Technik
Informatik & Medien
Hochschule Ulm
University of
Applied Sciences

Student Exchange Program
Fall 2014

International Mechanical and Manufacturing Engineering Program

I.M.E.P.

Hochschule Ulm
University of Applied Sciences

Program Coordinator:

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October 2014

General Information

Participants German class

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

Arrival:	September 1st, 2014
Registration and orientation:	September 2nd – 5th, 2014
Intensive German class	to be announced

Important:
Please arrange your arrival date on September 1st between 9:00 a.m. and 3:30 p.m.

If not participating in the German class:

Arrival:	October 1st, 2014 at Main Train Station Ulm student tutors will help students to check-in into the dorms

Important:
Please arrange your arrival date on October 1st in between 9:00 a.m. and 3:30 p.m.

!!!! October 3rd, national holiday !!!!

Registration:	October 2nd, 2014 welcome meeting at the international office Administration
Beginning of the course:	October 6th, 2014
Final exams:	Unless specified otherwise, they are in the usual class room instead of the last lesson of the course. Official results will be sent to the home University.
Departure:	December, 19th, 2014

Coordination:

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Course tutors:

t.b.a.

Application

Every student needs to hand in:

- 4 passport-sized photographs
- Application form Incomings, Housing request form and
  Application form language course
  Download: http://www.hs-ulm.de/Internationales/AAA/FormulareDownloads/
- Resume
- Proof of valid Health insurance in Germany and Europe (incl. repatriation and evacuation). Please bring the original paper to the International Office after arriving in Ulm
- Valid passport (non US-citizens need an entry visa for Germany)
- Transcript of records
- A document from the home university explaining that the student is still enrolled at the home institution (could be one list for the whole group)

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 € 240 and € 360 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.

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 one 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 € 64.50. The Student ID cards will be handed out 1-2 weeks after arrival. For a € 5 deposit students will get a plastic ID card. Students registering for the first time as residents in Ulm or Neu-Ulm will be given a free semester ticket (worth € 99.50) for public transport. This allows you to take busses and trains in Ulm and its surroundings for free. After the first semester students are allowed to take the city busses in Ulm every evening after 7 p.m. and on Sundays and Holidays free of charge by showing their Student ID card.

Please bring the original proof of your health insurance!

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 Mai 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 minimum of € 630 for living expenses per month. If you like you may open a bank account. 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. Probably the best way to handle money is to take a supply of traveler's checks. Please do not bring large amounts of cash, this is very unsafe.

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 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 2009 = 12.11.2009 (12 = day, 11 = month, 2009 or 09 = year)

Some safety tips

Ulm is a safe city in which to live 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 Nürnberg will be organized by the International Office.

There will be several field trips to industrial companies (e.g. Porsche, BMW or 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!
Your International Office Team

Stephanie Wagner + Anita Everett + Jeanette Kolb + Csilla Csapo

Travel tips

We know that some of you like to spend the weekend traveling in small groups. Therefore we have here some proposals. You can reach all these places by train. Many of them belong to the UNESCO world heritage.

Bamberg / Germany

This is one of the most beautiful old towns in Germany. With early gothic cathedral, renaissance places, medieval houses and a lot of typical pubs.
Recommended time of visit: 1-1.5 days.

Oberstdorf / Mountain Hiking

With the local train to Oberstdorf, then hiking to the Freibergsee (Lake) and further with the cable car to the summit of the Fellhorn (2000 m). Then to the summit of the Kanzelwand and downhill with another cable car to Riezlern. Back to Oberstdorf by bus, and then the train back to Ulm.
Recommended time of visit: 1 day. (Before the end of October as the cable car will be out of operation.)

Verona and Venice / Italy

Verona is the place of Romeo and Julia, with a roman amphitheater and a marvelous medieval town center. Venice is a unique place in the world from the 16th and 17th century. There is a night train to Verona, and it takes only 2 more hours to Venice.
Recommended time of visit: 2 days with night trains.

Avignon / France

The south of France has kept its flair and one can take advantage of the better climate and still sit outside in the cafe. The city was the residence of the catholic popes for some time and the palace is still there. It also has the famous bridge. Maybe you know the song: “Sur le pont de Avignon”.
Recommended time of visit: 2 days, with night trains.

Cinque Terre and the Mediterranean Sea / Italy

This is a famous "pirate coast" with villages on top of steep cliffs above the Mediterranean Sea. It has no roads but hiking trails, and a small railway connecting the villages. It can be easily reached by train to Genova / Italy and then with a local train direction Rapallo. You need good weather.
Recommended time of visit: 2 days, with night trains.

Courses

It is necessary to coordinate the courses that students want to take, with the corresponding department at their home University. Courses can be either compulsory, elective or just optional.

HSU Course:	Credits:	
	Member of the Faculty	
CAD / CAM	Prof. Dr. Josef Kurfess Prof. Dr. Hayri Damaritürk	4
Dynamics II	Prof. Dr. Anette Beckmann	4
Energy Efficiency in Manufacturing	Prof. Dr. Georg Kleiser	6
Applied Thermal-Fluid Systems	Prof. Dr. Christian Dettmann	4
Fluid Mechanics	Prof. Dr. Martin Müller	4
Lean Production Systems	Prof. Dr. Helmut Hartberger Prof. Dr. Manfred Hüser	4
Operations Research	Prof. Dr. Marc-Oliver Otto	5
System Automation	Prof. Dr. Walter Commerell	4
Germany within Europe	Ms. McLeod	4
German for Beginners		2

Courses take place between Mondays at 9:50 a.m. and Fridays 1:00 p.m.
Attendance at the lectures is required.

CAD / CAM

Catalog Data Credit (3-3-4)
Prerequisites: Basic course CAD / CAM / CAE

The main subject of this course is the interaction of design (CAD) and manufacturing (CAM), so that this course is useful for both mechanical and manufacturing engineers. The course starts with higher level concepts and exercises in CAD. Then knowledge of advanced manufacturing processes is provided. Finally the information transfer from CAD to the manufacturing processes is investigated.
Intensive lab work is part of this course.

Textbooks: Prof. Dr. Hayri Damaritürk: Script for international students

References: S. Vajna, Ch. Weber, J. Schlingensiepen and D. Schlottmann: CAD / CAM für Ingenieure, Vieweg-Verlag Braunschweig 1994

M. Weck: Fertigungssysteme, VDI-Verlag, Volume 1 to 4

B. Erdel: New Dimensions in Manufacturing, Hanser Gardner Publications, Cincinnati, USA

Coordinators: Prof. Dr. Kurfess, Prof. Dr. Damaritürk

Course Learning Objectives:

Upon completion of this course the student will be able to:
1. Understand the main functions and data models used in CAD systems
2. Apply CAD systems: Design parts in 2D and 3D with parametric and feature based design
3. Understand the design requirements for machining parts on CNC machines
4. Know and apply the advanced manufacturing processes
5. Perform data transfer from CAD to CAM
6. Machine parts using data from CAD

Topics covered

Week	Topic
1	Introduction to CA-technologies
2	CAD-Software: Two and three-dimensional modeling. Parametric and feature based design.
3	Data exchange from CAD to CAM
4-5	CAD-Laboratory Work, Designing parts and assemblies with Pro/Engineer.
6	Designing parts for NC machining: Milling on CNC-machining center
7-8	New emerging manufacturing technologies, programming of numerical controls, rapid prototyping, high speed machining.
9-11	Manufacturing Laboratory: Exercises on CNC machine tools, CNC measuring machine and robotics

Schedule: 6 weekly lectures / lab work of 45 minutes each

Computer usage: Work with CAD systems and programming of CNC machines

Mode of Evaluation: Attendance and lab work required, 1 written test
Distribution: Participation 25 %, lab work 25 %, written test 50 %

Prepared by: Prof. Dr. Kurfess, Prof. Dr. Damaritürk

Dynamics II

Catalog Data Credit (4-2-4)
Prerequisites: Dynamic Systems I
This is a second course, follow up course, in System Dynamics. The objective of this course is to provide an understanding into basic principles and methods underlying the steady state and dynamic characterization of feedback control systems. The focus is on multi-discipline approach as in the previous course. Construction of mathematical models of systems using Bond graphs, block diagrams and development of transfer functions and state space models is emphasized. System performance is studied mainly using computer simulation (both in time and frequency domains) software tools. Design of control systems is attempted using the same computer simulation tools. Introduction to some advanced topics in control systems is also provided.

Textbook(s): Prof. Dr. Beckmann: Control-Lectures for international Students

References: Levine: The Control Handbook, IEEE Press, 1996
Katsuhiko Ogata: Modern Control Engineering, Prentice Hall, 1997

Coordinator: Prof. Dr. Beckmann

Course Learning Objectives:
Upon completion of this course the student will be able to:

1. Model simple engineering systems involving multiple feedback loops. The system will include at least two disciplines, examples are taken from the automotive industry.
2. Analyze the frequency performance in time- and frequency domains; Laplace and inverse Laplace transform solutions for simple cases, Evaluation of the characteristic equations (ME PEO 1, 2, 3, 5)
3. Evaluate the system performance characteristics, such as stability, based on accepted matrices in time- and frequency domains (ME PEO 1,2,5)
4. Simulate the system performance in time- and frequency domains using accepted professional simulation tools, such as Matlab / Simulink (PEO 1,3,5)
5. Design simple controllers, such as P, PI, PD, and PID, for systems to meet certain performance objectives using the modeling and simulation tools, such as Matlab / Simulink (ME PEO 1.2.3.5)

Topics Covered

Week	Topics
1	Introduction to feedback control systems
2	Modeling of feedback systems
3	Mathematical models
4	Frequency features of systems
5	System graph and system simulation
6	Plants: : DC-motor, thermal plant, dynamics of a car
7	Controller task
8	Controller architecture
9	Controller types: P, I, PI, D, PD, PID
10	The control loop
11	Stability of the closed loop

Schedule: Four weekly lecture sessions of 45 minutes each, one weekly lab session of 90 minutes

Computer Usage: Basic computer skills (MS Word, Excel) and some familiarity with Matlab/ Simulink

Mode of Evaluation: Attendance and written lab reports required, 1 written test
Distribution: Participation 25%, lab 25%, written test 50%

Prepared by: Prof. Dr. Beckmann, (similar to Mech 430)

Energy Efficiency in Manufacturing

Catalog Data:

Credit: (6-0-6)
Prerequisites: Thermodynamics

About 25% of the final energy consumed in the EU is utilized for industrial processes. Increasing energy efficiency in this sector is one key target to reduce the emission of greenhouse gases on one hand and the economic dependency on energy prices on the other hand. In the first part of the course the relevance of energy as resource for manufacturing processes will be discussed. General methodologies to improve energy efficiency on basis of energy balances and energy flow analysis will be shown. Energy efficiency indicators will be introduced to evaluate and judge energy efficiency improvements in the context of manufacturing.
The second part of the course deals with the optimum design of energy-efficient industrial networks and energy conversion processes. Compressed-air, steam and condensate systems will be discussed in detail. Some key components in manufacturing processes, for example electric drives and furnaces are studied in respect of their energy balance. The knowledge and methods will be applied in a team exercise, which is mandatory for all participants.

Textbook: Prof. Dr. Kleiser: Script for international students

References: Integrated Pollution Prevention and Control: Reference Documentation on Best Available Techniques on Energy Efficiency. European Commission, 2008

Coordinator:

Prof. Dr. Georg Kleiser,
Email: kleiser@hs-ulm.de

Course learning objectives:

Students will be able to:

1. Understand the fundamentals and the technologies of the most important industrial energy conversion processes.
2. Calculate energy efficiency indicators and illustrate energy flows.
3. Analyze manufacturing processes in respect of their energy consumption.
4. Understand how energy management systems can be integrated into the manufacturing processes.
5. Evaluate various industrial energy supply networks (compressed air, steam systems, hot water supply) in respect of energy efficiency.
6. Find solutions to reduce the energy consumption of manufacturing processes and industrial energy systems.

Prerequisites by topic:

First and second law of thermodynamics
Thermodynamic properties of materials (ideal gas, steam, liquids)
Basic knowledge about heat transfer and fluid dynamics

Topics covered:

Week	Topics
1	Basic statistics about energy supply and energy consumption in industry, trade and commerce; energy types; industrial energy systems
2	Energy indicators (specific energy consumption, cumulated energy demand, energy efficiency factor), Characterization of systems, energy balances
3 -4	Energy flow charts, First and second law efficiency, exergy
5	Energy management systems, methodology of energetic optimization, economic aspects of energy efficiency
6	Industrial energy networks (compressed air, exhaust and supply air systems, heat recovery)
7	Hot water and steam systems, lubrication and cooling systems
8	Energy efficient drive systems, transportation of fluids and materials
9	Energy balances of furnaces, drying processes
10-11	Teamwork and Presentation

Schedule: 6 lecture sessions per week of 45 min each, including some teamwork and team presentations.

Computer Usage: Basic skills (MS Office is recommended)

Mode of Evaluation: Attendance required (25%), 1 presentation (25%), 1 written test (50%).

Prepared by: Prof. Dr. Georg Kleiser

Applied Thermal-Fluid Systems

2005 Catalog Data: Credit: (1-3-4)
Prerequisites: Thermodynamics, Fluid mechanics

In this course the physical laws of thermodynamics and fluid mechanics will be applied to industrial components and equipments. The governing equations will be summarized prior to the lab exercise. The students will learn to describe the behavior of the equipment by means of these equations and verify it by operating the equipment. The fundamentals of the measuring technique are applied, in order to be able to determine pressures, temperatures, mass flows and amounts of heat. At selected machines complete energy balances and efficiency are calculated. The influence of friction effects is studied.

Textbooks: Energy Systems Laboratory: Script for international Students

References: Moran and Shapiro: Fundamentals of Engineering Thermodynamics, Wiley, 2000

Roberson and Crowe: Engineering Fluid Mechanics, Wiley, 1997

Coordinator: Prof. Dr.-Ing. R. Ruderich

Course learning objectives:

Upon completion of this course the student will be able to:

1. Apply the laws of thermodynamics and fluid mechanics to actual industrial equipments
2. Evaluate machines, which operate with combined techniques from the field of fluid mechanics and thermodynamics.
3. Apply modern measurement techniques and measuring methods.
4. Learn the use of computers during the measuring process and with the analysis of the measurements.
5. Gain experiences at real machines.
6. Apply team working skills

Prerequisites:

First and second law of thermodynamics, Conservation of mass, Momentum and energy, Bernoulli´s equations, Properties of substances, Basic computer skills (MS Word, Excel)

Topic covered:

Week	Topics
1 - 3	Safety guidelines Diesel engine and turbo charger Performance characteristics Work and reaction of the turbo charger
4 - 5	Heat pump and air conditioner, MOLLIER – diagram lg(p),h – diagram of R134a
6 - 7	Centrifugal pump Principles of operations Cavitation performance map Characteristics of the pump
8 - 9	Condensing boiler
10 - 11	Natural gas-fired unit heat and power station for cogeneration Performance characteristics

Schedule: Four lessons per week of 45 minutes

Computer Usage: Basic computer skills (Excel, MS Word)

Laboratory project: One experiment in every laboratory session

Mode of Evaluation: Attendance and written lab reports required, one written test

Distribution: Participation 33 %, lab reports 33 %, written test 33 %

Prepared by: Prof. Dr.-Ing. C. Dettmann

Fluid Mechanics

Catalog Data: Fluid Mechanics
Credit: 4 (4-0-4)

Prerequisites: ME 304 Thermodynamics

Corequisites: None

Description: This is a first course in Fluid Mechanics that involves the study of the nature of fluid flow in ducts and over objects. The course introduces the fundamental aspects of fluid motion, fluid properties, flow regimes, pressure variations, fluid kinematics, and methods of flow description and analysis. The course presents the general conservation laws in their differential forms and their use in analyzing and solving fluid flow problems. In addition, the concept of measuring principles in fluid dynamics is demonstrated in laboratory tests. The effects of fluid friction on pressure and velocity distributions are also discussed. The effects of compressibility of gas flow with variable density are also included.

Textbook: Fundamentals of Fluid Mechanics, by Munson, Young, and Okishi, Fourth Edition, John Wiley and Sons, Inc.
R. Ruderich, Script "Fluid Mechanics" for international students

References: Engineering Fluid Mechanics, by Roberson and Crowe, 7th Edition, John Wiley & Sons, Inc. 2001
Fluid Mechanics, by Pijush K. Kundu and Ira M. Cohen, 2th Edition, Academic Press, 2002

Coordinator: Dr. Raimund Ruderich, Professor,
E-mail: Ruderich@hs-ulm.de

Course Learning Objectives:
Upon completion of this course the student will be able to:
1. Determine pressure distribution in fluids at rest and to calculate hydrostatic forces (magnitude and line of action) acting on plane and curved surfaces.
2. Draw streamlines in a given flowfield and to determine pressure variations along and normal to streamlines.
3. Determine the velocity and acceleration of the fluid for steady and unsteady flow.
4. Apply the control volume concept to describe fluid flow through the application of conservation of mass, momentum, and energy.
5. Apply the governing differential equations (mass, momentum, energy) to analyze fluid flows.
6. Take data of special experiments in laboratory tests and have to correlate these data using the theory of fluid flow.
7. Apply the basic principles to the flow of viscous incompressible fluids in pipes, multiple pipe systems, and ducts, to determine friction losses.
8. Utilize existing experimental and numerical data to analyze external flows, and to calculate drag and lift forces acting on immersed bodies.
9. Study the effect of compressibility on steady, isentropic, one-dimensional flow of an ideal gas in a varying cross-sectional area duct.

Prerequisites by Topic:

(1) Integration and Differentiation. Dot Product and Cross Product of Vectors.
(2) Moment of Inertia and Centroids
(3) Concepts of Control Volume and System
(4) Basic Computer Skills (MS Word and Excel)

Topics Covered & Schedule:

Week	Topic
1-2	The Nature of Fluids. The General Description of the Fluid by Introducing the Continuity Equation and the Navier-Stokes Equation in Differential Form in Cartesian Coordinates. Properties of Fluids including Definitions and Units.
3-4	Fluid Statics. Pressure Distribution. Hydrostatic Forces on Sloping Walls and Curved Surfaces. Buoyancy. First Laboratory Practice: Static Pressure Measurements.
5-7	Fluid Kinematics. Steady and Unsteady Flow. Streamlines and Streamtubes. Flowfield. Bernoulli's Equation for Steady and Unsteady Flow without Friction. Force Balance Across Streamlines. Second Laboratory Practice: Stagnation Pressure, Dynamic Pressure and Velocity Measurements with different methods.
8-9	Viscous Incompressible Flow in Pipes and Noncircular Ducts. Laminar and Turbulent Flow. Friction Factor. Moody Diagram. Loss Coefficients from Fittings. Pumps. Pipe Networks and Pressure Losses. Bernoulli's Equation. Laboratory Demonstration.
10	Boundary Layer Theory. Flow Over a Flat Plate. Flow Over an Airfoil. Separation and Reattachment. Drag and Lift. Laboratory Demonstration Including Flow Visualisation
11	Compressible Flow. Speed of Sound and Mach Number. Isentropic Compressible One-Dimensional Flow of Ideal Gases.
12	Comprehensive Final Examination

Computer Usage: Basic computer skills (Maple, (no previous experience is needed), MS Word, Excel)

Laboratory: Measuring project

Relationship to Professional Component: This course is 33 % Science and 67 % Engineering

Mode of Evaluation: Attendance, Lab reports 10%, home work 10%, written tests (midterm exam 30 % and final exam 50 %)

Prepared by: Prof. Dr. Martin Müller

Lean Production Systems

Catalog Data:

Credit: (4)
Prerequisites: Manufacturing processes

The objective of this course is to introduce the basic models and tools used in designing, building and operating a production system of bulk manufacturing.

Components of this class will be team projects involving Enterprise-level evaluation of value streams from concept development through product delivery and support. These term-long projects will include an assessment of current company process / information flows, resource requirements, technology utilization, and cycle-times.

Key elements will be a planning game and case studies.

The course requires active participation in classroom exercises as well as reading and presentation of the results of team exercises.

Textbooks:

Rother & Shook: Learning to See, Enterprise Institute
Rother, M.: Creating Continuous Flow

References:

Shingo: A Study of the Toyota Production System. Productivity Press, 1989

Coordinators:

Prof. Dr. Hüser, Prof. Dr. Hartberger

Course Learning Objectives:

Upon completion of this course the student will be able to:

1. understand the basic principles of production system design.
2. apply tools for analysis of production systems
3. measure production system performance
4. design and improve production systems

Topic covered:

Week	Topics
1	Goals and organizational structures of manufacturing companies
2 - 4	Value stream mapping of production systems including customer focus, JIT-System principles
5 - 9	Fulltime block seminar 3 days planning game bulk manufacturing
10 - 11	Case studies onsite in German production companies

Schedule: Four lessons per week of 45 minutes in the beginning
Block seminar of a planning game 3 days fulltime
Field studies onsite

Computer Usage: Basic computer skills (Powerpoint, Excel, Word)

Mode of Evaluation: Attendance, team work presentation and written test

Distribution: 20 %, 30 %, 50%

Prepared by: Prof. Dr. Hüser, Prof. Dr. Hartberger

Operations Research

Catalog Description:

Prerequisites: Mathematics of the first and second semester

Credits 5

Textbook(s):

References: Hamdy A. Taha, Operations Research: An Introduction, Prentice Hall, 2003

Coordinator: Prof. Dr. Marc-Oliver Otto

Course Learning Objectives:

Upon completion of this course the student will be able to:
1. Model simple economic problems like production planning, cutting problems, transportations problems, project planning and storage planning.
2. Solve the above mentioned models using well-known algorithms like the Simplex algorithm, the Dijkstra or FIFO algorithm, Stepping-Stone method or the Critical Path Method.
3. Map the real problems to the right class of models and know which assumptions are relevant and have to be fulfilled.
4. Find easy heuristics fo different problems himself.
5. Program the described algorithms in a computer language he knows.

Topics Covered

Week	Topics
1	Basic statistics I
2	Basic statistics II
3	Introduction to Operations Research
4	Modeling of economic problems
5	Matrices and linear programming
6	Graphical solution of LP and the Simplex method
7	Theory of graphs and networks
8	Shortest-route and minimal spanning tree
9	Advanced LP – transportation models and its variants
10	Network and project planning
11	Exams

Schedule: Six weekly lecture sessions of 45 minutes each

Computer Usage: Some models and algorithms are being shown on the computer

Mode of Evaluation: 90 minutes exam in week 11

Prepared by: Prof. Dr. Marc-Oliver Otto

System Automation

Catalog Description: The objective of the lecture is to give an overview on different system with their behavior and to provide an understanding of the system. The students gain the knowledge how to describe the behavior of the system and design a model of the system on the computer. To model the system the same software as in the lecture "Dynamic Systems" will be used.
The students learn how to structure and analyze the system and design the required automation solution. The students learn how to control event systems and continuous systems. There for the overall design process and the design steps are discussed and realized on practical examples.

Prerequisites: Dynamic Systems I

Credits 4

Textbook(s): Prof. Dr. Walter Commerell: System Automation

References: Levine: The Control Handbook, IEEE Press, 1996
Katsuhiko Ogata: Modern Control Engineering, Prentice Hall, 1997

Coordinator: Prof. Dr. Commerell

Course Learning Objectives:

Upon completion of this course the student will be able to:

1. Structure a multi domain system. Examples from automotive industry and common process industry will be used
2. Analyse multi domain systems with continuous and discrete parts as well as hybrid systems with both parts.
3. Understand and work on base of a model based design process using an accepted professional simulation tools, such as Matlab / Simulink/Stateflow
4. Design a concept on base or the user requirements
5. Design automation solutions on base of standard automation components as PLC or continuous controller.

Topics Covered

Week	Topics
1	Introduction to System Automation
2	Description of different Systems
3	View on continuous Systmes
4	View on discrete Systems
5	Analysis of Systems
6	Structure of Systems
7	Automation Process
8	Requirements Process
9	Design of automation Solutions
10	Example: Automotive
11	Example: Energy management Process

Schedule: Four weekly lecture sessions of 45 minutes each, one weekly lab session of 90 minutes

Computer Usage: Basic computer skills (MS Word, Excel) and some familiarity with Matlab/ Simulink

Mode of Evaluation: Attendance and written lab reports required, 1 written test
Distribution: Participation 25%, lab 25%, written test 50%

Prepared by: Prof. Dr. Commerell

Germany within Europe

Catalog Data: Credit (4-0-4)
Prerequisites: HUMN 201, SSCI 201, COMM 101

This course explores most important topics in the history Germany in the context of European history. Emphasis is placed on developing an understanding for major political, social and economic aspects of German history and on tracing the German historical experience in its context. The comparison of historical time periods between European and U.S. history provides grounds for exploration of German history and German relations with other countries throughout the world.

Textbooks: Buchner, Rudolf: Deutsche Geschichte im Europäischen Rahmen; Wissenschaftl. Buchges. Darmstadt, 1975

Burns, Rob: German Cultural Studies, an Introduction; Oxford University Press, New York, 1995

Der große PLOETZ, Herder Verlag Freiburg 1998

Gebhardt, Bruno: Handbuch der Deutschen Geschichte, Union Verlag Stuttgart

Gilbert, Felix; Large, David Clay: The End of the European Era, 1890 to the Present, published within the Norton History of Modern Europe Series, New York 1991

Hartwich, Hans-Hermann: Politik im 20.Jahrhundert; Westermann Verlag 1974

Required Reading: Axelrod Alan, Phillips,Charles: What everyone should know about the 20th century; Adam Publishing, Holbrook MA, 1995

Tarnas, Richard: The passion oh the Western mind, Understanding ideas that shaped the Western World View; Random House Toronto, 1993

Facts about Germany, Societäts-Verlag, Frankfurt 2000

References: Listed in the text books

Coordinator: Mrs. McLeod

Course learning objectives:

Upon completion of this course the student will be able to:
1. Explain effects of major historical events on German life
2. Demonstrate knowledge of periods of German history
3. Demonstrate through comparative analysis knowledge of present and historical background of Germany within its relations to Europe and U.S.
4. Demonstrate critical thinking skills through tracing main historical concepts in actual historical events

Topics covered:

Week	Topic
1	Geographical Survey Germany Germany within Europe, European States
2	History Earlier German and European History Medieval Period, 19th century World War I, Weimar Republic, World War II
3	Post World War II Period: Marshall Plans, Economic Miracle Revolutions 1968, 1989 – the 'new' Germany
4	The German-American Migration
5	German scientists and inventors

Schedule: 4 sessions of 45 minutes per week

Computer usage: Basic computer skills (MS Word)

Mode of Evaluation: Attendance and reading required, one written test, one presentation on a relevant topic
Distribution: Participation 30 %, Test 40 %, Essay 30 %

Prepared by: Mrs. McLeod

German Language

Credits:	None, participation voluntary, A certificate is given
Textbook:	Eurolingua Deutsch Band 1, Cornelsen Supplementary material provided by course coordinator
Coordinator:	Mr. Schuler
Goals:	This course will provide basic competence in speaking and reading German.
Lessons:	4 lessons per week (2 x 2 lessons)
German:	Listening, speaking, understanding First contacts; shopping; describing the way; telephone conversations; biographical details Writing and Reading Notes; texts; simple letters; price lists; use of dictionaries; advertisements; poems Grammar will include Definite and indefinite articles; singular and plural; conjugation of verbs; separable verbs; tenses; prepositions with dative and accusative
Evaluation:	Participation 60 %, one written test 40 %