Course number and name: Industrial Work-Force Dynamics in Germany

Credits and Contact Hours: 4 contact hours
Instructor: Prof. Dr. Wolfgang Döhl

Textbook: none

Supplemental materials: Extensive instructor’s notes/handouts/overheads (can be downloaded from http://www.pitt.edu/~jrclass/sca/notes.htm).

Specific Course Information:
This course provides an overview of the specific way of cooperation and co-determination in German industry. The students will learn about the organizational structure of labor unions and employers’ associations in Germany. They will come to know, how negotiations on wages and working conditions will take place and how start and settle a legal strike.

Prerequisites: none

a) Specific Goals for the Course:
- To provide an understanding of the German approach of cooperation
- To teach the fundamental concepts of codetermination in Germany
- To provide an understanding of the long term approach in employing people in Germany

b) Applicable ABET Outcomes:
(a) An ability to identify the specific background of the employment policy in Germany
(b) An ability to avoid pitfalls in employing and dismissing staff in Germany

Topics covered: Organization of labor unions and employer’s associations in Germany. “One company – one labor union” as a key issue. Efficiency in negotiating wages and labor conditions. Necessary steps to start a legal strike. Why strikes are rare in Germany. Co-determination a success factor in Germany.
• **Course number and name:** *The Impact of Technology Law and Technical Harmonization on Engineering in Europe*

• **Credits and Contact Hours:** 4 contact hours

• **Instructor:** Prof. Dr. Thomas Wilrich

• **Textbook:** none

• **Specific Course Information:**

  This course provides an overview on the impacts of laws concerning machinery and other technical products. In addition the impacts of technical harmonization on engineering are highlighted and discussed. The responsibilities of managers and other executives when placing product on the European market will be considered.

  **Prerequisites:** none

• **a) Specific Goals for the Course:**
  
  • To provide an understanding of the European law concerning engineering
  
  • To teach the fundamental concepts of the legal basis in technical law in Europe

• **b) Applicable ABET Outcomes:**

  (a) An ability to identify the essential aspects of European technical law for foreign manufacturers

  (b) An ability to avoid pitfalls in selling technical products in Germany

• **Topics covered:** European Technical Harmonization (*Single Market*) of company organization trade law concerning machinery and other technical products, interface of technology and law, the legal impact of standards (ISO EN), the responsibilities of the economic operators (producers, importers and distributors), the responsibilities of managers and other executives.
Course number and name: R&D Management

Credits and Contact Hours: 12.5 contact hours
Instructor: Prof. Dr. Koether

Textbook: none

Supplemental materials: Extensive instructor’s notes/handouts/overheads (can be downloaded from http://www.pitt.edu/~jrclass/sca/notes.htm).

Specific Course Information:
This course provides an overview of the development process for complex products like automobiles or machines. Topics include a general introduction to requirements and success factors for a successful product development. Goals, input and expectations of other stakeholders inside and outside the company are addressed. Main points are the tools to manage and control the product development process

Prerequisites: General understanding of collaboration and interaction of the functions marketing and sales – design – manufacturing, project management

a) Specific Goals for the Course:
• To provide an understanding of a product development process.
• To teach the fundamental concepts and techniques used in product development
• To provide an understanding of the key questions of product development and general solutions.

b) Applicable ABET Outcomes:
(a) An ability to apply knowledge of management, organization and engineering
(b) An ability to analyze and interpret complex tasks
(c) An ability to identify, formulate and solve engineering problems
(d) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Topics covered: Tasks in product development, research and product development, organization of development projects, strategic product planning, planning and controlling product development processes, innovation management, managing product variants, dealing with technology and design changes, collaborative development projects.

Factory tour: This course is combined with a factory tour.
• **Course number and name:** *Introduction to Production and Manufacturing Systems*

• **Credits and Contact Hours:** 12.5 contact hours

• **Instructor:** Prof. Dr. Klaus Pischetsrieder

• **Textbook:** none

**Optional Reading Recommendation:**


**Supplemental materials:** Extensive instructor’s notes/handouts/overheads (can be downloaded from http://www.pitt.edu/~jrclass/sca/notes.htm).

• **Specific Course Information:**
This course provides an overview over production systems with an emphasis on operations and collaboration with (international) suppliers. Topics include a general introduction to manufacturing technologies and their consequence on quality, cost and make-or-buy decisions. As manufactured goods can be shipped and marketed globally international aspects are addressed. Techno-logistic tools to provide customer specific products with short lead times are presented and discussed.

**Prerequisites:** Manufacturing Technologies, IE 1052 (Manufacturing Processes & Analysis),

• **a) Specific Goals for the Course:**
  - To provide an understanding of quality and cost of manufacturing technologies
  - To teach the fundamental concepts and techniques for an international production
  - To provide an understanding how to produce and deliver customized products with short lead time.

• **b) Applicable ABET Outcomes:**
  (a) An ability to apply knowledge of management, science and engineering
  (b) An ability to analyze and interpret complex management situation
  (e) An ability to identify, formulate and solve problems of engineering management
  (k) An ability to use modern tools necessary for engineering management practice

• **Topics covered:** Introduction to manufacturing technologies, quality, fixed and variable cost in production, goals and configuration of an international production network, technologies for make and buy, production network with suppliers, consequence of production in designing and managing the supply chain.

• **Factory tour:** This course is combined with a factory tour.
Course number and name: **Ergonomics - Aspects in Manufacturing and Product Design**

- **Credits and Contact Hours:** 12.5 contact hours
- **Instructor:** Prof. Dr.-Ing. Johannes Brombach
- **Textbook:** none

Optional Reading Recommendation:
**Bridger, R.S.:** Introduction to ergonomics. Taylor & Francis, ISBN 0-415-27378-1

Supplemental materials: Extensive instructor’s notes/handouts/overheads (will be served by download to be specified).

Specific Course Information:
This course begins by giving students an overview of the basics of ergonomics with respect to legal and social demands and by detailing the core competences of an ergonomist: anthropo-technics, occupational physiology, human capabilities and environmental interactions. These will be used to generate basic application principles for designing products, tools, workplaces and human-machine interactions. Special attention will be paid to the biorhythm and effects of age, the handling of weights, noise prevention, and the design of the workplace with regard to workflow.

a) **Specific Goals for the Course:**
- To provide an understanding on interaction of human and work
- To teach the fundamental concepts and techniques used in analyzing work situations with respect to main stress factors
- To valuate strategies for good designed, i.e. healthy and stress reduced work places and machine or product interactions
- To emphasize the social, economical and human demands on ergonomic work
- To support practical applications in lab exercises

b) **Applicable ABET Outcomes:**
(a) An ability to apply knowledge of mathematics, science and engineering
(b) An ability to analyze and interpret data
(e) An ability to identify, formulate and solve engineering problems
(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Topics covered: economical, social and legal aspects of ergonomic work and work safety, principle of stress and strain, fatigue and recreation, biomechanics (forces, weights), anthropometrics, environmental factors, handling of weights, seat design, working tools, human machine interaction, software ergonomics.

Lab exercise: The lab exercises will be related to seat design, noise and noise prevention, work place design, clothing and climate comfort.
Course number and name: Digital factory layout and factory simulation

Credits and Contact Hours: 12.5 contact hours

Instructors: Prof. Dr. Andreas Rieger, Prof. Dr. Jürgen Spitznagel

Textbook: none

Optional Reading Recommendation:

Supplemental materials: Extensive instructor’s notes/handouts/overheads (can be downloaded from http://www.pitt.edu/~jrclass/sca/notes.htm).

Specific Course Information:
This course provides an overview of digital factory planning (processes and layout), factory simulation as well as methods and principles of lean production. In addition the students experience the use of a simulation tool for digital factory planning. Finally the students are asked to run their own production shop and learn how to improve productivity through lean methods and principles. The integrated course concept supports a systematic analysis, simulation and real practice of processes and structures in a factory environment.

Prerequisites: IE 1052 (Manufacturing Processes & Analysis), IE 1081 (Operations Research)

a) Specific Goals for the Course:

• To provide students with an understanding of the concept behind digital factory
• To teach methods and tools to plan and test a product and the related production processes from the early design phase to the operative control of the factory
• To use discrete event simulation tools for plant-, line- and/or process-simulation and
• To enable students to learn effective methods to implement lean work systems in production

Thus the students are able to build up and test a simulation model of a real plant / production line. They are also able to evaluate the output and the results of plant-, line- and/or process-simulations.

b) Applicable ABET Outcomes:
(a) An ability to apply knowledge of mathematics, science and engineering
(b) An ability to analyze and interpret data
(e) An ability to identify, formulate and solve engineering problems
(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Topics covered: Global Challenges for Production, factory targets and factory planning, introduction to Lean Thinking, test of a product and the related production processes, plant-,
line- and/or process-simulation, run and improve a production shop.

- **Factory tour**: The course is combined with a factory tour