

WINB450K Technical systems, components and processes

Module name: Technical systems, components and processes
Module overview
EDP designation: WINB450K
Module coordinator(s): Prof. Dr Florian Finsterwalder, Prof. Dr Martin Fritz,
Module scope (ECTS): 5 CP (45 hours of attendance and 105 hours of self-study including exam preparation)
Classification (semester): 3rd or 4th <i>curriculum</i> semester
Content requirements: Basic knowledge of automation, power engineering, electrical engineering, control engineering
Prerequisites according to SPO: None
Competences: <u>Sustainable process engineering:</u> <ul style="list-style-type: none"> Students understand the fundamentals of heat and mass transfer and can apply these to the calculation and design of process engineering systems and apparatus. Students are able to recognise thermal separation problems, systematically develop solutions and design the corresponding processes for separation. They will have mastered methods for characterising solid particles and will be able to evaluate corresponding measurement results, for example to carry out risk assessments. You will be able to design processes for material preparation tasks on the basis of your acquired knowledge of mechanical, thermal and chemical process engineering and integrate these into corresponding systems, for example cleaning systems. Students have a basic understanding of the kinetics of chemical reactions and can use this to carry out simple reactor calculations, for example for material conversion. Students are able to visualise process engineering processes clearly and comprehensibly with the help of flow diagrams. Students understand the importance of critical raw materials for high-tech products and can evaluate common recycling processes. They recognise the necessity of recycling for sustainable economic activity. With the help of ecological and cost balances, students can assess different recycling methods.
<u>Cyber-physical systems:</u> <ul style="list-style-type: none"> Students can assess, design and expand technical applications of networked systems by having basic knowledge from selected areas such as sensor technology, radio modules/networks, data management, computer architecture, understanding the functionality of components and systems and being able to apply this knowledge in order to be able to discuss competently with people from this environment.

Examination:

Written examination (90 minutes) or term paper (duration 4 weeks) and oral examination (30 minutes) or oral examination (60 minutes). The specific form of examination will be announced at the beginning of the course .

Usability:

Course: Cyberphysical systems

EDP designation: WINB451K

Lecturer: Prof. Dr Martin Fritz

Hours per week (SWS): 2 SWS

Availability: annually in the winter semester

Type and mode: Lecture / compulsory subject in the specialization Production Management

Teaching language: German

Contents:

Depending on the focus set, selected topics from sensor technology, wave propagation, radio technology (multiplex, modulation and re-transmission methods), data storage, interfaces and/or computer architecture (microprocessor, microcontroller).

Recommended literature:

Will be announced at the beginning of the semester.

Notes:

Course: Sustainable process engineering

EDP designation: WINB452K

Lecturer: Prof. Dr Florian Finsterwalder (Prof. Dr Christoph Roser)

Hours per week (SWS): 2 SWS

Availability: annually in the winter semester

Type and mode: Lecture / compulsory subject in the specialization Production Management

Teaching language: German

Contents:

- Industrial significance of process engineering
- Fundamentals of heat and mass transfer
- Mechanical process engineering: particle size distributions, solid comminution, separation processes, solid-liquid separation, mixing processes, process examples
- Thermal process engineering: evaporation, distillation, extraction, adsorption/desorption, process examples
- Chemical process engineering: kinetics, ideal stirred tank reactors, ideal flow tube, basics for describing real reactors, examples of electrochemical processes, e.g. electrolysis
- Flow diagrams
- Sensors, switching and control elements
- Case studies and selected system concepts
- Economic considerations: Material flows and energy balances

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| <ul style="list-style-type: none">• Recycling: material types and types of waste, critical raw materials, recycling routes, life cycle assessments, economic efficiency criteria, examples of technically realised recycling processes• Excursion: Visit to process engineering plants (e.g. refinery, cement plant, water treatment, recycling plant) |
| Recommended literature (in the current edition):
Werner Hemming, Walter Wagner, Process Engineering, Vogel Business Media, ISBN 978-3-8343-3412-1.
Karl Schwister, Volker Leven, Process Engineering for Engineers, Hanser-Verlag.
Hans Martens, Daniel Goldmann, Recyclingtechnik: Fachbuch für Lehre und Praxis, Springer-Vieweg, ISBN 978-3658027858. |
| Notes: |