

# KEEP

KETTERING ENGINEERING  
EXCHANGE PROGRAM

**Esslingen University**

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Germany

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[HTTPS://WWW.HS-ESSLINGEN.DE/EXCHANGE-PROGRAMMES-KEEP-INTAP](https://www.hs-esslingen.de/exchange-programmes-keep-intap)

Faculty of Mobility and Technology  
and International Centre



## INTRODUCTION

The Kettering Engineering Exchange Program was originally developed in conjunction with Kettering University (former GMI) in Flint, Michigan, USA. The program has been running for more than 30 years. The basic idea was to extend international student exchanges. The primary objectives were to offer interesting lectures in automotive competency and to give participants cultural and historical impressions. In addition the program offers a variety of field trips to the German car industry, its suppliers and other scenic places in Germany.

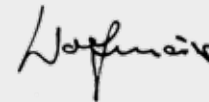
In the meantime we have developed the program into one of the most important and one of the most successful international programs at Esslingen University. KEEP has become a consistent feature of our wide range of international activities. The program offers an excellent mixture of intellectually stimulating classes, interesting field trips and cultural visits. Our dedicated lecturers will do all they can to make your stay enjoyable and informative. Acquired subject knowledge, a command of the German language and familiarity with German culture will give you a competitive edge when applying for jobs with a European dimension either in the U.S. or abroad.

The lectures start once a year in the spring term and run from April to July. In the first week after arrival the International Office organizes an orientation program consisting of housing information, assistance with bureaucratic procedures like filling in forms, opening a bank account, health insurance etc. The students will also get support with the enrolment procedure, as well as a guided campus tour. The course language is English. The number of participants is limited to 20 members.

Each semester the International Office of Esslingen University will provide the coordinator of Kettering University with the exact application deadline, information about the application procedure and program schedule. Please contact your coordinator for more detailed information.

We are looking forward to receiving your applications.

You are warmly welcome!



Prof. Christof Wolfmaier  
President of Esslingen University



Prof. Berkemer  
Academic Coordinator KEEP

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## CHOICE OF COURSES

### BASIC ELEMENTS OF FEEDBACK CONTROL TECHNOLOGY

Professor Dr. Joachim Berkemer  
Phone +49(0)711 397-3376, Joachim.Berkemer@hs-esslingen.de  
Room S 04.005

### COMPUTER SIMULATION IN AUTOMOTIVE ENGINEERING

Professor Dr. Thomas Schirle  
Phone +49(0)711 397-3232, Thomas.Schirle@hs-esslingen.de  
Room S14.204

### FLUID MECHANICS

Professor Dr.-Ing. Christian Saumweber  
Phone +49(0)711 397-3633, Christian.Saumweber@hs-esslingen.de  
Room S 02.210

### GERMANY AT A GLANCE

M.A. Mr. Holger Starzmann  
Holger.Starzmann@hs-esslingen.de

### GERMAN AS A FOREIGN LANGUAGE

Team of German Language Instructors

## IMPORTANT CONTACT INFORMATION

### INTERNATIONAL OFFICE INCOMING COORDINATOR

incoming@hs-esslingen.de

### FACULTY OF MOBILITY AND TECHNOLOGY

Academic Coordinator  
Professor Dr. Joachim Berkemer  
Phone +49(0)711 397-3376, Joachim.Berkemer@hs-esslingen.de

### INTERNATIONAL CENTRE AND GRADUATE SCHOOL

Programme Management  
M.A. Ms. Kremena Daneva  
Phone +49(0)711 397-3335, Kremena.Daneva@hs-esslingen.de

### POLICE

Phone 110 (all over Germany)

### EMERGENCY/FIRE BRIGADE

Phone 112 (all over Germany)



## FIELD TRIPS

### AS PART OF THE PROGRAM „INTERNATIONAL FRIENDS“

- | Heidelberg (castle and historic town center)
- | Lake Constance (Zeppelin museum, castles and historic town center, boat trip)
- | Tübingen (city tour with historical site visits)

### AS PART OF DEPARTMENTAL ACTIVITIES

- | Mercedes plant, Sindelfingen
- | Mercedes plant, Stuttgart-Untertürkheim
- | Porsche plant, Stuttgart-Zuffenhausen
- | Audi plant, Neckarsulm

A selection of the excursions is planned every semester.

## BASIC ELEMENTS OF FEEDBACK CONTROL TECHNOLOGY

(MECH-430 DYNAMIC SYSTEMS WITH CONTROLS)

### INSTRUCTOR

Professor Dr. Joachim Berkemer

### PREREQUISITES

- | Mathematics
- | Mechanical Engineering
- | Electrical Engineering

### TOPICS (1 h = 45 min)

- | Introduction to continuous-time control
- | Descriptions of control loop elements
- | Elementary transfer elements (P, I, D, dead time)
- | Lag elements (PT1, IT1, DT1, PT2)
- | Composition of transfer elements for control equipment
- | Modelling of transfer systems
- | Nyquist plots, Bode diagrams, stability
- | Controller design and control loop synthesis

>>> Total 40 h

### TEXTBOOK/REFERENCE MATERIALS

Bilingual (German/English) handouts; Authors: Prof. Heinrich Abel, Prof. Hermann Kull, Prof. Jürgen van der List, Prof. Douglas P. Looze, Prof. Gerhard Walliser

### ASSESSMENT & COURSEWORK

Written Midterm and Final exam (2x 90min)

### ESTIMATED ABET CATEGORY CONTENT

Theory: 4 credits

### GOALS >>>>>

The course should give the basic theoretical knowledge necessary for the use of modern applications of control technology.

# COMPUTER SIMULATION IN AUTOMOTIVE ENGINEERING

## (MECH-330 DYNAMIC SYSTEMS WITH VIBRATIONS)

### INSTRUCTOR

Professor Dr. Dipl.-Ing. Thomas Schirle

### PREREQUISITES

- | Mathematics (desirable but not mandatory): ordinary differential equations  
linear algebra, eigenvalues
- | Engineering mechanics, linear vibration theory
- | Basic Computer programming (desirable but not mandatory)

### TOPICS (1 h = 45 min)

- | Simulation and simulation tools in automotive engineering
- | Processes, systems, models, continuous/discrete systems
- | Mathematical modeling of a car suspension
- | Introduction to MATLAB/SIMULINK
- | Numerical aspects: integration methods, stability, accuracy
- | Esslingen Driving Simulator Experience

>>> Total 8h

### LABORATORY PROJECTS (1 h = 45 min)

- | Programming and simulation of a car suspension
- | SIMULINK model of a car suspension
- | SIMULINK S-Function for embedding of user defined models
- | State Space form of car suspension LTI model
- | Automatic linearization of nonlinear systems
- | Modeling approaches for a nonlinear shock absorber
- | "Skyhook" damping concept for active suspension systems
- | Active suspension system with road preview (mechanics, hydraulics, control).
- | Simulation of system performance.

>>> Total 32h

### TEXTBOOK/REFERENCE MATERIALS

Handout in English language

### ASSESSMENT & COURSEWORK

Written Midterm and Final exam (2x 90min)

### ESTIMATED ABET CATEGORY CONTENT

4 credits

### GOALS >>>>>

- | To understand basic concepts, strength and weaknesses of dynamic systems simulation in the design process
- | To gain insight into possible numerical effects and suitable solver methods
- | To apply related software for programming and dynamic system simulation
- | Experience potentials and limitations of a full scale driving simulator

## FLUID MECHANICS

(MECH-322 FLUID MECHANICS)

### INSTRUCTOR

Professor Dr. Christian Saumweber

### PREREQUISITES

Introductory physics and mathematics courses

### TOPICS (1 h = 45 min)

- | Properties of Fluids
- | Hydro- and Aerostatics
- | Hydro and Aerodynamics
  - | Stream Filament Theory
  - | Introduction to Gas Dynamics
  - | Flows with Friction
  - | Dimensional Analysis

>>> Total 40 h

### TEXTBOOK/REFERENCE MATERIALS

Lecture notes

### ASSESSMENT & COURSEWORK

Written Midterm and Final exam (2x 90min)

### ESTIMATED ABET CATEGORY CONTENT

4 credits

This course is an introduction to the fundamental concepts of fluid dynamics. It provides the basic tools necessary to apply the conservation principles of mass, momentum and energy to non-viscous and viscous fluids in the analysis of engineering systems.

<<<<<< GOALS



## GERMANY AT A GLANCE: HISTORY, POLITICS AND CULTURE (SSCI-398 SOCIAL SCIENCE STUDY ABROAD ADVANCED TOPICS)

### INSTRUCTOR

M.A. Mr. Holger Starzmann

### PREREQUISITES

None

### TOPICS (1 h = 45 min)

- | Introduction: general aspects of German history
- | The first Germans and the Romans
- | The Mediaeval period - Encounter between Orient and Occident
- | The Reformation and Restoration
- | Formation of the Prusso-German nation-state and World War I
- | The Weimar Republic
- | The Third Reich and World War II
- | Germany in a bipolar world
- | The rush to German unity
- | The German political system
- | People and Culture: Language, Religions, Holidays and Traditions
- | Today's Germany in Europe and in the European Union

### TEXTBOOK/REFERENCE MATERIALS

- | Detwiler, D.S. A Short History of Germany. Southern Illinois University Press, 1989
- | Fulbrook, Mary. German History Since 1800. London: Bloomsbury Academic, 2010
- | Jarner, Peter, ed. Modern Germany: Politics, Society and Culture. London: Routledge, 1998
- | Jones, Alun. The New Germany: A Human Geography. New York: Wiley/Longman, 1994
- | Jarausch, Konrad H. The Rush to German Unity. Oxford University Press, 1994
- | Wehling, Hans-Georg. The German Southwest. Baden-Wuerttemberg: History, Politics, Economy and Culture. Stuttgart: Kohlhammer, 1991
- | Fulbrook, Mary. The People's State: East from Hitler to Honecker. New Haven, Conn. London: Yale University Press, 2008
- | Additional materials, maps, newspaper and online articles and handouts



- | Online-Sources:  
<http://www.spiegel.de/international/>  
<http://edition.cnn.com/>  
<http://www.ft.com/home/europe>

### ASSESSMENT & COURSEWORK

- | Oral presentation and final written exam
- | Participation in class

### ESTIMATED ABET CATEGORY CONTENT

4 credits

### ECTS CREDITS

4 credits

## GOALS >>>>>

This course introduces students to German history from the Middle Ages to the Berlin Republic. It covers major events in medieval and early modern times, such as the German Reformation and the Thirty Years War, but the main focus is on the nineteenth and twentieth centuries. In particular, the course will involve the study of the German Confederation, the formation of the Prusso-German nationstate and the imperial era, the period of the World Wars, and the history of the two Germanys after the end of the Third Reich and their path to the reunification. On completion of the focus on his-tory, students will be familiar with basic knowledge in German geogra-phy, the political system and the cultural legacy of Germany.

# GERMAN AS A FOREIGN LANGUAGE LEVEL A1

(LANG-297 LANGUAGE FREE ELECTIVE)

### INSTRUCTOR

Team of Instructors

### PREREQUISITES

No technical prerequisites.  
 Participation of the online assessment test before arrival

### TOPICS (1 h = 45 min)

- | The basic course covers a large amount of practical training of the German standard language. Typical matters of the students in everyday situations are important. Emphasis is placed on developing and training sound communicative skills to be able to function independently in all situations inside and outside the university. A variety of basic topics and authentic situations from daily life are used, e.g. grocery shopping, small talk, orientation in the city.
- | Main grammatical topics
  - | Conjugation of verbs (regular and irregular) in the present tense, verbs with vowel change
  - | Personal pronouns, possessive pronouns
  - | Genders of nouns, definite and indefinite articles, negative articles in nominative and accusative
  - | W-questions, yes/no questions
  - | Modal verbs „können“ (be able to), „mögen“ (like to), „möchten“ (would like to)
  - | Negative statements
  - | Preterite (simple past) of „haben“ (have) and „sein“ (be)
  - | Singular, plural
  - | Connectives „aber“ (but), „oder“ (or), „und“ (and)
  - | Word order in statements, W-questions, yes/no questions, sentences with modal verbs.
  - | Time indications.

### PROJECTS

1 excursion – visiting a production company  
 (e.g. Kessler Sekt – Esslingen)





### TEXTBOOK/REFERENCE MATERIALS

Information about the textbook and additional learning materials will be given by the teacher in the first lesson

### ASSESSMENT & COURSEWORK

- | Final exam
- | Participation in class

### ESTIMATED ABET CATEGORY CONTENT

4 credits

### ECTS CREDITS

4 credits

Students arriving with a good command of German language may take the assessment test for German language classes for STIPUS students and, depending on the test performance, join the courses at advanced levels.

### GOALS >>>>>

The International Office offers “German as a foreign language” courses on different levels for international exchange students and free mover students. During orientation, students participate in a brief written test and oral inter-view to evaluate which level fits best. Small groups allow students an active exchange of ideas with teachers and other students. During the courses, students will apply skills required for communication in the German standard language and – for advanced learners – in the scientific language

## EXAMPLE OF A TYPICAL KEEP SCHEDULE

TIME	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
07:35 am – 09:05 am					
09:30 am – 11:00 am	Computer Simulation	Fluid Mechanics	Fluid Mechanics	Field trip	Feedback Control
11:15 am – 12:45 pm	Computer Simulation			Field trip	Feedback Control
02:00 pm – 03:30 pm				Field trip	
03:45 pm – 05:15 pm				Field trip	
05:30 pm – 07:00 pm		Germany at a glance	German as a foreign language	Field trip	