Syllabus

Summer School Programme 2018

German Engineering and Language
July 01 to July 28, 2018

1. Programme Goals

The Summer School 2018 on **German Engineering and Language** is primarily designed to provide insight into the broad field of German cutting-edge engineering, the programs taught at TU Darmstadt as well as into the German language and culture. The students will focus on selected and highly relevant problem areas, ranging from automotive engineering to aeronautical engineering as well as mechatronic engineering and production engineering.

During the summer school, the students will work in international and interdisciplinary teams to find solutions to complex practical tasks. The various engineering classes offer an insight into the latest research findings combined with practical applications. In addition, students will have several opportunities during company visits, such as: Mercedes-Benz, Continental AG, Merck Chemical Engineering Company and EUMETSAT (European Organisation for the Exploitation of Meteorological Satellites) in order to get hands on insight into engineering applications and future employment opportunities.

2. Programme Prerequisites

The Summer School 2018 has no formal prerequisites. The participants must be enrolled as Full-Time students at their home university. Students are expected to apply with a CV, a transcript of records and a motivation letter.

This programme will be most useful to students with the following background and skills:

German Language

No German language skills required. However, for participants with advanced German language skills, classes with a higher level of German will be provided.

Intercultural Competence Training (ICT): Working and Studying in Germany

Cultural awareness is an asset, but not required.

Lecture Series: Engineering Courses

Undergraduate students from the fields of Engineering and Sciences.

Outside of class time students are expected to: Do the assigned readings, prepare for workshops, complete homework assignments and other exercises.

Basic German I – CEFR Level A1, A2 & B1 / 4 ECTS – 2 US Credits

Course Description:

These courses are designed to teach German speaking, reading, writing and listening skills, as well as to introduce vocabulary based on the topics covered. Topics are supplemented by texts and accompanied by various controlled speaking and writing exercises, as well as a number of open discussions.

Level A1 is the lowest level of generative language use. The leaner will be able to interact in a simple way to fulfill their everyday basic needs. This course serves as a first introduction to the German language.

Course Goals and Objectives: Level A1 / CEFR

Based on the Common European Framework of Reference (CEFR), the goal of this course is for students to be able to understand and use familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type.

Students will be able to introduce themselves and others and can ask and answer questions about personal details, such as where they live, people they know and things they have.
Students will be able to interact in a simple way provided that the other person talks slowly and clearly and is prepared to help.

Level A2 is the level of basic language use. The learner will be able to understand and produce common sentences and phrases of every day communication in familiar contexts.

Course Goals and Objectives: Level A2 / CEFR

Based on the Common European Framework of Reference (CEFR), the goal of this course is for students to be able to understand and use familiar everyday expressions and phrases aimed at the exchange of simple information.

Students will be able to converse about themselves, their families, shopping, work and their environment. Students will be able to exchange information in routine situations about their basic needs in a grammatically simple yet efficient way.

Level B1 reflects the level specification for a visitor to a foreign country. The learner is able to communicate coherently about familiar topics and experiences.

Course Goals and Objectives: Level B1 / CEFR

Based on the Common European Framework of Reference (CEFR), the goal of this course is for students to be able to understand main points of clear standard input on familiar matters regularly encountered in work, school, leisure, etc.

Students will be able to deal with most situations that are likely to arise in every day routines and situations likely to arise whilst travelling in an area where the language is spoken.

Students will be able to produce simple connected texts on topics which are familiar or of personal interest. They will also be able to describe experiences and events, dreams, hopes and ambitions, and briefly give reasons and explanations for opinions and plans.

Course Structure: 14 units / 4 weeks = 56 units of 45 minutes each.

Prerequisites: none/A1/A2, depending on the class the student chooses.

Learning Outcomes:

Functions	Grammar	Lexis	Discourse Markers	Topics/Content
Directions	Adjectives: in their predicative function	Actions of daily life	Connecting words: und, aber, oder, dann, danach	Family life
Describing habits and routines	Comparatives and superlatives	Food and drink		Health and body
Giving personal information	Common (un)countable nouns	Nationalities and countries		Hobbies and pastimes
Greetings	Imperatives (+/-)	Personal information		Holidays
Telling the time	Modal verbs: “können”, “dürfen”, “müssen”	Things in the town, shops and shopping		Leisure activities
Understanding and using numbers	Past simple of “sein” and “haben”	Verbs – basic, separable, regular and irregular		Shopping
Understanding and using prices	Possessive articles			Work and Jobs
	Prepositions of place and time			
	Pronouns: simple, personal			
	Questions (alternative and information questions)			
	Statements (positive and negative)			
	Basic syntax of main clauses			

Grading:

The whole final grade is determined in three parts: final exam (50%), oral exam/presentations (25%) and active participation/homework (25%)

- The grade for the final exam is determined as follows: 25% grammar, 25% listening comprehension, 25% reading comprehension and 25% text production (writing).
- The grade for the oral exam/presentation is determined as follows: pronunciation, fluency and lexis and correct usage of grammar (each count for 25% of the oral exam grade).
- 25% of the grade is based on active, thoughtful participation in class activities, demonstrating the student’s willingness to learn and preparation for each class ahead of time. The participation grade will be reduced if the student is demonstrably unprepared for or unwilling to participate in class activities.

Teaching Material:
Motive A1 Kursbuch ISBN 978-3-19-001880-2
Motive A1 Arbeitsbuch ISBN 978-3-19-061880-4

Motive A2 Kursbuch ISBN 978-3-19-001881-9
Motive A2 Arbeitsbuch ISBN 978-3-19-031881-0

Motive B1 Kursbuch ISBN 978-3-19-001882-6
Motive B1 Arbeitsbuch ISBN 978-3-19-031882-7

Intercultural Competence Training: Studying and Working in Germany / 2 ECTS – 1 US Credit

Course Description:
In times of globalization, intercultural competence is a basic skill for life and work in order to deal with the increasing cultural diversity in our societies. This seminar will train non-German people who live, study and work in Germany, especially in the Rhine-Main area, in intercultural competence skills. In addition to factual background information, this course will introduce students to practical techniques, skills and knowledge to help them successfully arrange themselves within an intercultural working and learning environment in Germany.

Part 1: Intercultural Competence – An Introduction
- Culture with an upper-case or lower-case "C?"
- Dimensions of culture and cultural standards
- Culture shock - myth or fact?
- Cultural competence – how to get along

Part 2: Working in Germany
- German time management – a key to success
- Integration, inclusion or segregation, how to meet local people and to take part in non-university events and activities
- Topics and taboos in Germany – traps and pitfalls in everyday life and behavior
- Germans like to speak English – but who understands their Germish or Denglish?

Part 3: Studying in Germany
- How to communicate with your professors and your co-students: learning the different levels of (in)formality in speaking and writing to different people
- How to study in Germany successfully – become familiar with German students' study strategies and comparisons and contrasts to students' study habits in different areas of the world

Company visits (such as):
- Mercedes-Benz (German automobile manufacturer)
- Continental AG (German automotive manufacturing company)
- EUMETSAT (European Organisation for the Exploitation of Meteorological Satellites)
- MERCK (German chemical, pharmaceutical and life sciences company)

Course Goals and Objectives:
Recognition of cross-cultural similarities and differences between Germany and the home country of the students, and understanding the reasons for those similarities and differences based on academic analysis.

Course Structure: 4 units of in-class lectures and discussions, 5 field trips to corporations.

Prerequisites: none

Learning Outcomes:

- Understanding of different European definitions of the term “culture”
- Understanding and critical reflection on the concepts of “cultural dimensions“ and “cultural standards”
- Identifying, judging, and solving critical incidents in cross-cultural situations
- Getting acquainted with and understanding the German university system and its autonomous learning requirements

Grading:
The students’ entire grade is based on the participation in the seminar as well as a presentation that shows that the obtained knowledge can be usefully applied in a real world context.

The student’s presentation will be evaluated on its clarity and organization, the demonstrated understanding of intercultural competence, and the ability to apply that understanding to a specific element of interculturality. The students will select their own topics.

Teaching Material: Hard copies handed out by the teacher in class

Lecture Series: Engineering Courses / 2 ECTS – 1 US Credit

Academic head: Prof. Dr.-Ing. Cameron Tropea

I.) Automotive Engineering, Prof. Dr. rer. nat. Hermann Winner

Course Description:
The course gives an introduction into automotive engineering by typical problems in this field. The problems are demonstrated by driving experiments and demonstrations.

Contents:

- Theory of Driving Resistance
- Theory of Braking Dynamics
- Introduction to Advanced Driver Assistance Systems (ADAS)
- Introduction to research projects at FZD

Course structure:

- Introduction to Griesheim Airfield (test vehicles)
- Experiments & Driving Demonstrations ADAS
  a. Driving Resistance
  b. Braking
  c. ADAS Demonstration
- FZD presentation by Prof. Winner

- Analysis of experiment 1: Driving Resistance
- Analysis of experiment 2: Braking
- Written exam

Prerequisites:
None.

Learning Outcomes:
The students know the basics of driving resistances, braking dynamics and advanced driver assistance systems. In addition they have received an insight into the research projects of an automotive engineering institute.

Grading:
A written exam at the end of the last lecture tests the student's knowledge with respect to the theory-lessons.

II.) Aeronautical Engineering, Prof. Dr.-Ing. Cameron Tropea, Prof. Dr.-Ing. Uwe Klingauf

Course Description:
This course aims to introduce students to basic concepts in experimental aerodynamics and flight mechanics. In the first session lectures provide an overview of these concepts and in the laboratory, the students use selected measurement techniques to derive aerodynamic data. In the second session, lectures again provide an overview. Students will then conduct practical experiments in the institute's research flight simulator to determine the performance of an airplane.

Contents:
Session 1: Institute of Fluid Mechanics and Aerodynamics (SLA), Griesheim Campus
- Schlieren, shadowgraphy, interferometry
- Mach number measurements on trisonic blow-down tunnel; flow over an inclined flat plate
- Measurements of a heated plate using a Mach-Zehnder interferometer; determination of plate temperature
- Demonstration of PIV using a circulating water channel

Session 2: Institute of Flight Systems and Automatic Control (FSR), Lichtwiese Campus
- Introduction to physics of flight
- Aircraft performance: lift and drag, drag polar curve
- Measurement and evaluation of selected performance parameters

Course Structure
- Lectures – "Experimental Aerodynamics", "Schlieren, Shadowgraphy, Interferometry", "Introduction to Flight Mechanics and Flight Testing"
- Laboratory exercises
- Lab tour (SLA, FSR)

Prerequisites:
None.

Learning Outcomes:
The students obtain an overview of measurement techniques used in aerodynamics and become familiar with the use of specific techniques, in particular the Schlieren technique, shadowgraphy and the Mach-Zehnder interferometer for the measurement of Mach number and temperature respectively. In the second session, students are introduced to methods of flight testing.

Grading:
The grade will be based on an examination comprising comprehension questions (short questions and multiple-choice questions) and a presentation of group measurement results (5-6 per group)

III.) Mechatronic Engineering, Prof. Dr.-Ing. Stephan Rinderknecht

Course Description:
The course gives a mechatronic systems engineering perspective on automotive drive trains, which focuses on system integration. We present design methods and system integration techniques in a lecture and convey additional insights in small exercises and a visit in our lab.

Contents:
- Design process and documentation
- V model design and quality aspects
- Geometric and functional integration
- Interrelations to automatic control

Course structure:
- Lectures: “Engineering design methods” & “Mechatronic system integration”
- Lab tour: Mechatronic research at IMS
- Theoretical exercise & laboratory experiment: “Investigation of an automated electric drive train”

Prerequisites:
None.

Learning Outcomes:
The students understand mechatronic engineering design methods at different levels, i.e., component and system level of automotive drive trains. They are able to apply design methods to improve the system integration of mechatronic systems regarding geometry and function.

Grading:
The knowledge of the students will be assessed in a written exam.

IV.) Production Engineering, Prof. Dr.-Ing. Dipl.-Wirtsch.-Ing. Peter Groche, Prof. Dr.-Ing. Eberhard Abele, Prof. Dr.-Ing. Dipl.-Wirtsch.-Ing. Joachim Metternich

Course Description:

The course aims at giving a deeper insight into production technology, production management and energy efficiency as it is developed at the institutes PTW and PtU. Thus, the course focuses, on the one hand, on the special applications of lasers in manufacturing. Laser welding and laser cutting processes will be studied as examples. On the other hand, the use of new, innovative digital technologies in forming technology is demonstrated with respect to process monitoring. Furthermore, workshops in the Process Learning Factory CiP and in the ETA-Factory will give a first, hands-on insight into Lean Production and energy efficiency techniques.

Content:

Session 1: Lasers in manufacturing (PtU), Campus Lichtwiese

- Lecture and introduction: Laser systems in manufacturing
- Cutting and welding with the laser system
- Assessment of the manufactured parts

Session 2: Value Stream Mapping (PTW), Campus Lichtwiese, CiP-Factory

- Value Stream Mapping theory in classroom
- Hands-on application of learned theory in the Learning Factory

Session 3: Digitalization in forming technology (PtU), Campus Lichtwiese

- Applications of Industrial Internet and Industrie 4.0 at shop-floor level
- Value-adding to products through digitalization of forming processes
- Development of autonomous manufacturing processes

Session 4: Energy Value Stream Mapping (PTW), Campus Lichtwiese, ETA-Factory

- Energy Value Stream Mapping theory in classroom
- Hands-on application of learned theory in the ETA-Factory

Course Structure:

- Theoretical Lectures – "Laser ssystems in manufacturing", "Digitalization in forming technology", "Value Stream Mapping", "Energy Value Stream Mapping"
- Learning Factory/Laboratory/theoretical exercises
- Lab/experimental field tour (PTW, PtU)
- Exam

Prerequisites:

None.

Learning Outcomes:

In this course, the theory of laser technology will be taught including the relevant factors of influence. In addition, the acquired theoretical knowledge will be deepened in a short research project executed at the laser processing centre. As a second topic, a theoretical knowledge of the integration of sensor and actuator technology in forming tools will be taught. A practical demonstration of forming tools equipped with sensors for real time process monitoring will deepen the theoretical knowledge. Furthermore, the students will get in touch with the topic "Value Stream Mapping", a core concept of Lean Production, and with the "Energy Value Stream Mapping", a suitable tool for detecting energy losses in industrial value streams.

Grading:

The grade will be based on an examination comprising comprehension questions (short questions and multiple-choice questions) and/or a presentation of project results (5-6 students per group).

4. Scheduled Programme 2018

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Week I	**July 02**	**July 03**	**July 04**	**July 05**	**July 06**	**July 07**	**July 08**
08:30 – 12:00	Welcome Prof. Cameron Tropea Summer School Team	German Language Course A1, A2 or B1	Automotive Engineering: Experiments & Driving Demonstrations ADAS *Group A* *Airfield Griesheim*	German Language Course A1, A2 or B1	Intercultural Training	Excursion Munich (incl. Tour BMW museum)	Excursion Munich (incl. Tour Neuschwanstein castle)
Break	Lunch Break	Lunch break	Lunch break	Lunch break	Lunch break		
13:30 – 17:30	City Tour SIM-Cards	Automotive Engineering: Introduction & Theory	Automotive Engineering: Experiments & Driving Demonstrations ADAS *Group B* *Airfield Griesheim*	Automotive Engineering: FZD presentation by Prof. Winner & Analysis & Written Exam	Intercultural Training		
	Heinerfest (Fireworks)	High Rope Course		Barbeque: Beer garden			
Week II	**July 09**	**July 10**	**July 11**	**July 12**	**July 13**	**July 14**	**July 15**
08:30 – 12:00	German Language Course A1, A2 or B1	German Language Course A1, A2 or B1	German Language Course A1, A2 or B1	German Language Course A1, A2 or B1	Company Visit: EUMETSAT	Excursion Frankfurt/Main	
Break	Lunch break	Lunch break	Lunch break	Lunch break	Lunch break		
13:30 – 17:30	Aeronautical Engineering: Institute of Fluid Mechanics and Aerodynamics *Airfield Griesheim*	Aeronautical Engineering: Institute of Fluid Mechanics and Aerodynamics *Airfield Griesheim*	Aeronautical Engineering: Institute of Flight Systems and Automatic Control *Campus Lichtwiese*	Aeronautical Engineering: Institute of Flight Systems and Automatic Control *Campus Lichtwiese*	Aeronautical Engineering: Test & Presentation *Campus Lichtwiese*		
		Guided Tour Mathildenhöhe & Rosenhöhe			International Cooking		

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Week III	**July 16**	**July 17**	**July 18**	**July 19**	**July 20**	**July 21**	**July 22**
08:30 – 12:00	Company Visit: Continental	Company Visit: Mercedes-Benz	German Language Course A1, A2 or B1	German Language Course A1, A2 or B1	German Language Course A1, A2 or B1	Hiking Tour Ludwigshöhe Darmstadt	
Break	Lunch Break		Lunch break	Lunch break	Lunch break		
13:30 – 17:30	Mechatronic Engineering: Lecture "Engineering Design Methods"		Mechatronic Engineering: Lecture "Mechatronic system integration"	Mechatronic Engineering: Lab tour Automotive research at IMS	Mechatronic Engineering: Theoretical exercise & laboratory experiment "Investigation of an automated drive train"		
			Hessen State Museum		International Cooking & Party		
Week IV	**July 23**	**July 24**	**July 25**	**July 26**	**July 27**	**July 28**	**July 29**
08:30 – 12:00	German Language Course A1, A2 or B1	German Language Course A1, A2 or B1	German Language Test A1, A2 or B1	Company Visit: tbc	Studying and Living in Hesse & Delivery of the Transcripts	Departure	
Break	Lunch break	Lunch break	Lunch break	Lunch break	Lunch break		
13:30 – 17:30	Production Engineering: Lasers in manufacturing *Campus Lichtwiese*	Production Engineering: Value Stream Mapping *Campus Lichtwiese, CiP-Factory*	Production Engineering: Digitalization in forming technology *Campus Lichtwiese*	Production Engineering Test: Energy Value Stream Mapping *Campus Lichtwiese, ETA-Factory*	Farewell "Schlossgarten"		
	Surprise						

The four-week International Summer School Programme 2018 consists of three components:

1. Intensive German Language Course
2. Intercultural Competence Training: Studying and Working in Germany (ICT)
3. Engineering Courses and Workshops
4. Social Programme

5. Grading

For Summer School 2018 students, grades are calculated as follows:

<u>**Credit points Summer School 2018 at TU Darmstadt**</u>				
Sessions	**Amount of sessions**	**Workload in hours**	**25-30 h = 1 ECTS**	**1 ECTS = 0,5 US Credit**
German Intensive Language Course				
> Class hours	14	42	1,68	0,84
> Homework, preparation and exam		58	2,32	1,16
Total: German Intensive Language Course		100	4,00	2
Intercultural Competence Training: Study and Work in Germany				
> Intercultural Training	2	6	0,24	0,12
> Project work and presentation	2	6	0,24	0,12
> Homework and preparation		6	0,24	0,12
Intercultural Experience				
> Company visits	4	12	0,48	0,24
> Excursions	3	12	0,48	0,24
> Social Events	4	8	0,32	0,16
Total: Intercultural Competence Training: Living and Studying in Germany		50	2,00	1
Lecture Serie: Engineering courses				
> Automotive Engineering incl. homework and preperation	3	15	0,5	0,25
> Aeronautical Engineering incl. homework and preperation	5	15	0,5	0,25
> Mechatronic Engineering incl. homework and preperation	5	15	0,5	0,25
> Production Engineering incl. homework and preperation	5	15	0,5	0,25
Total: Lecture Serie: Engineering courses	18	60	2	1
Total		**210**	**8,00**	**4**