

# KEEP

KETTERING ENGINEERING  
EXCHANGE PROGRAM

Hochschule Esslingen  
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[WWW.HS-ESSLINGEN.DE/INCOMING](http://WWW.HS-ESSLINGEN.DE/INCOMING)

Faculty of Automotive Engineering  
and International Office



## 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 20 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 Hochschule Esslingen – University of Applied Sciences. KEEP has become a consistent feature of our wide range of our 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 24 members.

Each semester the International Office of Hochschule Esslingen 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. Wolfmaier  
Dean of the Faculty of Automotive Engineering  
KEEP Coordinator

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## CHOICE OF COURSES

### ALTERNATIVE POWERTRAIN

Prof. Werner Klement  
Phone +49(0)711 397-3346, Werner.Klement@hs-esslingen.de  
Room S 02.008

### BASIC ELEMENTS OF FEEDBACK CONTROL TECHNOLOGY

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

### COMPUTER SIMULATION IN AUTOMOTIVE ENGINEERING

Dipl.-Ing. Thomas Schirle  
Phone +49(0)711 397-3232, Thomas.Schirle@hs-esslingen.de  
Room S 13.205

### FINITE ELEMENT ANALYSIS (FEA)

Dr. Gerald Scheday  
Phone +49 179 464-0305, Gerald.Scheday@de.bosch.com

### FLUID MECHANICS

Prof. Dr. Thomas Hanak  
Phone +49(0)711 397-3416, Thomas.Hanak@hs-esslingen.de  
Room S 04.214

### GERMANY WITHIN EUROPE

M.A. Udo Renner  
Phone +49(0)7071 964-658, Udo.Renner@hfwu.de

### GERMAN AS A FOREIGN LANGUAGE

M.A. Karin Böse-Janissek  
Phone +49(0)7161 155-44, Norbert.Janissek@t-online.de

## IMPORTANT CONTACT INFORMATION

### INTERNATIONAL OFFICE

Monika Zellner  
Phone +49(0)711 397-3116, Monika.Zellner@hs-esslingen.de

### FACULTY OF AUTOMOTIVE ENGINEERING

Kremena Daneva  
Phone +49(0)711 397-3335, Kremena.Daneva@hs-esslingen.de

### FACULTY OF AUTOMOTIVE ENGINEERING

Dean Prof. Dipl.-Ing. Christof Wolfmaier, KEEP Coordinator  
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Christof.Wolfmaier@hs-esslingen.de

### POLICE

Phone 110 (all over Germany)

### EMERGENCY/FIRE BRIGADE

Phone 112 (all over Germany)



## FIELD TRIPS

### AS PART OF THE COURSE "GERMANY AT A GLANCE"

- Dachau (concentration camp memorial site)
- Augsburg (city tour with historical site visits)
- Lake Constance (Zeppelin museum, castles and historic town center, boat trip)
- Tübingen (city tour with historical site visits)

### AS PART OF DEPARTMENTAL ACTIVITIES

- Robert Bosch GmbH, Reutlingen or Stuttgart-Feuerbach
- Daimler AG, Sindelfingen
- Daimler AG, Stuttgart-Untertürkheim
- Porsche AG
- Audi Assembly Line, Neckarsulm
- Gottlieb-Daimler-Birth-Building, Schorndorf

A selection of the excursions from the above list is planned every year.

A report of each of the departmental field trip is required for credit transfer. The abstracts have to be sent to Prof. Wolfmaier.

## BASIC ELEMENTS OF FEEDBACK CONTROL TECHNOLOGY

### COORDINATOR

Prof. Dr.-Ing. Joachim Berkemer

### PREREQUISITES

- Mathematics
- Mechanical Engineering
- Electrical Engineering

### TOPICS (1 h = 45 min)

Introduction to continuous-time control	5h
Descriptions of control loop elements	3h
Elementary transfer elements (P, I, D, dead time)	7h
Lag elements (PT1, IT1, DT1, PT2)	7h
Composition of transfer elements for control equipment	3h
Modelling of transfer systems	5h
Nyquist plots, Bode diagrams, stability	7h
Controller design and control loop synthesis	3h

**>>> 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

Midterm exam, final exam	4h
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### 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

## COORDINATOR

Dipl.-Ing. Thomas Schirle

## PREREQUISITES

- Mathematics (desirable but not mandatory): solution of systems of linear OEDs, eigenvalues and eigenvectors
- Engineering mechanics including linear vibration theory
- Computer programming (desirable but not mandatory): C

## TOPICS (1 h = 45 min)

Notation: processes, systems, models, states, systems of OEDs	4h
Related mathematics (repetition): eigenvalues, eigenvectors, solution of systems of OEDs, stability	4h
Modeling, discretization and numerical integration;	4h
Integration scheme of Euler; Trapezoidal rule;	
Runge-Kutta methods; steps of the simulation process	
Related numerical mathematics: stability, accuracy,	8h
regions of stability, stiff systems; nonlinearities and their numerical treatment: play, dry friction, stops, etc.; simulation software	
Simulation models in automotive engineering	4h

>>> Total 24 h

## LABORATORY PROJECTS (1 h = 45 min)

Analysis and simulation of electronic circuits with Pspice	4h
A simple 2-mass nonlinear vibration model in C	4h
Introduction to MATLAB/SIMULINK and its simulation tools	4h
Engine/drivetrain simulation in SIMULINK	4h
Introduction to ACSL; A simple model in hydraulics	4h
Vehicle dynamics simulation and animation with CASCaDE	4h

>>> Total 24 h

## TEXTBOOK/REFERENCE MATERIALS

Printed handout in English language (86 p.)

## ASSESSMENT & COURSEWORK

Midterm exam, final exam 4h

## ESTIMATED ABET CATEGORY CONTENT

4 credits

## GOALS >>>>>

- To understand basic concepts, strength and weaknesses of dynamic systems simulation in the design process
- To apply related software (MATLAB/SIMULINK, ACSL, ADAMS, DADS, SPICE, CAS DaDE, e.g.)
- To gain insight into, and to deal with, possible numerical problems when applying simulation software

## FLUID MECHANICS

### COORDINATOR

Prof. Dr. Thomas Hanak

### PREREQUISITES

Introductory physics and mathematics courses.

### TOPICS (1 h = 45 min)

Introduction	2h
Fluid statics	4h
Elementary fluid dynamics – The Bernoulli equation	8h
Fluid kinematics	4h
Finite control volume analysis	8h
Viscous flow in pipes	8h
Flow over immersed bodies	6h

>>> Total 40 h

### TEXTBOOK/REFERENCE MATERIALS

Bruce R. Munson, Donald F. Young & Theodore H. Okiishi, Fundamentals of Fluid Mechanics, 5th Ed. Wiley, 2006.

### ASSESSMENT & COURSEWORK

- There will be one midterm and a final examination. All exams will be closedbook, but a handwritten cheat sheet (about letter size) will be allowed.
- The final grade will be determined as follows:
 

Midterm exam	30%
Final exam	70%
- A list of suggested homework exercises from each chapter of the textbook will be posted.

### ESTIMATED ABET CATEGORY CONTENT

4 credits

### <<<<<< GOALS

This course is an introduction to the fundamental concepts of fluid statics and 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.

## GERMANY AT A GLANCE: HISTORY, POLITICS AND CULTURE (SOCIAL SCIENCE ELECTIVE 300 LEVEL)

### COORDINATOR

M.A. Udo Renner

### PREREQUISITES

Only for Kettering University: HUMN 201, SSCI 201, COMM 101

### TOPICS (1 h = 45 min)

- Introduction: general aspects of German history
- The first Germans and the Romans
- The Mediaeval period and the Thirty Years War
- 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
- Today's Germany in Europe

### PROJECTS

Instructional field trips will be conducted during the course. For an overview please refer to page 6.

### TEXTBOOK/REFERENCE MATERIALS

- Detwiler, D.S. A Short History of Germany. Southern Illinois University Press, 1989
- Fulbruck, Mary. A Concise History of Germany. Cambridge: University Press, 2004
- 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
- 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

- Midterm (multiple choice test) and final exam (essay test)
- Participation in class and on excursions

### 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 history, students will be familiar with basic knowledge in German geography, the political system and the cultural legacy of Germany.

## GERMAN AS A FOREIGN LANGUAGE 1

### COORDINATOR

M.A. Karin Böse-Janissek

### PREREQUISITES

No prerequisites

### TOPICS (1 h = 45 min)

- Communication activities
- Basic German sounds, rules of spelling, sentence structure, grammar
- Arrivals
- Communication e-mail
- My life
- Travel
- In town
- Places
- People
- Work
- Leisure
- Stories
- The past

### PROJECTS

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

### TEXTBOOK/REFERENCE MATERIALS

Schritte International 1: Kurs- und Arbeitsbuch/Hueber  
 (Europäischer Referenzrahmen)





**ASSESSMENT & COURSEWORK**

Final exam

**ESTIMATED ABET CATEGORY CONTENT**

4 credits for Kettering students

**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 >>>>>**

This course will be an introduction to speaking, reading and writing German. It will provide the basic knowledge in the German language and grammar necessary to communicate in every-day situations.

**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		Feedback Control	Field trip
11:15 am – 12:45 pm	Computer Simulation			Feedback Control	Field trip
02:00 pm – 03:30 pm		Fluid Mechanics			Field trip
03:45 pm – 05:15 pm		Germany at a glance			Field trip
05:30 pm – 07:00 pm		Germany at a glance	German as a foreign language		Field trip