Student Exchange Program
Spring 2018

I.E.E.P.
International Electrical Engineering Program

Hochschule Ulm
Ulm University of Applied Sciences

Program Coordinator:
Prof. Dr.-Ing. Anestis Terzis
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Important Dates

For participants of German intensive language course
(The German intensive language course is ONLY offered for students without any or with little knowledge of German)

Arrival: March 1\textsuperscript{st}, 2018, 9:00 a.m. – 3:00 p.m.
Registration and orientation: March 2\textsuperscript{nd}, 2018, 9:00 a.m.
Campus Prittwitzstraße 10, Room E 03a
Intensive German class: March 5\textsuperscript{th} - March 19\textsuperscript{th}, 2018

Please arrange your arrival on March 1\textsuperscript{st} between 9:00 a.m. and 3:00 p.m.

For students who will arrive in April

Arrival: April 3\textsuperscript{rd}, 2018, 9:00 a.m. – 3:00 p.m.
Registration and orientation: April 4\textsuperscript{th}, 2018, 9:00 a.m.
Campus Prittwitzstraße 10, Room E 03a

Please arrange your arrival on April 3\textsuperscript{rd} between 9:00 a.m. and 3:00 p.m.

Beginning of classes: April 5\textsuperscript{th}, 2018
Breaks:
Easter: March 30\textsuperscript{th} – April 2\textsuperscript{nd}, 2018
Labor Day: May 1\textsuperscript{st}, 2018
Ascension Day: May 25\textsuperscript{th}, 2018
Pentecost: May 19\textsuperscript{th} – June 3\textsuperscript{rd}, 2018
Whit Monday: June 5\textsuperscript{th}, 2018
Corpus Christi: June 15\textsuperscript{th}, 2018

Final exams: June 18\textsuperscript{th} - June 29\textsuperscript{th}, 2018
Departure: June 30\textsuperscript{th}, 2018
Additional project work (4 weeks) optional
Students are welcome to stay at Ulm University of Applied Sciences for an additional month to work on a project in one of the university’s laboratories.
Coordination:

Prof. Dr.-Ing. Anestis Terzis  
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and Information Technology  
Eberhard-Finckh-Straße 11, room P 101  
Tel.: +49 (0)731 502 8341  
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International Office (Akademisches Auslandsamt)

Prittwitzstraße 10, room E 03, 89075 Ulm  
Stephanie Wagner  Tel.: +49 (0)731 502 8272  
E-Mail: wagner@hs-ulm.de  
Anita Everett  Tel.: +49 (0)731 502 8457  
E-Mail: everett@hs-ulm.de  
Jeanette Kolb  Tel.: +49 (0)731 502 8023  
E-Mail: j.kolb@hs-ulm.de
Application

- Students have to be nominated by their home university
  The home university sends an e-mail with names & email-addresses to
  wagner@hs-ulm.de
- Students receive a link for the online-application

Accommodation

Accommodations will be booked by the international office upon receipt of the housing request form. All students will stay in student residences, depending on availability. All rooms are single rooms. Kitchen and bathrooms are to be shared with other students. Please note: in Germany accommodation is not separated by gender. Bed sheets etc. will be provided. There will be no equipment for cooking. We recommend to bring or to buy a small amount of personal kitchenware.

Housing prices are between €300 and €400 per month. Students will be placed by the housing office (Studentenwerk Ulm) on availability basis, unfortunately preferences cannot be considered. If you accept the room assigned, you have to sign the contract. A security deposit of €300 must be made upon arrival. The money will be withdrawn from your German bank account which you will need to open during the first days of stay. We will assist you in doing so.

The checking-in into the dorms is possible from Monday through Friday, 9:00 a.m. to 4:00 p.m.

Please note that check-in and check-out are only possible Monday-Friday. We will assign student tutors to assist you when checking-in. For check-out please make an appointment with the janitor in your dorm at least 10 days before you plan to leave in order to have your room inspected.

Exams

In case a student fails a course, i.e. is awarded a grade of 4.7 or worse, a re-examination may be done within 2 weeks after the announcement of the exam results. The examiner decides both the date and the form of the re-examination.

For conducting the re-examination the candidate has to be present in person. The exam may not be taken at the home university.
How to get to Ulm

From Stuttgart Airport:
Take the underground (S-Bahn) S2 or S3 to Stuttgart main train station (Hauptbahnhof – Hbf). It will take you about 30 minutes. At the main train station take a train to Ulm. Trains leave to Ulm about every hour. It will take you about 1 hour to get to Ulm.

From Munich Airport:
Take the underground to Munich main train station (Hauptbahnhof – Hbf). It will take you about 40 minutes. At the main train station take a train to Ulm. Trains leave to Ulm about every hour. It will take you about 1.20 hours to get to Ulm.

From Frankfurt Airport:
There are direct trains to Ulm from Frankfurt Airport. Trains leave to Ulm about every hour. It will take you about 2.15 hours to get to Ulm.

From Ulm main train station To Hochschule Ulm
If you give us a call we will send a student tutor to pick you up at the main train station. Otherwise take bus no. 7 to bus stop “Kliniken Michelsberg” and walk down the hill.

For train connections you can check at www.bahn.de.

After you arrive

Tutors will help you organizing your stay in Ulm. They will show you the university, the city and they will accompany you to the different offices.

The Activity fee for each student is €90.50. The Student ID cards will be handed out 1-2 weeks after arrival. You are allowed to take the city busses in Ulm and its surroundings every evening after 6 p.m. and on Saturdays, Sundays and public holidays free of charge by showing your Student ID card.

All European students please bring your EHIC-Card!

If you stay more than 3 month in Germany you have to go to the registration office in Ulm or Neu-Ulm and register in Germany. Student tutors will help you in filling out the needed forms and will accompany you to the registration office.

Within the first 2 weeks of your stay you will be provided with an e-mail account at Hochschule Ulm. The computer rooms are open from Monday through Friday from 7.30 a.m. until 7 p.m.
Some more useful information

For the Fall Term

We recommend bringing winter clothes and also proper clothes for rainy days. In Ulm we face temperatures between 10° Celsius and minus 10° Celsius in the winter. The location of Ulm offers plenty of opportunities to go skiing on a weekend.

If you would like to do so, please bring your skiing equipment. It’s also possible to rent skis for those who don’t want to bring them along. Ulm has some indoor swimming pools that you can visit, therefore swim clothes might be a good idea for those who enjoy swimming.

For the Spring Term

In April it may still snow in Ulm so better bring some warm clothes. The temperatures in May and June can be quite warm and you may already use the outdoor swimming pools in June. If you want to do some traveling you should remember that southern Europe is a lot warmer at this time of the year.

In general

For company visits we recommend dress clothes.

Living in a student dorm you do not need to bring linens. Blankets, sheets and pillows will be provided by the dorms but please bring your own towels. The floors will be shared with other students. Each floor has its own kitchen. The voltage in Germany is 230 Volt (50 Hz). You may buy an adapter to use electrical appliances here.

Copies of your passport, credit cards, driver’s license etc. are very useful in case they are lost or stolen.

Most shops open at 8 a.m. and close normally at 8.00 p.m. There are some shops that are open until 9 p.m. or later, especially grocery stores. On Sundays every shop is closed.

Money

You will need a around 1.000,-- € for living expenses per month. Credit cards (most common is MasterCard, Visa and American Express) are honored in many places throughout Europe. Do not count on having your credit cards taken in every shop, but they are good to have in case of an emergency.
You will be required to open a German bank account in order to pay your rent and other expenses. This bank account is free of charge for students younger than 30 years and we will assist you in opening it. You can also use it to receive money from your parents, sponsor etc. via bank transfer. You may collect money at the automatic teller machine (ATM) using an ATM card with your personal identification number (PIN). Furthermore the bank account will allow online banking.

Food

As the Hochschule Ulm and your dorms are not far away from the city center there will be some supermarkets and grocery stores nearby to buy food and drinks. The student canteen (Mensa) offers two menus (one vegetarian) each day.

Dates

You may find the German way of writing dates is different from that which you are used to. To avoid any confusion when you are filling in documents, you should write dates as follows:

12th November 2016 = 12.11.2016 (12 = day, 11 = month, 2016 = year)

Some safety tips

Ulm is a safe city to live in and you should feel able to go out and about without fear. However as in most cities and countries throughout Europe you must use a common sense and be aware of your surroundings, particularly at night. Whenever possible, you should avoid walking alone at night and keep out of badly lit streets and lonely areas. Do not accept lifts from strangers and lock your room when you leave it. Let a friend or roommate know where and with whom you will be and do not leave your belongings unattended.

Field trips

Cultural field trips for example to Munich to visit the German Museum or to the Christmas market in Nuremberg will be organized by the International Office.

There will be several field trips to industrial companies (e.g. Porsche, BMW and Daimler), some of them combined with places of general interest. Attendance is required. If students have special interests, we will try to arrange a visit. The dates are mainly given by the visited company and may include Monday mornings or Friday afternoons.

We are looking forward to seeing you in Ulm!

Stephanie Wagner + Anita Everett + Jeanette Kolb (International Office)
Lectures

Digital Integrated Circuits (Professor Terzis)

Control Technology (Professor Beckmann)

Advanced Project Work (Professors of faculty)

German History in the last 3 centuries (Professor Kratzer)

German Language (Professor Dippe)

Attendance at the lectures is required. Hochschule Ulm can not guarantee that Friday will be free for students.
Catalog Description

This is an introductory course presenting the fundamentals of digital integrated circuit design. This includes the basics of VHDL as well as the fundamentals of programmable digital circuit technology such as FPGAs. Exercises are carried out on workstations with state-of-the-art design software and FPGA development boards.

Prerequisites

Basic knowledge of digital technology

Class Schedule

per week: 4 periods (45 min) + additional time (1 hour) to complete lab exercises

Textbook

Own manuscript (in English) will be provided

References

Brock J. LaMeres, Introduction to Logic Circuits & Logic Design with VHDL, Springer 2017
Volnei A. Pedroni, Digital Electronics and Design with VHDL, Morgan Kaufmann, 2008

Credits

4

Relationship to Program Educational Objectives

1. The students receive a thorough introduction to the digital integrated circuit technology. They get insight in the potential and restrictions in view of the digital circuit design for programmable logic integration.

2. The students get acquainted with basic VHDL concepts. They describe the behaviour of digital circuits theoretically using their knowledge in digital technology and perform simulations.

3. The students consolidate their knowledge by design entry and circuit simulation with the latest industry standard software and digital hardware boards.

4. Hardware experiments in the laboratory is provided in order to give a feeling of the real world, which can be compared with the theory and the simulation results.
Course Learning Objectives

Students who receive credit will have demonstrated the ability to do the following tasks.

1. Work with state-of-the-art EDA tools (Xilinx ISE® Design Suite).
2. Design and analyze combinational and sequential circuits for a circuit integration.
3. Create, debug and simulate digital designs based on VHDL.
4. Configure FPGAs and verify hardware operation based on development Boards.
5. Understand the EDA design processes (including IP-Core based design) as they relate to the FPGA design flow steps.
6. Describe fundamental architectures of digital programmable circuits like standard FPGAs and advanced System On Chip FPGAs.
7. Design digital systems which use embedded clock processing sub-systems of the chip.
8. Optimise the synthesized circuit according to specifications of timing constraints.
9. Verify the function of a digital circuit using a post place & route timing simulation in combination with HW tests.

Topics

1. Fundamentals of Hardware Description Language (VHDL):
   Basic elements of VHDL code, operators, attributes, concurrent code, sequential code, structural description.
2. VHDL Design and Simulation:
   Design of combinational logic, design of sequential logic, hierarchical design, simulation of digital circuits, creating a test bench.
3. Programmable digital circuits:
   Digital circuit implementation approaches, fundamentals of programmable logic (SPLD, CPLD, FPGA), basic FPGA architectures, modern System on Chip FPGAs.
4. System- and High-Level Design Methodologies:
   Schematic entry vs. HDL entry, IP core based design, arithmetic circuits, clock management, use of embedded sub-systems, high level design based on Matlab/Simulink, aspects of HW/SW co-design.

Laboratory Exercises

1. Familiarization with the Xilinx ISE® Design Suite and the Virtex 5 FPGA development Board.
2. Design and Simulation of combinational logic and sequential logic.
3. FPGA-Implementation of a switch debouncer circuit including timing analysis, Pin-Assignment and programming of the Virtex 5 chip.
4. Use of embedded FPGA sub-systems to process different clock signals.
5. High-Level Design and simulation of a Direct Digital Synthesizer using the Core Generator of Xilinx ISE® Design Suite.
Control Technology

<table>
<thead>
<tr>
<th>Department</th>
<th>Faculty „Electrical Engineering and Information Technology“</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinator</td>
<td>Professor Dr. Anette Beckmann</td>
</tr>
<tr>
<td>Catalog Description</td>
<td>This is an introductory course presenting the fundamentals of feedback control including description of Plants. Simulation techniques (Matlab/Simulink) are applied during the course.</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>Basic knowledge of Laplace transform and differential equations</td>
</tr>
<tr>
<td>Class Schedule</td>
<td>per week: 4 periods (45 min) + additional time (1 hour) to complete lab exercises</td>
</tr>
<tr>
<td>Textbook</td>
<td>Own textbook (in English) is provided</td>
</tr>
<tr>
<td>Credits</td>
<td>4</td>
</tr>
</tbody>
</table>

Relationship to Program Educational Objectives

1. Students receive a short theoretical overview of mathematical system description as refreshment and based on existing knowledge (see prerequisites).

2. Theoretical system knowledge is expanded by more detailed and realistic applications, mainly addressing automotive industry problems.

3. Students learn the essentials of linear control theory. The stability problem is addressed. Theory is minimised by restriction to simple control loops with PI controllers and Bode plot with phase margin as design criterion.

4. Students assess their own learning success while applying the contents of the course at the end within a complete application example. They have to solve a complex control problem and run through the design steps
   - problem description,
   - definition of control goals,
   - plant description, plant simulation,
   - design of control architecture,
   - parameter calculation for the controller,
   - verification of the control loop performance.
Course Learning Objectives

Students who receive credit will have demonstrated the ability to do the following tasks.

1. Describe dynamical systems by differential equations
2. Visualise mathematical models as signal flow diagrams and design Matlab/Simulink models
3. Convert ODE description to transfer Functions
4. Select a linear controller and implement it as analogue or digital device
5. Design the control loop
6. Apply Nyquist criterion in order to ensure control loop stability
7. Calculate phase margin of open loop
8. Simulate and verify the design result

Topics

1. Introduction to the control problem, control loop performance assessment
2. System Theory and Plants
   2.1 Mathematical Models of Systems
   2.2 Frequency Features of Systems
   2.3 System graph and Simulation
   2.4 Selected Plants
3. Controller and Control Loop
   3.1 Controller Tasks
   3.2 Controller Architecture
   3.3 Controller Types and Implementation
   3.4 The Control Loop
   3.5 Stability of the Closed Loop
4. A Complete Application

Laboratory Exercises

1. Demo Exercises with different Plants in the Control Lab
2. Familiarisation with Matlab/Simulink
   Simulation of simple system’s step response
3. Simulation of a DC drive
4. Drawing Bode Diagrams with Matlab
5. Simulation of a Spindle Drive Position Control Loop
6. (optional) Realisation of a Turn Rate Control Loop with an Analogue Controller
Advanced Project Work

<table>
<thead>
<tr>
<th>Department</th>
<th>Faculty „Electrical Engineering and Information Technology“</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinator</td>
<td>Professor of Faculty</td>
</tr>
<tr>
<td>Catalog Description</td>
<td>This is an interdisciplinary engineering project including project planning, reporting and presentation</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>Knowledge of electrical engineering basics</td>
</tr>
<tr>
<td>Class Schedule</td>
<td>per week: 6 periods, 45 min each (minimum)</td>
</tr>
<tr>
<td>Textbook</td>
<td>not applicable</td>
</tr>
<tr>
<td>Credits</td>
<td>4</td>
</tr>
</tbody>
</table>

Relationship to Program Educational Objectives and Course Learning Objectives

1. Students apply their electrical engineering knowledge with a “real life” or “Lab based” engineering problem.
2. Students learn to define such a problem and to describe it as first part of their project report.
3. Students learn to plan a project, i.e. to break down the problem description to working packages and to set up a project time table.
4. Students solve the technical problem. Applicable literature is to be evaluated and often a Web-investigation is to be performed.
5. Students provide a report about their project and give a presentation, using standard presentation techniques like PowerPoint.
6. An oral test gives the students the opportunity to maintain their project results.

Course Learning Objectives

Students who receive credit will have demonstrated the ability to do the following tasks.

1. Organize a project plan in cooperation with a project partner.
2. Make a literature or web investigation of the state-of-the-art technology.
3. Carry out a project according to a project plan.
4. Write intermediate reports and a final technical report.
5. Give a technical presentation in front of an auditorium.
Topics

The following general topics have to be fulfilled during the course

1. Problem description and analysis
2. Literature and/or Web investigation
3. Discussion of project features with supervisors
4. Realisation of the project in teamwork
5. Technical report
6. Technical presentation
7. Oral Test

Typical projects are:
- Analysis of a control problem, design of a control architecture
- Development of a sensor concept
- Simulation and design of microelectronic circuits
- Development of a computer-controlled test program
- Evaluation of system measurements

Laboratory Exercises

Not applicable
<table>
<thead>
<tr>
<th>Department</th>
<th>Computer Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinator</td>
<td>Professor Dr. Klaus Peter Kratzer</td>
</tr>
<tr>
<td>Catalog Description</td>
<td>German history up to and including reformation and the Thirty Years War; culture, society, and political developments in the 18th century; reform and liberation; German federation; revolution in 1848; Bismarck and his struggle for Prussian hegemony; the German Empire &amp; the 1st World War; the Weimar Republic; Nazi Germany &amp; the 2nd World War; the aftermath of the wars; detente and German reunification</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>None</td>
</tr>
<tr>
<td>Class/Lab Schedule</td>
<td>Four class periods per week</td>
</tr>
<tr>
<td>Other Materials</td>
<td>Numerous source materials (print, audio, video) in English or in English translation (to be distributed in class)</td>
</tr>
<tr>
<td>Credits</td>
<td>Liberal Studies: 4 credits</td>
</tr>
</tbody>
</table>

Relationship to Program Educational Objectives
Similar to other LS courses

Topics

1. An Overview of German history up to and including reformation and the Thirty Years War.
3. Reform and liberation. German federation. German nationalism in the 19th century as expressed in music and literature.
4. Revolution in 1848. Bismarck and his struggle for Prussian hegemony.
7. Nazi Germany & the 2nd World War. The pseudo-democratic establishment and consolidation of the Nazi state. Social life and economic policy. The 2nd World War. Concentration camps and the Holocaust. The collapse of Nazi Germany.

9. Detente and German reunification. The economic miracle in West Germany. West Germany’s “east policy”. The collapse of East Germany. Reunification and consolidation.

Course Learning Objectives

Each student who receives credit for this course will have demonstrated the ability to do all of the tasks listed below:

1. Describe and explain the political developments in and around Germany for the period under discussion
2. Describe and explain the socio-cultural evolution in Germany for the period under discussion
3. Explain the development of the German political system
4. Explain attitudes and customs in present-day Germany from an historical viewpoint
## German Language

### Department
Institute for Foreign Languages and Management

### Coordinator
Professor Dr. Ben Dippe

### Catalog Description
see below

### Textbook
- Menschen: Deutsch als Fremdsprache - Kursbuch, Hueber-Verlag
- Menschen: Deutsch als Fremdsprache – Arbeitsbuch, Hueber-Verlag
- Supplementary material provided by course coordinator

### Credits
2, 3 or 5 credits

<table>
<thead>
<tr>
<th>Credits:</th>
<th>Lessons:</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensive Course (voluntary)</td>
<td>German Intensive Course 1 (A1.1): 15 lessons per week (5 x 6 lessons)</td>
<td>2 credits</td>
</tr>
<tr>
<td>Intensive Course (voluntary)</td>
<td>German Intensive Course 2 (A1.2): 15 lessons per week (5 x 6 lessons)</td>
<td>3 credits</td>
</tr>
<tr>
<td>Course during term</td>
<td>German as a Foreign Language Beginner Level 1 (A1.1): 8 lessons per week</td>
<td>2 credits</td>
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<tr>
<td>Course during term</td>
<td>German as a Foreign Language Beginner Level 2 (A1.2): 4 lessons per week</td>
<td>3 credits</td>
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<tr>
<td>Course during term</td>
<td>German as a Foreign Language Elementary Level 1 (A2.1): 4 lessons per week</td>
<td>5 credits</td>
</tr>
<tr>
<td>Course during term</td>
<td>German as a Foreign Language Elementary Level 2 (A2.2): 4 lessons per week</td>
<td>5 credits</td>
</tr>
<tr>
<td>Course during term</td>
<td>German as a Foreign Language Intermediate Level (B1): 4 lessons per week</td>
<td>5 credits</td>
</tr>
</tbody>
</table>

### Goals:
The courses will provide competence in speaking, reading and writing German according to the respective level of the Common European Framework (CEF).

### Evaluation:
Written exam (and course participation where applicable)