KETTERING ENGINEERING EXCHANGE PROGRAM

Hochschule Esslingen
University of Applied Sciences
Kanalstrasse 33
73728 Esslingen
Germany
Phone: +49(0)711 397-3116

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
CHOICE OF COURSES

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
Prof. Dr.-Ing. Christian Saumweber
Phone +49(0)711 397-3633, Christian.Saumweber@hs-esslingen.de
Room S 02.010

FLUID MECHANICS
Prof. Dr.-Ing. Ulrich Gärtner
Phone +49(0)711 397-3259, Ulrich.Gaertner@hs-esslingen.de
Room S 01.-127

GERMANY AT A GLANCE
Holger Starzmann
H.Starzmann@gmx.de

GERMAN AS A FOREIGN LANGUAGE
M.A. Karin Böse-Janissek
Norbert.Janissek@t-online.de

IMPORTANT CONTACT INFORMATION

INTERNATIONAL OFFICE INCOMING
incoming@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
Phone +49(0)711 397-3300, +49(0)711 397-3332, Mobile +49(0)171 314-5923
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 PROGRAM "INTERNATIONAL FRIENDS"

- 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.

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

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**  
Prof. Dr.-Ing. Christian Saumweber

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

**Laboratory Projects**  
1 h = 45 min  
- Analysis and simulation of electronic circuits with Pspice  
- A simple 2-mass nonlinear vibration model in C  
- Introduction to MATLAB/SIMULINK and its simulation tools  
- Engine/drivetrain simulation in SIMULINK  
- Introduction to ACSL; A simple model in hydraulics  
- Vehicle dynamics simulation and animation with CASCaDE

**Textbook/Reference Materials**  
Printed handout in English language (86 p.)

**Assessment & Coursework**  
Midterm exam, final exam  
4 h

**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 CaDE, e.g.)  
- To gain insight into, and to deal with, possible numerical problems when applying simulation software
FLUID MECHANICS

COORDINATOR
Prof. Dr.-Ing. Ulrich Gärtner

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: 8h

TEXTBOOK/REFERENCE MATERIALS

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
Holger Starzmann

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 Word War II
- Germany in a bipolar world
- The rush to German unity
- The German political system
- People and Culture
- Todays Germany in Europe

TEXTBOOK/REFERENCE MATERIALS
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.
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.

EXAMPLE OF A TYPICAL KEEP SCHEDULE

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

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.