Intro to A&R

Orientation Week '23

Fachschaft Automation and Robotics

Agenda

01. Overview

What to expect over the next 4 semesters.

02. Majors

What career paths you can choose.

03. Mandatory and Elective Courses

Description of courses offered.

04. Thesis

Important things to consider about your Thesis.

05. Grading and Credit System
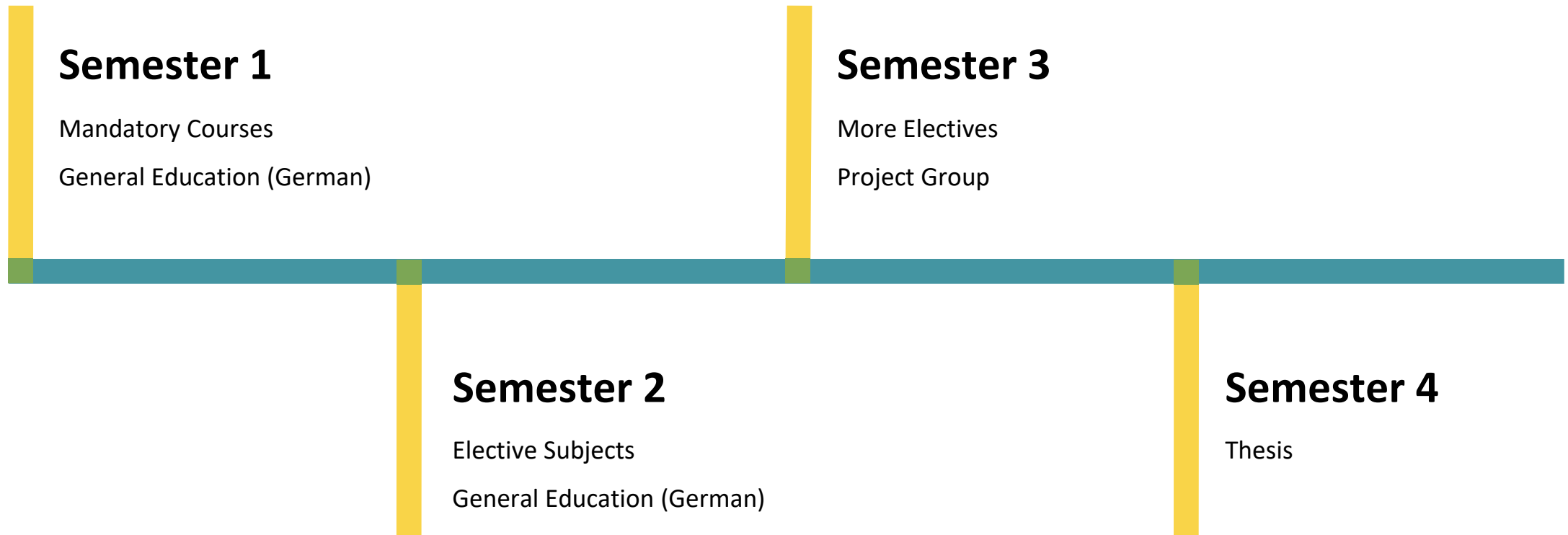
How does the German education system work?

Program Structure

Course Structure and Organization

Expected Program Structure

Semester 1

Mandatory Courses

General Education (German)

Semester 3

More Electives

Project Group

Semester 2

Elective Subjects

General Education (German)

Semester 4

Thesis

Another Expected Program Structure

Semester 1

Mandatory Courses

General Education
(German)

Semester 3

Mandatory Courses

Project Group

Semester 5

Thesis

Semester 2

Elective Subjects

General Education
(German)

Semester 4

Elective Courses

Project Group

*You can split your course content to your comfort, and it is not mandatory to complete the degree program within 2 years.

1. Semester	2. Semester	3. Semester	4. Semester
Advanced Engineering Mathematics Mandatory Course 6 Credits	**Elective Classes** in total 45 Credits, at least 30 Credits in the selected major field of study (Process Automation, Robotics, Cognitive Systems)		**M A S T E R T H E S I S** 30 Credits
Control Theory and Applications Mandatory Course 6 Credits			
Computer Systems Mandatory Course 6 Credits	**Project Group*** 12 Credits		
Modeling and Control of Robotic Manipulators Mandatory Course 6 Credits			
Scientific Programming in Matlab Mandatory Course 3 Credits	**General Education 2*** 3 Credits		
General Education 1* 3 Credits			

Semester - 1

- Imparts basic knowledge in all necessary fields related to the program

- One course from each department

- Allows students from all undergraduate backgrounds to come on the same page

- Good combination of lab and theory exercises

- Re-evaluate your goals, competency and plan your path for future electives

Semester 1 Schedule (Expected)

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1st Semester Schedule				
MONDAY	**TUESDAY**	**WEDNESDAY**	**THURSDAY**	**FRIDAY**
08:00 Control Theory and Applications (Lecture)	Advanced Eng. Mathematics (Lecture)	Computer Systems (Lecture)	Computer Systems (Lecture + Tutorial)	
09:00				
10:00 Modelling and Control of Robotic Manipulators (Lecture)				
11:00	Scientific Programming in MATLAB		Adv Eng. Math (Tut Batch 2) 10:00-12:00	
12:00		Advanced Eng. Mathematics (Tutorial Batch 1)	Modelling and Control of Robotic Manipulators (Biweekly Lab)	
13:00				
14:00				
15:00				Control Theory and Applications (Lecture + Tutorial)
16:00				
17:00				
18:00				

You can view the updated Curricula Timetable on LSF

Semester 2 / 3

- Time to start thinking about major

- Take up a wide range of electives depending on your interests and goals

- Take up a project group of your choice in any one of these semesters *

- Get yourself ready for the end game (thesis)

Semester 4

- Take up a thesis topic either at the university or at a company*

- Start preparing yourself for the job market or even a PhD

- Don't leave without saying goodbye

Small Tip - Keep learning German whether you need the credits for it or not.

Some Additional Information/Tips

- You can **try/attend courses** without giving the exams for them

- Exams of most courses have **2 attempts in a semester**. You can give any of them. These attempts are usually 1 month apart

- Semesters are **shorter** than they seem

- Studies can creep up on you. Don't skimp on your preparation !

Some Additional Information/Tips

- You can always go for an **Internship**. But as internships are 40hrs/week, you will need to take a semester away.

- **Semester Abroad** options are also possible

- You can take **electives from other Universities** in "University Alliance Ruhr(UA Ruhr)" i.e., Ruhr Universität Bochum and University of Duisburg and Essen

Mandatory Courses

Everything you will learn in the first semester

Advanced Engineering Mathematics

Credit Points : 6

Instructor : Prof Hogenrich Damanik

Graded : Yes

- Topics ranging from Linear Algebra, Calculus to Differential Equations.

- Weekly lectures and tutorials.

- Assignments to submit and quiz as prerequisite for final examination.

- Final examination is a written exam, normally of 2 hours.

Control Theory and Applications

Credit Points : 6

Instructor : Prof Sergio Lucia

Graded : Yes

- Topics ranging from Modelling of systems, state space theory, transfer functions and design of controllers.

- Weekly lectures and tutorials.

- Midterm exam which may or may not be graded.

- Final examination is a written exam, normally of 2 hours.

Computer Systems

Credit Points : 6

Instructor : Prof Ralf Burda

Graded : Yes

- Topics ranging from microprocessors, storage technologies, data networks and memories.

- Weekly lectures and tutorials.

- Mandatory project demonstration before the examination.

- Final examination is a written exam, normally of 2 hours.

Modelling and Control of Robotic Manipulators

Note for new students: There is no lecture on 9th October 2023. First lecture is on 16th October.

Credit Points : 6

Instructor : Prof Frank Hoffmann

Graded : Yes

- Topics ranging from spatial representation, kinematics, dynamics, actuators, motion control and ROS.

- Weekly lectures and biweekly optional labs.

- Mandatory project demonstration of 1 credit at the end of the semester.

- Final examination is a written exam (5 credits), normally of 2 hours.

Scientific Programming in MATLAB

Credit Points : 3

Instructor : Prof Frank Hoffmann

Graded : No

- Covers basic programming techniques in MATLAB.

- Weekly lab submission, minimum 8 out of 11 labs should be passed for successful completion.

- Every lab is accompanied by an in-person quiz, 50% grade is needed to pass the quiz.

General Education 1 & 2

Credit Points : 3 + Points

Graded : No

- For international students, it is recommended to take German as a foreign language.

- Depending on your level of proficiency you can enrol yourself in the respective level.

- Placement test might be needed to enrol yourself directly to a level higher than A1.

Elective Courses

Make your own choices going forward

Elective Courses

Credit Points: 3/5/6/10

- Need to acquire **45 credits** worth of subjects as electives

- Each subject is **tagged for either one or more major**

- **At least 30 credits** should be acquired in the major of choice

- List of available electives: https://etit.tu-dortmund.de/studium-und-lehre/studiengaenge/master-automation-and-robotics/elective-classes/

Project Group

Working in teams on challenging topics

Project Group

Credit Points : 12

Graded : No

- Chance to work on practical projects based on research areas of different departments

- Every Semester, departments **publish list of available projects**. Choose the one you like

- Work in a **Team**

- Good **preparation for Thesis**

- Can be done in either the **SUMMER or WINTER semester.** Usually **lasts for 1 semester**

- Introduction to upcoming projects is given at the end of the previous semester

- Students need to register themselves for a specific project

- Keep in mind that most projects have **limited seats** so it is always safe to have a backup option
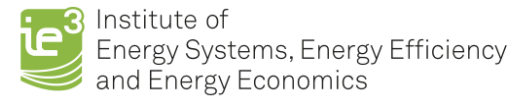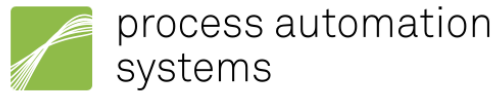
Majors

Career paths available for you

Process Automation

- Study fields related to control engineering, automation and design of process industry

- Fundamentals of the major provided by "**Control Theory and Applications**" in 1st Semester

- Possible Courses – **Process Automation, Data Based Dynamic Modelling, Distributed and Networked Control, Advanced Process Control, Nonlinear Model Predictive Control**

- Relevant Chairs -   process automation systems   ie³ Institute of Energy Systems, Energy Efficiency and Energy Economics

Robotics

- Study fields related to robotics- manipulators, control, networks, automated systems

- Fundamentals of major provided by "**Modelling and Control of Robotic Manipulators**" course in 1st Semester

- Potential Courses – **Mobile Robots, Application of Robots, Networked Mobile Robot Systems, Machine Learning in Robotics, Automated Driving, Automotive Systems**

- Relevant Chairs -   Institut für Roboterforschung   CNI Communication Networks Institute   Lehrstuhl für Förder- und Lagerwesen
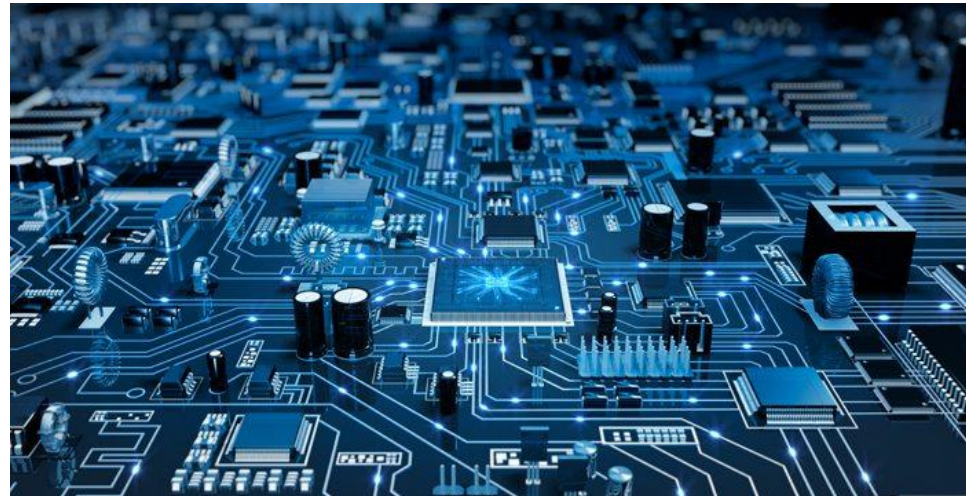
Cognitive Science

- Study fields related to Embedded Systems, Communication Networks, Machine Learning, Computer Vision, Artificial Intelligence

- Fundamental knowledge of major provided by Computer Systems course **

- Potential Courses – **Machine Learning in Robotics, Computer Vision, 3d Computer Vision, Computational Intelligence, Machine Learning Methods for Engineers, Cyber-Physical Systems, Hardware-Software Codesign**

- Inter-Disciplinary : Relevant for almost all departments

- Relevant Chairs -

Some Additional Information/Tips

▪ Almost every course has **more than 1 major associated with them**. For example – "Mobile Robots" counts towards both *Cognitive Systems* as well as *Robotics*

▪ Don't worry much about Majors. **Keep choosing subjects you like**. You Major will align itself.

Departments

Different departments relevant for the course

Various Departments we usually work with

e·it Fakultät für Elektrotechnik und Informationstechnik

Fakultät Maschinenbau

fi fakultät für informatik

bci Fakultät Bio- und Chemieingenieurwesen

fakultät für mathematik m!

Thesis

Everything you need to know about your thesis.

Thesis

Credit Points: 30

Graded: Yes

- Topic for the thesis should be relevant to the major of choice

- You are free to do your thesis in **any department/chair**

- Approach professors/department well in advance

- **Minimum 80 credits** should have been acquired including all the mandatory courses

- Once you have registered, you have a **deadline of 6 months** to submit your thesis

- Can be done in the **University** under the guidance of a professor

- In some cases, it might be possible to do it in a **Company** as well

04 – Credit System and Grading

Credit System

How the workload is defined in German Education

Credit System

- European Credit Transfer System (ECTS) is followed in German universities.

- Expected credit load for each semester is 30 CP.

- 1 Credit point relates to 30 hours of workload (including self-study).

- Theoretical subjects have at least 5 credits and can go up to 10 credits.

- Lab subjects usually have 3 credits.

04 – Credit System and Grading

Grading

How the workload is defined in German Education

Grading System

- Best possible grade is **1,0** in the German scale.

- Worst possible grade is **5,0**.

- Normal passing percentage is **50% of tota**l for technical courses and 60% for language courses

- Depending on the course grading scale can be absolute or relative

- **Note that not all courses are graded**. For example – Lab courses, Language Courses, Project Group

Grade	Text	Declaration
1.0	sehr gut (very good)	pass
1.3	Sehr gut (excellent) –	pass
1.7	Gut (good) +	pass
2.0	gut (good)	pass
2.3	Gut (good) –	pass
2.7	Befriedigend (satisfactory) +	pass
3.0	Befriedigend (satisfactory)	pass
3.3	Befriedigend (satisfactory) –	pass
3.7	Ausreichend (sufficient) +	pass
4.0	Ausreichend (sufficient)	pass
4.3	Nicht ausreichend (unsatisfactory)	Nicht bestanden (fail)
4.7	Nicht ausreichend (unsatisfactory)	Nicht bestanden (fail)
5	Nicht ausreichend (unsatisfactory)	Nicht bestanden (fail)

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Type of Exams

- Every Professor decides the type of exam they want to conduct and the grading scale

- **Written exams**: Duration of these are varied.

- **Oral exams**: Duration is mostly between 30 to 45 minutes.

- **Presentations**: Duration is mostly between 30 to 45 minutes.

- Lab courses usually do not have a final examination, evaluation is done by submission of reports or completion of the given experiments.

- Every exam can be **attempted for a maximum of 3 times**

- Failing a mandatory course 3 times leads to ex-matriculation from the degree program.

- Thesis can only be attempted for a maximum of 2 times.

Q&A

Ask us through:
Mail: fachschaft.ar@tu-dortmund.de
Instagram: https://www.instagram.com/fsar_tudortmund/