/International/study-abroad/>

International Office of the University of Stuttgart:

<https://www.uni-stuttgart.de/universitaet/international/service/>

SAVE THE DATE

International Days at Faculty 5

„Study abroad“ with testimonials from Outgoings

Wednesday, 21. Juni 13.00-14.00 room 4.282

And other events for international students!

International Service Point Faculty 5



Complementary to the services of the university's International Office:

- Support and contact point for the faculty's international students
 - Promoting further internationalization at our faculty
 - Events & networking activities for and with international students
-
- Stay informed! Regularly check our [ISP-Website](#) & [LinkedIn](#) for the latest news
 - Registration for additional German language courses from April 3-11, 2023 via [C@MPUS](#)
 - Registration for the [Semester Opening](#) on May 5 at 6:00 pm by April 30 the latest!



Meta Geisbüsch, LL.M. & Laura Busch, M.A.

University of Stuttgart

International Service Point (ISP) | Faculty 5

Pfaffenwaldring 47 | Room 4.270

+49 (0)711 685 -67926 / -67277

internationalstudents@f05.uni-stuttgart.de

Gayathri Narayana, B.Eng., Student Assistant



University of Stuttgart

Faculty 5: Computer Science, Electrical Engineering and
Information Technology

Semester Opening!

For newly enrolled students
of English conducted Master's
programs of Faculty 5

May 4, 2023 | 6:00 - 7:30 pm

Pfaffenwaldring 47 | Lecture hall 47.04

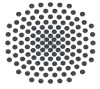
Program

- ❖ Welcome address by the Dean & Study Deans of the English conducted Master's programs of Faculty 5
- ❖ Introduction of actors & institutions of Faculty 5 / the University of Stuttgart
- ❖ Casual Get-Together with fellow students, while enjoying drinks, snacks & music!



Please register
by April 30,
2023





Tips and counseling for good learning!

- Counseling for individual students and study groups
- Weekly learning tips newsletter
- Workshop:
 - *Learning methods: Preparing for your degree and exams*

Contact: lernberatung@uni-stuttgart.de

More information: www.uni-stuttgart.de/zsb/lernberatung

Know how to learn!

Learning counseling offers

...and how about the inclusion and connection to industry?

- Many guest lectures from industry can be taken as electives
- Participation in R&D projects with partner companies at the institutes in the frame of student helper contracts
- Field trips, lectures, seminars, conferences a.m.m.
- Study thesis (15 ECTS in M.Sc.) can be performed either at a university institute or in industry, also abroad
- Bachelor- and Master's theses* in the frame of cooperations between the department's institutes and companies are available in Germany and abroad

*the **definition of the content and supervision** of the thesis must be carried out **by a professor from the Department of Electrical Engineering and Information Technology**. Content definition and supervisory approval by a professor in the department must be **obtained before the thesis is started**.



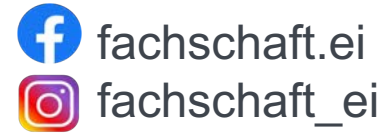
Getting involved as a mentor

Intercultural Mentoring Program

Have you studied at the University of Stuttgart for at least three semesters and do you speak German well? Do you want to interact with international students? Why not join our Intercultural Mentoring Program?

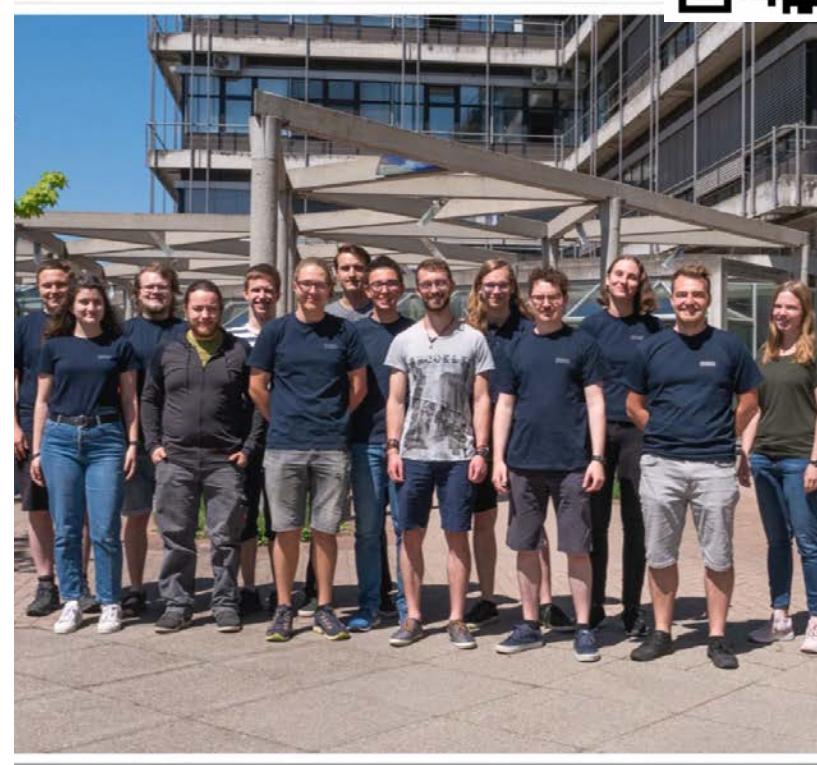
- <https://www.student.uni-stuttgart.de/en/participate/mentoring/>

Electrical Engineering Students Council (so-called „Fachschaft“)



- “Fachschaft” = **association** of all students studying *Electrical Engineering* or any other program at the *Department of Electrical Engineering*.

→ simply put 😊: group of student’s that are studying the same thing and want to **voluntarily** help make the whole study experience better and support whoever needs help.
- Activities: representation of interests in university bodies (e.g. Faculty Council), info-point for questions and problems, First Semester Introduction, Party (eMotions), day trips to companies and workshops, etc.
- Great opportunity to meet other (German) students
- <https://www.ei.faveve.uni-stuttgart.de/en/>



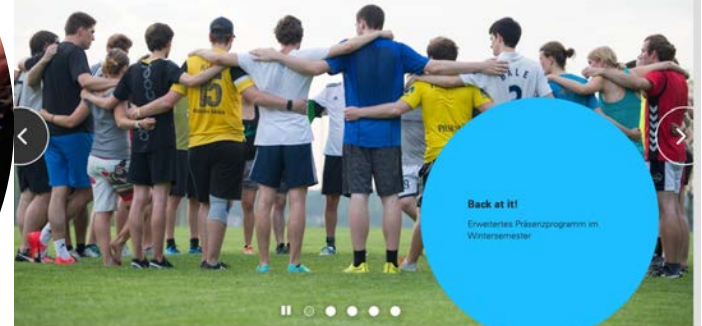
<https://www.unimusik.uni-stuttgart.de>



<https://www.greenteam-stuttgart.de>



<https://www.hochschulsport.uni-stuttgart.de/>



<http://www.emotions-stuttgart.de/>



<http://studlab.ei.faveve.uni-stuttgart.de/>





University of Stuttgart

Institute of Robust Power Semiconductor Systems

Thank You!



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**Viel Erfolg und
eine gute Zeit in
Stuttgart**

