

INTAP

INTERNATIONAL AUTOMOTIVE
ENGINEERING PROGRAM

Hochschule Esslingen
University of Applied Sciences
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Faculty of Automotive Engineering
and International Office



INTRODUCTION

The International Automotive Engineering Program, INTAP, was originally developed in conjunction with Kettering University (former GMI) in Flint, Michigan, USA.

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. The credits of the lectures are usually accepted at our partner universities.

In the meantime we have developed INTAP into one of the most important and one of the most successful international programs at Hochschule Esslingen – University of Applied Sciences. The program has been running for more than 15 years. During the last couple of years we have focussed more and more on the international aspect in its proper meaning. This means that we try to accept students of different nationalities from partner universities all over the world in order to give the student the opportunity to learn from other cultures and mentalities. The program is offered to the open market, which could well be one of the main attractions of INTAP.

The lectures start once a year in the fall semester, running from October to December. In September the International Office organizes an orientation program consisting of an intensive German Class at beginners and advanced level, assistance with administrative procedures and the opportunity to get in touch with other international students. These orientation weeks are a mandatory part of the program, as they make the integration here much easier.

Each semester the International Office of Hochschule Esslingen will provide the coordinators of our partner universities with the exact application deadline, information about the application procedure and program schedule. Therefore, please contact your coordinator for more detailed information. The course language is English. The number of participants is limited to 24 members.

We are looking forward to receiving your applications.

You are warmly welcome!



Prof. Wolfmaier
President of Esslingen University
former INTAP Coordinator

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CHOICE OF COURSES

ALTERNATIVE POWERTRAIN

tbd

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. Thomas Schirle

Phone +49(0)711 397-3232, Thomas.Schirle@hs-esslingen.de

Room 14.204

FINITE ELEMENT ANALYSIS (FEA)

tbd

FLUID MECHANICS

Prof. Dr. Thomas Hanak

Phone +49(0)711 397-3416, Thomas.Hanak@hs-esslingen.de

Room S 04.214

GERMANY AT A GLANCE

M.A. Mr. Holger Starzmann

E-Mail: H.Starzmann@gmx.de

GERMAN AS A FOREIGN LANGUAGE A1

Team of German Language Lecturers

IMPORTANT CONTACT INFORMATION

INTERNATIONAL OFFICE

incoming@hs-esslingen.de

FACULTY OF AUTOMOTIVE ENGINEERING

Prof. Dr.-Ing. Joachim Berkemer

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

Room S 04.005

FACULTY OF AUTOMOTIVE ENGINEERING

M.A. Ms. Kremena Daneva

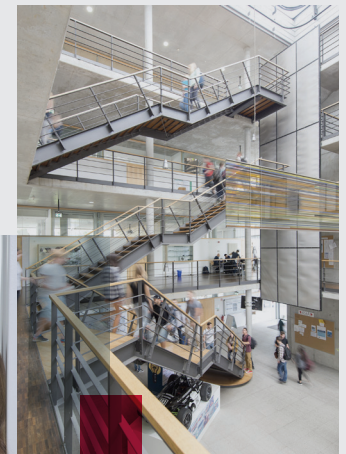
Phone +49(0)711 397-3335, Kremena.Daneva@hs-esslingen.de

POLICE

Phone 110 (all over Germany)

EMERGENCY/FIRE BRIGADE

Phone 112 (all over Germany)



FIELD TRIPS

AS PART OF THE PROGRAM “INTERNATIONAL FRIENDS“

- Neuschwanstein (castle)
- 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
- Robert Bosch plant, Reutlingen or Stuttgart-Feuerbach

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

ALTERNATIVE POWERTRAIN

COORDINATOR

tbd

PREREQUISITES

- Knowledge about powertrain
- Mechanical design
- Basic knowledge in electrical engineering

TOPICS (1 h = 45 min)

Part 1 | Electrical drives

Electrical drives – some basics	2h
Power electronics	4h
Control systems for DC-motors	4h
Control systems for AC-drives	4h
Innovative battery-systems for E-Vehicles	2h
Simulation of DCDC-converter, DC- and AC-drive with Matlab/Simulink	2h

Part 2 | Hybrid

Vehicle performance data: Demands for drivelines	4h
Planetary gear sets: Torque, speed, power split	8h
Hybrid systems: Parallel, serial; others, THS, Two mode	10h

>>> Total 40 h





TEXTBOOK/REFERENCE MATERIALS

Handout

ASSESSMENT & COURSEWORK

Midterm exam, final exam

ESTIMATED ABET CATEGORY CONTENT

Theory: 4 credits

ECTS CREDITS

4 credits

GOALS >>>>>

The course gives an overview about new technologies in the drivelines. These are electrical drives and the combination of electrical machine and combustion engine (Hybrid solutions).

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

ESTIMATED ABET CATEGORY CONTENT

Theory: 4 credits

ECTS CREDITS

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. 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,	4h
regions of stability, stiff systems; nonlinearities and their numerical treatment: play, dry friction, stops, etc.; simulation software	
Simulation models in automotive engineering	4h

>>> Total 20 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

>>> Total 20 h

TEXTBOOK/REFERENCE MATERIALS

Printed handout in English language (86 p.)

ASSESSMENT & COURSEWORK

Midterm exam, final exam

ESTIMATED ABET CATEGORY CONTENT

4 credits

ECTS CREDITS

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

FINITE ELEMENT ANALYSIS (FEA)

COORDINATOR

tbd

PREREQUISITES

Basic Courses in Applied Mechanics, Mathematics and Mechanics of Materials.

TOPICS (1 h = 45 min)

Constitutional Equations of the Finite Element Method	10h
Element Formulations (1D, 2D and 3D)	4h
Quality and Error in Discretization and Numerics	5h
Outlook to nonlinear Material and Large Strain Formulations	1h

>>> Total 20 h

LABORATORY PROJECTS (1h = 45min.)

Introduction to ANSYS Workbench

Preprocessing, Solver and Postprocessing	10h
Finite Element Analysis at appropriate Examples	10h

>>> Total 20 h

TEXTBOOK/REFERENCE MATERIALS

Printed handout

ASSESSMENT & COURSEWORK

Midterm exam, final exam

ESTIMATED ABET CATEGORY CONTENT

Theory and practical work: 4 credits

ECTS CREDITS

4 credits

GOALS >>>>>

- Theoretical basic Knowledge in Finite Element Method
- Pre-/ Postprocessing in commercial Software (ANSYS Workbench)
- Evaluation and Interpretation of Finite Element Analysis (FEA)

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

ECTS CREDITS

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. Mr. 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 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

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 and final 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 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 A1

COORDINATOR

M.A. Ms. 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

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

ASSESSMENT & COURSEWORK

- I Final exam
- I 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 >>>>>

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 everyday situations.

EXAMPLE OF A TYPICAL INTAP SCHEDULE

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

