Karlsruher Institut für Technologie

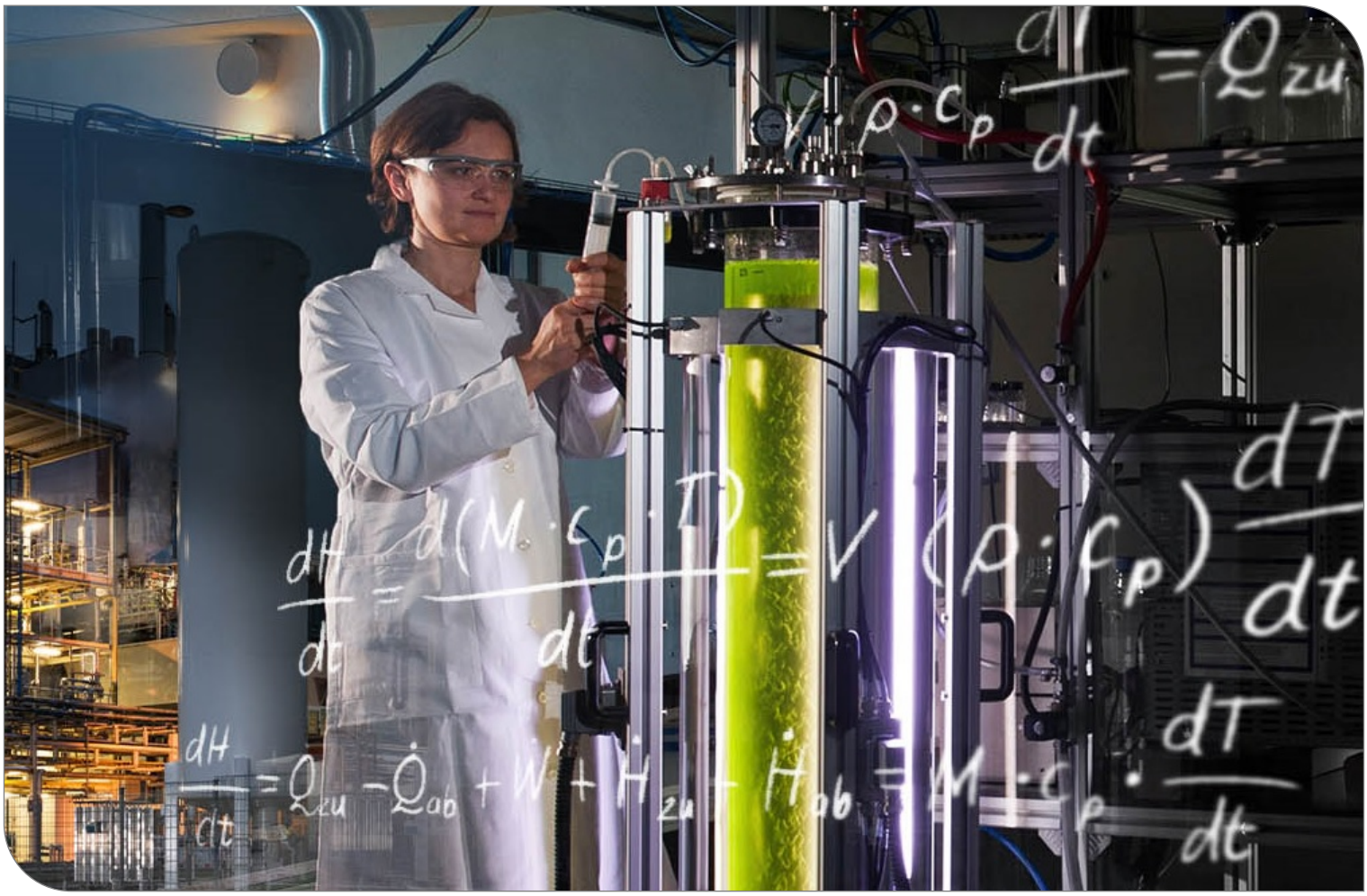
Module Handbook
Bioengineering Bachelor 2015 (Bachelor of Science (B.Sc.))

SPO 2015

Summer term 2025

Date: 22/02/2025

KIT DEPARTMENT OF CHEMICAL AND PROCESS ENGINEERING



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1 General Information

1.1 Study program details

KIT-Department	KIT Department of Chemical and Process Engineering
Academic Degree	Bachelor of Science (B.Sc.)
Examination Regulations Version	2015
Regular terms	6 terms
Maximum terms	12 terms
Credits	180
Language	Deutsch
Grade calculation	Weighted by (Weight * CP)
Additional Information	Link to study program **www.ciw.kit.edu** Department **https://www.ciw.kit.edu/1628.php** Business unit Studium und Lehre **https://www.sle.kit.edu/vorstudium/bachelor-bioingenieurwesen.php**

1.2 Qualification Goals

The focus of bioengineering is on process engineering in the context of an industrial, engineering-driven application of biological and biotechnological principles. In this way, bioengineering differs from natural sciences programs, biotechnology or molecular biotechnology, which deal primarily with the utilization of biological principles. Bioengineers make a crucial contribution to the development of interdisciplinary approaches for creating an energetically and materially sustainable, post-fossil economy.

The Bachelor's program provides knowledge on scientific fundamentals and methodical expertise in the area of bioengineering. The Bachelor's degree will qualify students to apply the acquired theoretical knowledge to a specific professional field. Furthermore, students will gain the knowledge and skills that are necessary to complete a Master's program successfully.

The compulsory program in the first and second year focuses on methodical and qualified fundamental knowledge of mathematics, natural sciences, biotechnology and engineering. The main focus is on process engineering of biological material systems, reactions and processes in theory (basic lectures) and practice (introductory laboratory courses).

The knowledge acquired in the first and second year is not only the basis for the third year of the Bachelor's program, but also for the following Master's studies. Mandatory elective courses in the third year of study offer the opportunity to gain in-depth knowledge in a specialist area for the first time. These mandatory elective courses comprise technological aspects and a practical project work (group work). Within their Bachelor's thesis, students prove the ability of working on specialized problems independently and within a defined time frame using scientific methods.

Graduates are qualified to identify, abstract, and solve technical problems using the basic knowledge provided during the Bachelor's program. Furthermore, they can evaluate biotechnological products and processes systematically as well as select and apply analyzing and simulation tools. They are able to combine theory and practice as well as to organize and implement projects independently. Graduates are able to collaborate with experts in other fields.

2 Curriculum

Bachelor Bioengineering						
Semester	Fundamentals of Mathematics and Natural Sciences 48 CP	Biology und Biotechnology 34 CP	Fundamentals of Scientific Engineering 24 CP	Thermodynamics and Transport Processes 26 CP	Fundamentals of Process Engineering 18 CP	Elective Courses and Bachelor Thesis 30 CP
1 30 LP	• Advanced Mathematics I (7*) • General Chemistry and Chemistry of Aqueous Solutions (10)	• Biology for Engineers I (5)	• Engineering Mechanics: Statics (5)			• Soft Skill Qualification (3)
2 29 LP	• Advanced Mathematics II (7) • Computational Methods (5) • Organic Chemistry (5)	• Biology for Engineers II: Biochemistry (3)	• Engineering Mechanics: Strength of Material (2) • Design of Machines (7)			
3 31 LP	• Advanced Mathematics III (7)	• Biology for Engineers II: Microbiology + Lab (2) • Enzyme Technology (3) • Food Biotechnology (5)	• Engineering Mechanics: Dynamics (5)	• Thermodynamics I (7)		
4 33 LP		• Lab Enzyme Technology (2) • Downstream Processing + Lab (7)	• Control Engineering and System Dynamics(5)	• Thermodynamics II (7) • Heat- and Masstransfer (7) • Fluiddynamics (5)		
5 32 LP	• Elementary Physics (7)	• Bioprocess Engineering + Lab (5)			• Mechanical Processing (6) • Chemical Process Engineering(6) • Thermal Process Engineering (6)	• Specialization/ Project Work (2)
6 25 LP						• Soft Skill Qualification (3) • Specialization/ Project Work (10) • Bachelor Thesis (12)
* Numbers in Brackets = CP (Credit Points)						

Lectures/ Exercises/ Laboratories (Semester Overview, Attendance Time hours per week)

	1. Semester (WS)				2. Semester (SS)			
	V	**Ü**	**P**	***LP***	**V**	**Ü**	**P**	***LP***
Advanced Mathematics I and II	4	2	-	*7*	4	2	-	*7*
Engineering Mechanics: Statics/ Strength of Material	2	2	-	*5*	1	1	-	*2*
Computational Methods	-	-	-		2	1	P	*5*
General Chemistry and Chemistry of Aqueous Solutions	3	2	P	*10*		-	-	-
Design of Machines	-	-	-	-	4	2	-	*7*
Organic Chemistry for Engineers	-	-	-		2	2	-	*5*
Biology for Engineers I (Cell Biology, Genetics)	4	-	-	*5*				
Biology for Engineers II (Biochemistry)					2			3
Soft Skill Qualification	2	-	-	*3*				
Total Credit Points				*30*				*29*

	3. Semester (WS)				4. Semester (SS)			
	V	**Ü**	**P**	***LP***	**V**	**Ü**	**P**	***LP***
Advanced Mathematics III	4	2	-	*7*	-	-	-	
Engineering Mechanics: Dynamics	2	2	-	*5*	-	-	-	
Control Engineering and System Dynamics	-	-	-		2	2	-	*5*
Fluiddynamics	-	-	-		2	2	-	*5*
Technical Thermodynamics I and II	3	2	-	*7*	3	2	-	*7*
Fundamentals of Heat- and Masstransfer	-	-	-		3	2	-	*7*
Biology for Engineers II (Microbiology)	2		P	4				
Food Biotechnology	3	1		5				
Enzyme Technology	2	-	-	*3*	-	-	P	2
Downstream Processing	-	-	-	-	3	1	P	*7*
Total Credit Points				*31*				*33*

	5. Semester (WS)				6. Semester (SS)			
	V	**Ü**	**P**	***LP***	**V**	**Ü**	**P**	***LP***
Chemical Process Engineering	2	2	-	*6*	-	-	-	
Thermal Process Engineering	2	2	-	*6*	-	-	-	
Mechanical Processing	2	2	-	*6*	-	-	-	
Elementary Physics	4	2	-	*7*	-	-	-	
Bioprocess Engineering	2	-	P	*5*	-	-	-	
Specialization/ Project Work	1	1	-	*2*	1	1	P	*10*
Soft Skill Qualification					2	-	-	*3*
Bachelor Thesis	-	-	-		360 Stunden			*12*
Total Credit Points				*32*				*25*

WS: Winter Term, SS: Summer Term V: Vorlesung (lecture); Ü: Übung (exercise); P: Praktikum (Lab); LP = ECTS

Overview graded and ungraded examinations

1. FS	2. FS	3. FS	4. FS	5. FS	6. FS
S/V HM I	S/V HM II	S/V HM III	K RuS	K Physik	S ÜQ
K HM I	K HM II	K HM III	S/V Thermo II	K MVT	M Profilfach
K ACWL	K Info	S/V TM III	K Thermo II	K TVT	P Projektarbeit
P ACWL PR	K OC	K TM III	K WSÜ	K CVT	A Bachelorarbeit
K Statik	K Festigkeitsl.	S/V Thermo I	S/V Fluiddyn.	K BVT	
S ÜQ	S/V Apparatebau	K Thermo I	K Fluiddynamik	P BVT	
K Zellbiologie	K Apparatebau	K Mikrobiologie	K BioTTV		
K Genetik	K Biochemie	S/P Mikrobio.	P Aufarbeitung		
		K Enzymtechn.	P Enzymtechn.		
		S/V LMBT			
		K LMBT			
6 Benotete Leistungen	6 Benotete Leistungen	6 Benotete Leistungen	7 Benotete Leistungen	6 Benotete Leistungen	3 Benotete Leistungen

Unbenotete Leistungen (Studienleistungen)
S: Studienleistung, unbenotet
S/V: Studienleistung: Vorleistung zu einer Prüfung, z. B. Übungsblätter
S/P: Praktikum unbenotet

Benotete Leistungen (Prüfungsleistungen)
K: Klausur/ Prüfungsleistung schriftlich
M: Prüfungsleistung mündlich
P: Praktikum/ Prüfungsleistung anderer Art
A: Abschlussarbeit

S: ungraded coursework
S/V: ungraded Coursework: Prerequisite for an written examination
S/P: Lab, ungraded

K: Written Examination
M: Oral Examination
P: Graded Lab
A: Thesis

3 Field of study structure

Mandatory	
Orientation Exam *This field will not influence the calculated grade of its parent.*	
Bachelor's Thesis	12 CR
Fundamentals of Mathematics and Natural Sciences	48 CR
Fundamentals of Scientific Engineering	24 CR
Thermodynamics and Transport Processes	26 CR
Fundamentals of Process Engineering	18 CR
Fundamentals of Biology and Biotechnology	34 CR
Specialization/ Project Work	12 CR
Interdisciplinary Qualifications	6 CR
Voluntary	
Additional Examinations *This field will not influence the calculated grade of its parent.*	
Master's Transfer Account *This field will not influence the calculated grade of its parent.*	

3.1 Orientation Exam

Mandatory		
M-CIWVT-100877	Orientation Exam	0 CR

3.2 Bachelor's Thesis

Credits
12

Prerequisite:

The Bachelor thesis may only be started when the requirements (at least 120 LP) have been fulfilled.

Procedure for registering the Bachelor's thesis

Registration for the Bachelor's thesis is handled by the Bachelor Examination Board:

- Registration before starting the thesis
- If possible, send documents to the Bachelor Examination Board via the Institute Secretariat.
- The Bachelor Examination Board requires the following documents no later than four weeks after the start of the work
  - Admission certificate https://www.ciw.kit.edu/1838.php filled out and signed
  - Copy of the assignment (signed by the person submitting the assignment)
- The Bachelor Examination Board will record and register the Bachelor thesis in the campus management system. The deadline for submission is also recorded by the Bachelor Examination Board.

Submission of the Bachelor's thesis:

- The maximum processing time is four months. The submission deadline is recorded in the campus management system. The thesis must be handed in within the deadline.
- When submitting the Bachelor's thesis, students must declare that they have written the thesis independently and have not used any sources or aids other than those specified. The exact wording can be found in the study and examination regulations.
  - The following must be handed in1 copy at the dean's office/at the Bachelor Examination Board.
  - Handing in at the supervisor after consultation
- The date of submission is the date of submission to the Bachelor Examination Board.

Mandatory		
M-CIWVT-101949	Module Bachelor's Thesis	12 CR

3.3 Fundamentals of Mathematics and Natural Sciences

Credits
48

Mandatory		
M-MATH-100280	Advanced Mathematics I	7 CR
M-MATH-100281	Advanced Mathematics II	7 CR
M-MATH-100282	Advanced Mathematics III	7 CR
M-MATH-101337	Introduction to Informatics and Algorithmic Mathematics	5 CR
M-CIWVT-101722	General Chemistry and Chemistry of Aqueous Solutions	10 CR
M-CHEMBIO-101115	Organic Chemistry for Engineers	5 CR
M-PHYS-100993	Elementary Physics	7 CR

3.4 Fundamentals of Scientific Engineering

Credits
24

Mandatory		
M-CIWVT-101733	Engineering Mechanics: Statics and Strength of Materials	7 CR
M-CIWVT-101128	Engineering Mechanics: Dynamics	5 CR
M-CIWVT-101941	Design of Machines	7 CR
M-CIWVT-106308	Control Engineering and System Dynamics *First usage possible from Apr 01, 2023.*	5 CR

3.5 Thermodynamics and Transport Processes

Credits
26

Mandatory		
M-CIWVT-101129	Thermodynamics I	7 CR
M-CIWVT-101130	Thermodynamics II	7 CR
M-CIWVT-101131	Fluiddynamics	5 CR
M-CIWVT-101132	Fundamentals of Heat and Mass Transfer	7 CR

3.6 Fundamentals of Process Engineering

Credits
18

Mandatory		
M-CIWVT-101135	Mechanical Processing	6 CR
M-CIWVT-101134	Thermal Process Engineering	6 CR
M-CIWVT-101133	Chemical Process Engineering	6 CR

3.7 Fundamentals of Biology and Biotechnology

Credits
34

Mandatory		
M-CIWVT-101624	Biology for Engineers I	5 CR
M-CIWVT-101622	Biology for Engineers II	7 CR
M-CIWVT-101124	Downstream Processing	7 CR
M-CIWVT-101126	Food Biotechnology	5 CR
M-CIWVT-105509	Enzyme Technology *First usage possible from Oct 01, 2020.*	5 CR
M-CIWVT-105510	Bioprocess Engineering *First usage possible from Oct 01, 2020.*	5 CR

3.8 Specialization/ Project Work

Credits
12

In the fifth semester the possibility of profile building exists for the first time. Eleven specialization subjects are available. The size and structure of these specialization subjects are similar. All specialization subjects extend over two semesters, start in the winter semester and end at the end of May at the latest. In the winter semester, lectures usually take place in which extended, subject-specific knowledge is imparted. Subsequently, research-related project work is carried out in small groups. Prerequisites for participation in the profile subjects are at least 60 ECTS and at least one successfully completed internship (e.g. general and inorganic chemistry, process engineering,...).

The learning control of specialization subjects consists of two parts which are listed in the description of the module description (e.g. oral examination and presentation of the project work). The specialization subject is only passed if both partial examinations are passed (evaluated with at least "sufficient"). A failed partial performance can only be repeated once. Dates for repeat exams will be agreed with the person responsible for the subject.

As the practical work is carried out in the laboratory, the number of participants in the individual specialization subjects is limited. The registration for the specialization subjects is usually possible in July. Within a registration period of two weeks, students have the opportunity to choose their preferred subject (at least one first and one second wish). After the registration deadline, the places will be allocated automatically, taking into account your wishes as far as possible.

Before the start of the registration period, an information event will be held on **22 June 2022** in which the individual subjects will be presented and the registration procedure explained.

The location and time of the information event will be published in good time on the faculty's and student council's homepages.

The registration process is divided into two stages:
In July, the desired profile subjects can be selected via the following portal https://portal.wiwi.kit.edu/
After the allocation you can choose your specialization subject in the Study Portal, the choice is approved online by the faculty, afterwards the registration for the individual examinations is possible.

Election regulations

Elections in this field require confirmation.

Specialization/ Project Work (Election: 1 item as well as at least 12 credits)		
M-CIWVT-101145	Energy and Environmental Engineering	12 CR
M-CIWVT-101147	Mechanical Separation Technology	12 CR
M-CIWVT-101148	Food Technology	12 CR
M-CIWVT-101153	Process Development and Scale-up	12 CR
M-CIWVT-101143	Biotechnology	12 CR
M-CIWVT-101154	Micro Process Engineering	12 CR
M-CIWVT-104457	Fundamentals of Refrigeration	12 CR
M-CIWVT-105995	Circular Economy *First usage possible from Oct 01, 2022.*	12 CR
M-CIWVT-106448	Air Pollution Control *First usage possible from Oct 01, 2023.*	12 CR
M-CIWVT-106477	Automation and Control Systems Engineering *First usage possible from Oct 01, 2023.*	12 CR
M-CIWVT-106700	Formulation and Characterisation of Energy Materials *First usage possible from Oct 01, 2024.*	12 CR
M-CIWVT-106825	Chemical Reaction Engineering *First usage possible from Oct 01, 2024.*	12 CR

3.9 Interdisciplinary Qualifications

Credits
6

A total of 6 LPs must be completed in the area of "soft skill qualifications" during the Bachelor's programe. Non-technical modules, such as modules from other subject areas, language courses or other courses offered by the House of Competence (HoC) or the Centre for Applied Cultural Studies and General Studies (ZaK), belong to interdisciplinary qualifications.

Election notes
3 of the 6 LPs are fixed: At least one of the following modules must be selected:

- Ethics and Global Material Cycles
- Industrial Business Administration

Modules in the range of 3 LP can be freely selected. The following can be done

- either the two above mentioned modules
- or any modules of at least 3 LP (e.g. HoC or ZaK courses)

can be selected.

Soft Skill Qualifications (Election: 2 items)		
M-CIWVT-101149	Ethics and Global Material Cycles	3 CR
M-WIWI-100528	Industrial Business Administration	3 CR
M-CIWVT-105848	SmartMentoring *First usage possible from Oct 01, 2021.*	3 CR
M-CIWVT-106534	Data-Driven Modeling with Python *First usage possible from Oct 01, 2023.*	3 CR

3.10 Additional Examinations

Additional Examinations (Election: at most 30 credits)		
M-CIWVT-102017	Further Examinations	30 CR
M-FORUM-106753	Supplementary Studies on Science, Technology and Society *First usage possible from Oct 01, 2024.*	16 CR

3.11 Master's Transfer Account

Students who have already earned at least 120 LP in their Bachelor's programe can earn credit points from a consecutive Master's programe at KIT up to a maximum of 30 LP.

Exams can be taken in the following subjects:

- Advanced Fundamentals
- Internship
- Soft Skill Qualifications

Further information on individual modules can be found in the module manual of the Master's program.

Within the first Master's semester, achievements can be taken over into the master program. Please contact the Master's Examination Board.
There is no obligation to transfer achievements form Master Transfer Account!

Election notes
Please note: Upon successful completion of all studies and exams needed for the bachelor's degree, a control of success registered as a prior master's examination may only be passed as long as you are enrolled in the bachelor's program. You should not yet have been admitted to the master's program and the master's semester should not yet have started.

This means that as soon as your admission to the master's program has been expressed and the master's semester has started, your participation in the examination is the **first regular examination** attempt within the framework of your master's studies.

Master Transfer Account (Election: at most 30 credits)		
M-CIWVT-101991	Single Results	30 CR

Modelled Conditions
The following conditions have to be fulfilled:

1. You need to have earned at least 120 credits in the following fields:
    - Fundamentals of Biology and Biotechnology
    - Fundamentals of Scientific Engineering
    - Fundamentals of Mathematics and Natural Sciences
    - Specialization/ Project Work
    - Thermodynamics and Transport Processes
    - Interdisciplinary Qualifications
    - Fundamentals of Process Engineering

4 Modules

M 4.1 Module: Automation and Control Systems Engineering [M-CIWVT-106477]

Responsible: Prof. Dr.-Ing. Thomas Meurer
Organisation: KIT Department of Chemical and Process Engineering
Part of: Specialization/ Project Work (Usage from 10/1/2023)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
12	Grade to a tenth	Each winter term	2 terms	German	4	1

Mandatory			
T-CIWVT-113088	Automation and Control Systems Engineering - Exam	6 CR	Meurer
T-CIWVT-113089	Automation and Control Systems Engineering - Project Work	6 CR	Meurer

Modeled Conditions
The following conditions have to be fulfilled:

1. You need to have earned at least 60 credits in your course of studies.

M 4.2 Module: Advanced Mathematics I [M-MATH-100280]

Responsible: Prof. Dr. Roland Griesmaier
Organisation: KIT Department of Mathematics
Part of: Fundamentals of Mathematics and Natural Sciences

Credits	Grading scale	Duration	Language	Level	Version
7	Grade to a tenth	1 term	German	3	3

Mandatory			
T-MATH-100275	Advanced Mathematics I	7 CR	Arens, Griesmaier, Hettlich
T-MATH-100525	Tutorial Advanced Mathematics I *This item will not influence the grade calculation of this parent.*	0 CR	Arens, Griesmaier, Hettlich

Competence Certificate
Learning assessment is carried by a written examination of length 120 minutes and by homework assignments (pre-requesite). A "pass" result on the pre-requesite is a requirement for registration for the corresponding written examination.

Prerequisites
none

Competence Goal
The students know the fundamentals of one-dimensional calculus. They can reliably use limits, functions, power series and integrals. They understand central concepts such as continuity, differentiability or integrability and they know important statements about these concepts. The students can follow the arguments leading to these statements as presented in the lectures and are able to independently prove simple assertions based on these statements.

Content
Fundamentals, sequences and convergence, functions and continuity, series, differential calculus of one real variable, integral calculus

Module grade calculation
The module grade is the grade of the written examination

Workload
In class: 90 hours

- lectures, tutorials and examinations

Independent study: 120 hours

- independent review of course material
- work on homework assignments
- preparation for written exams

Literature
will be announced in class.

Base for
Advanced Mathematics II

M 4.3 Module: Advanced Mathematics II [M-MATH-100281]

Responsible: Prof. Dr. Roland Griesmaier
Organisation: KIT Department of Mathematics
Part of: Fundamentals of Mathematics and Natural Sciences

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
7	Grade to a tenth	Each summer term	1 term	German	3	2

Mandatory			
T-MATH-100276	Advanced Mathematics II	7 CR	Arens, Griesmaier, Hettlich
T-MATH-100526	Tutorial Advanced Mathematics II *This item will not influence the grade calculation of this parent.*	0 CR	Arens, Griesmaier, Hettlich

Competence Certificate
Learning assessment is carried by a written examination of length 120 minutes and by homework assignments (pre-requesite). A "pass" result on the pre-requesite is a requirement for registration for the corresponding written examination.

Prerequisites
none

Competence Goal
The students know about the fundamentals of linear algebra. The are able to use vectors, linear maps and matrices without problems. They have basic knowledge about Fourier series. The students also can theoretically and practically deal with initial value problems of ordinary differential equations. They can make use of classical solution techniques for linear differential equations.

Content
vector spaces, linear maps, eigenvalues, Fourier series, differential equations, Laplace transform

Module grade calculation
The module grade is the grade of the written examination.

Workload
In class: 90 hours

- lectures, tutorials and examinations

Independent study: 120 hours

- independent review of course material
- work on homework assignments
- preparation for written exams

Recommendation
The following modules should have been taken: Advanced Mathematics 1

Literature
will be announced in class.

Base for
Advanced Mathematics III

M 4.4 Module: Advanced Mathematics III [M-MATH-100282]

Responsible: Prof. Dr. Roland Griesmaier
Organisation: KIT Department of Mathematics
Part of: Fundamentals of Mathematics and Natural Sciences

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
7	Grade to a tenth	Each winter term	1 term	German	3	2

Mandatory			
T-MATH-100277	Advanced Mathematics III	7 CR	Arens, Griesmaier, Hettlich
T-MATH-100527	Tutorial Advanced Mathematics III *This item will not influence the grade calculation of this parent.*	0 CR	Arens, Griesmaier, Hettlich

Competence Certificate
Learning assessment is carried by a written examination of length 120 minutes and by homework assignments (pre-requesite). A "pass" result on the pre-requesite is a requirement for registration for the corresponding written examination.

Prerequisites
none

Competence Goal
The students know about differential calculus for vector-valued functions of several variables and about techniques of vector calculus such as the definition and application of differential operators, the computation of domain, line and surface integrals and important integral theorems. They have basic knowledge about partial differential equations and know basic facts from stochastics.

Content
Multidimensional calculus, domain integrals, vector calculus, partial differential equations, stochastics.

Module grade calculation
The module grade is the grade of the written examination.

Workload
In class: 90 hours

- lectures, tutorials and examinations

Independent study: 120 hours

- independent review of course material
- work on homework assignments
- preparation for written exams

Recommendation
The following modules should have been taken before: Advanced Mathematics I and II

Literature
will be announced in class.

M 4.5 Module: Air Pollution Control [M-CIWVT-106448]

Responsible: Prof. Dr.-Ing. Achim Dittler
Organisation: KIT Department of Chemical and Process Engineering
Part of: Specialization/ Project Work (Usage from 10/1/2023)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
12	Grade to a tenth	Each winter term	2 terms	German	4	1

Mandatory			
T-CIWVT-113046	Air Pollution Control	7 CR	Dittler
T-CIWVT-113047	Air Pollution Control - Project Work	5 CR	Dittler

Competence Certificate
The learning control consists of two partial achievements:

1. oral examination, duration 30 minutes
2. project work

Prerequisites
Participation requires

- minimum 60 ECTS
- minimum 1 lab course

Modeled Conditions
The following conditions have to be fulfilled:

1. You need to have earned at least 60 credits in your course of studies.

Competence Goal
Students undertstand transport behavior and methods of size distribution measurement of airborne fine particles in the context of environmental and nanotechnology. They are able to apply this knowledge to solve basic problems of particle technology in a team oriented approach.

Content
The classes provide a knowledge base of methods of particle dispersion, particle transport processes in gases, as well as methods for their characterization with applications in the environment and industrial product design. Practical experience related to these concepts is developed in a team based lab project.

Module grade calculation
The module grade is calculated from the grades of the two partial achievments:
40 % project work, 60 % oral examination.

Workload

- Attendance time: 56 h (V+Ü) + 120 (project work) + 10 (Excoursion)
- Self-Study: 24 h
- Oral examination: 140 h

Literature
Skriptum Gas-Partikel-Messtechnik

M 4.6 Module: Biology for Engineers I [M-CIWVT-101624]

Responsible: Prof. Dr. Christoph Syldatk
Organisation: KIT Department of Chemical and Process Engineering
Part of: Fundamentals of Biology and Biotechnology

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	German	3	2

Mandatory			
T-CIWVT-111062	Cell Biology	3 CR	Gottwald
T-CIWVT-111063	Genetics	2 CR	Neumann

Competence Certificate
The module is successfully completed by

- a written exam "Cell Biology" of 90 min
- a written exam "Genetics" of 90 min

Prerequisites
None

Competence Goal
Cell-biology: Identification of pro- and eukaroytic cells, identification of pro- and eukaroytic cellular constituents, knowledge of basic metabolic pathways, knowledge of the most important molecule classes und their occurence, ability to operate a light microscope and knowledge of the underlying theory, being able to select bioreactors according to the application.

Genetics: Students are able to give a detailed description of basic aspects of molecular genetics in pro- and eukaryotes and can explain genetic processes in their own words. Basic aspects are in particular: Structure and organization of nucleic acids, mechansims of replication, transcription, translation, regulation of gene expression, recombination, transposition, DNA repair mechanisms and genetic basics of virology. Furthermore, students are able to apply their basic knowledge by explaining graphics or by transfering their knowlegde to gene technological methods.

Content
Cell biology: Microscopy; Cell structure of pro- and eukaryotes; Eukaryotic cell compartiments; Structure and function of macromolecules; Communication between cells; Cell cycle.

Genetics: Nucleic acids; Chromatin and chromosomes; Genes and genomes; Replication; Transcription; Translation; Recombination; Mutations and DNA repair mechanisms; Gene regulation; Methods and applications of molecular gene technology.

Module grade calculation
The module grade is calculated from the LP-weighted average of both parts of the module.

Workload
Attendance time: Lecture of 4 SWS: 60 h
Self-study time: 30 h
Exam preparation: 60 h

Recommendation
None

Literature
Cell biology

- Alberts, Lehrbuch Molekulare Zellbiologie (Wiley-VCH)
- Munk: Biochemie - Zellbiologie (Thieme)
- Plattner/Hentschel: Tellbiologie (Thieme)

Genetics

- Munk, Taschenlehrbuch Biologie, Genetik (Thieme)
- Knippers, Genetik (Thieme)

M 4.7 Module: Biology for Engineers II [M-CIWVT-101622]

Responsible: Prof. Dr. Christoph Syldatk
Organisation: KIT Department of Chemical and Process Engineering
Part of: Fundamentals of Biology and Biotechnology

Credits	Grading scale	Duration	Language	Level	Version
7	Grade to a tenth	2 terms	German	3	3

Mandatory			
T-CIWVT-103331	Laboratory Work: Biology for Engineers	2 CR	Rudat
T-CIWVT-111064	Biochemistry	3 CR	Rudat
T-CIWVT-111065	Microbiology	2 CR	Neumann

Competence Certificate
Learing Control Consits of:

1. Written examination Biochemistry; 90 minutes (graded)
2. Laboratory work Microbiology; one week (non-graded)
3. Written examination Microbiology; 90 minutes (graded)

Prerequisites
To participate in the microbiology exam, the microbiology lab has to be passed.

Module grade calculation
Grade of the module is the grade of the written examination

Workload
Lecture/ written examination:

Attendance time: 60 h; self-study: 30 h; exam-preparation: 60 h

Laboratory work:
Attendance time: 40 h; self-study: 20 h

M 4.8 Module: Bioprocess Engineering [M-CIWVT-105510]

Responsible: Prof. Dr.-Ing. Alexander Grünberger
Organisation: KIT Department of Chemical and Process Engineering
Part of: Fundamentals of Biology and Biotechnology (Usage from 10/1/2020)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	German	3	1

Mandatory			
T-CIWVT-111073	Laboratory Work Bioprocess Engineering	2 CR	Neumann
T-CIWVT-110128	Bioprocess Engineering	3 CR	Grünberger

Prerequisites
None

Workload

- Lectures: 30 h
- Homework: 20 h
- Exam Preparation: 40 h
- Lab Work: Experiments: 40 h
- Lab Work: Homework: 20 h

M 4.9 Module: Biotechnology [M-CIWVT-101143]

Responsible: Prof. Dr. Jürgen Hubbuch
Organisation: KIT Department of Chemical and Process Engineering
Part of: Specialization/ Project Work

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
12	Grade to a tenth	Each winter term	2 terms	German	4	4

Mandatory			
T-CIWVT-103668	Biotechnology	3 CR	Henke
T-CIWVT-103669	Biotechnology	9 CR	Perner-Nochta

Competence Certificate
The module comprises two graded learning controls:

1. written examination lastin 90 minutes.
2. practical work/ protocol/ presentation

- project plan
- project work
- poster presentation/ talk
- report

Prerequisites
Participation requires

- minimum 60 ECTS
- minimum 1 lab course

Modeled Conditions
The following conditions have to be fulfilled:

1. You have to fulfill one of 8 conditions:
    1. The module M-CIWVT-101138 - Lab Work Process Engineering must have been passed.
    2. The module M-CIWVT-101139 - Process Machines must have been passed.
    3. The module M-CIWVT-101722 - General Chemistry and Chemistry of Aqueous Solutions must have been passed.
    4. The module M-CIWVT-101964 - Laboratory Work in General and Inorganic Chemistry must have been passed.
    5. The module M-CHEMBIO-101115 - Organic Chemistry for Engineers must have been passed.
    6. The course T-CIWVT-103331 - Laboratory Work: Biology for Engineers must have been passed.
    7. The module M-CIWVT-106427 - Basic Practical Course in Natural Sciences must have been passed.
    8. The module M-CIWVT-106500 - Basic Practical Course must have been passed.
2. You need to have earned at least 60 credits in your course of studies.

Competence Goal
Basic understanding of processes and synthesis of processes in biotechnologic production

lecture Bioanalytics:

The students can describe the selection and implementation of methods for the analysis of biomolecules. Students will be able to evaluate the advantages and limitations of the various methods with regard to their areas of application in biotechnological research in the context of various biomolecules (in particular DNA, RNA, proteins/enzymes, metabolites). Students are able to select suitable methods and experimental designs for their own (future) work in the context of qualitative and quantitative bioanalytics.

Lecture „Management of scientific projects“ and exercises:
The students are able to conduct literature research on their own, design own experiments, evaluate their own data, write own scientific texts. They can plan their own small project regarding time and finances required and prepare a project plan as well as present it. They can prepare a (scientific) poster and present it.

Project Work:
The students are able to do own scientific research and practical work in the field of biotechnology. They know how to analyse their own gained data and prepare a project report.

Content
lecture Bioanalytics:

The lecture will introduce the most important methods for the analysis of biomolecules. According to the genetic information flow in the cell, methods of bioanalysis for DNA, RNA, proteins/enzymes and metabolites are taught. The theory and application of methods are illustrated using research examples. Methods focus on sequencing technologies, protein analysis, enzymology, chromatographic methods and the basics of mass spectrometry and NMR. Other microscopy methods and reporter systems for analyzing biomolecules in whole cells are also presented.

Lecture „Management of scientific projects“ and exercises:
The lecture covers literature research, design of experiments, data evaluation, scientific writing and project management; in parts it is software-based and carried out in an electronic classroom.

Practical excercises cover literature research, preparation of a project plan, presentation of the project plan, preparation of a poster, presentation of the poster

Procect Work:
Accomplishment of autonomous investigation and practical work in the field of biotechnology, preparation of a project report

Module grade calculation
weighted mean based on LP.

Workload
Bioanalytics:

- Lectures and Exercises: 30 h
- Homework: 30 h
- Exam Preparation: 30 h

Management of scientific projects:

- Lectures and Exercises: 45 h
- Homework: 45 h

Lab Work:

- Lab: 80 h
- Homework: 10 h

Project:

- Lab: 10 h
- Homework: 80 h

Literature
Will be announced.

M 4.10 Module: Chemical Process Engineering [M-CIWVT-101133]

Responsible: Prof. Dr.-Ing. Gregor Wehinger
Organisation: KIT Department of Chemical and Process Engineering
Part of: Fundamentals of Process Engineering

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each winter term	1 term	German	4	2

Mandatory			
T-CIWVT-101884	Chemical Process Engineering	6 CR	Wehinger

Competence Certificate
Learning control is a written examination lasting 120 minutes.

Prerequisites
None

Competence Goal
Students can analyse and design reactors for chemical and enzymatic-biochemical conversions in homogeneous phase. They are able to promote the formation of a certain desired product in multi-step reactions, when parallel and consecutive steps can yield further products. Furthermore, students can apply balances of energy to identify conditions of safe reactor operation when exo- and endothermic reactions are run.

Content
Application of mass and energy balances for the analysis and design of ideal reactors for single-phase conversions, and for the identification of optimum operation conditions.

Module grade calculation
grade of the written examination

Workload

- Attendance time: lectures and exercises: 60 h
- self-study: 60 h
- preparation of examination. 60 h

Recommendation
Courses of 1st - 4th semester

Literature

- Skript Chemische Verfahrenstechnik I, https://ilias.studium.kit.edu
- G.W. Roberts: Chemical Reactions and Chemical Reactors, Wiley VCH 2009
- O. Levenspiel: Chemical Reaction Engineering, John Wiley & Sons Inc. 1998

M 4.11 Module: Chemical Reaction Engineering [M-CIWVT-106825]

Responsible: Prof. Dr.-Ing. Gregor Wehinger
Organisation: KIT Department of Chemical and Process Engineering
Part of: Specialization/ Project Work (Usage from 10/1/2024)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
12	Grade to a tenth	Each winter term	2 terms	German	4	1

Mandatory			
T-CIWVT-113695	Chemical Reaction Engineering - Exam	6 CR	Wehinger
T-CIWVT-113696	Chemical Reaction Engineering - Project Work	6 CR	

M 4.12 Module: Circular Economy [M-CIWVT-105995]

Responsible: Prof. Dr.-Ing. Dieter Stapf
Organisation: KIT Department of Chemical and Process Engineering
Part of: Specialization/ Project Work (Usage from 10/1/2022)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
12	Grade to a tenth	Each winter term	2 terms	German	4	2

Mandatory			
T-CIWVT-112172	Circular Economy - Oral Exam	8 CR	Stapf
T-CIWVT-112173	Circular Economy - Project Work	4 CR	Stapf

Competence Certificate
The learning control consists of two partial achievements:

1. Oral exam on lectures, exercises and case studies, duration approx. 30 minutes.
2. Project work, exmaination of another type. The term paper and the presentation of the results are graded.

Prerequisites
Participation in the Specialization/ Project Work is only possible if the following achievements have been made:

- At least 60 credits
- At least one lab

Modeled Conditions
The following conditions have to be fulfilled:

1. You need to have earned at least 60 credits in your course of studies.

Competence Goal
The students understand important material systems and essential process steps of the provision and recycling of mineral and metallic raw materials and anthropogenic carbon. With the aim of closing cycles, they can use methods of process evaluation, such as analysis and assessment of process chains using efficiency indicators. To do this, students work on increasingly complex case studies in a team using scientific methods and finally apply these methods during project work.

Content
Introduction to transition in resources and technologies towards a sustainable circular economy. Knowledge acquisition in system analysis, in process efficiency assessment and in sustainability evaluation. Motivation for process engineering research and development in the field of sustainable raw material supply of a climate-neutral society:

- Material flow and process knowledge of the primary and the recycling industries
- Methodological knowledge (business management basics of relevance, material flow analysis, determination of performance indicators)
- Independent scientific work (application of knowledge, analysis, assessment) in case studies / as project work.

Module grade calculation
The module grade is the CP-weighted average of the two partial achievements.

Workload
Attendance time:

- Lectures and exercises: 45 h
- Project work: 80

Self-study:

- Wrap up lectures: 45 h
- Wrap up case studies: 60 h
- Preparation term paper and presentation: 40 h

Exam preparation: 90 h

M 4.13 Module: Control Engineering and System Dynamics [M-CIWVT-106308]

Responsible: Prof. Dr.-Ing. Thomas Meurer
Organisation: KIT Department of Chemical and Process Engineering
Part of: Fundamentals of Scientific Engineering (Usage from 4/1/2023)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German	3	1

Mandatory			
T-CIWVT-112787	Control Engineering and System Dynamics	5 CR	Meurer

Competence Certificate
Learning control is a written exam, duration120 minutes.

Prerequisites
None

Competence Goal
Provision of linear system theory and simple controls for technical systems to CIW and BIW engineers.

Content
Dynamic systems, Properties of important systems and modeling, Stability, Controller design, Estimation

Module grade calculation
The module grade is the grade of the written exam.

Workload
Attendance Time:

- Lectures:30 hrs.
- Exercises 15 hrs.

Self-study:

- Preparation and wrap-up lectures sample course: 60 hrs.
- Exam preparation: 45 hrs.

Literature

- Meurer: Regelungstechnik und Systemdynamik, Vorlesungsskript.
- Aström, R. Murray: Feedback Systems, Princeton University Press, 2008.
- C.T. Chen: Linear System Theory and Design, Oxford Univ. Press, 1999.
- Lunze: Regelungstechnik I, Springer-Verlag, 2010.
- Lunze: Regelungstechnik II, Springer-Verlag, 2010.
- H. Unbehauen: Regelungstechnik I, Vieweg, 2005.

M 4.14 Module: Data-Driven Modeling with Python [M-CIWVT-106534]

Responsible: Dr.-Ing. Frank Rhein
Organisation: KIT Department of Chemical and Process Engineering
Part of: Interdisciplinary Qualifications (Usage from 10/1/2023)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	pass/fail	Each winter term	1 term	German	3	1

Mandatory			
T-CIWVT-113190	Data-Driven Modeling with Python	3 CR	Rhein

M 4.15 Module: Design of Machines [M-CIWVT-101941]

Responsible: Dr.-Ing. Marco Gleiß
Organisation: KIT Department of Chemical and Process Engineering
Part of: Fundamentals of Scientific Engineering

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
7	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-CIWVT-103641	Design of Machines	0 CR	Gleiß
T-CIWVT-103642	Design of Machines, Exam	7 CR	Gleiß

Competence Certificate
The learning contol consists of two partial achievements.

1. Completed coursework (ungraded)/ prerequisite. 4 of 5 exercises hase to be passed.
2. Written examination lasting 120 minutes.

Prerequisites
None

Content
Scientific drawing, introduction into material science with a focus on manufacturing an design of steel, design of machines and apparatuses, hygenic design

Module grade calculation
The module grade is the grade of the written exam.

Workload
Attendance time: lecture 2 SWH, exercises 3 SWH: 70 hrs
Self-study: 70 hrs
Preparation of exam: 70 hrs

Recommendation
Moduls of the 1st semester.

M 4.16 Module: Downstream Processing [M-CIWVT-101124]

Responsible: Prof. Dr. Jürgen Hubbuch
Organisation: KIT Department of Chemical and Process Engineering
Part of: Fundamentals of Biology and Biotechnology

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
7	Grade to a tenth	Each summer term	1 term	German	4	3

Mandatory			
T-CIWVT-101897	Downstream Processing	5 CR	Hubbuch
T-CIWVT-111097	Laboratory Work: Downstream Processing	2 CR	Hubbuch

Competence Certificate
Learning control constist of

- written examination of 120 min duration
- Lab work

Prerequisites
None

Competence Goal
Overview on unit operations for protein separations and respective analytics used in the biotechnological industry.

Content
The elcture series adresses fundamentals in biotechnological purification of bio-products and respective analytics.

Lab:

Methods for the purification of proteins, which are based on solubility of proteins as well as on interactions between proteins and carrier materials. Sampling and sample preparation; protein characterisation; analytical methods for the determination of product concentrations; determination and calculation of the various process parameters; graphical representation and interpretation of the results; linearisation procedures; computer-aided process modelling and optimisation.

Module grade calculation
ECTS-weighet mean of written examination and lab work.

Workload
Lectures and exercises: 60 h
Homework: 50 h
preparation of examination: 40 h

Lab Work (one week):

Attendance time: 40 h
preparation and reports: 20 h

Recommendation
Courses of 1st - 3rd semester

Literature
will be announced

Base for
Special subject Biotechnology

M 4.17 Module: Elementary Physics [M-PHYS-100993]

Responsible: Prof. Dr. Wolfgang Wernsdorfer
Organisation: KIT Department of Physics
Part of: Fundamentals of Mathematics and Natural Sciences

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
7	Grade to a tenth	Each winter term	1 term	German	3	2

Mandatory			
T-PHYS-101577	Elementary Physics	7 CR	Wernsdorfer

Competence Certificate
See components of this module.

Prerequisites
The module *Advanced Mathematics I* has to be passed.

Modeled Conditions
The following conditions have to be fulfilled:

1. The module M-MATH-100280 - Advanced Mathematics I must have been passed.

Recommendation
Contents of *Engineering Mechanics: Dynamics*

Literature

- P. Tipler, Physik für Wissenschaftler und Ingenieure, Springer 2015
- E. Hering, R. Martin, M. Stohrer, Physik für Ingenieure, Springer 2016

M 4.18 Module: Energy and Environmental Engineering [M-CIWVT-101145]

Responsible: Prof. Dr. Reinhard Rauch
Prof. Dr.-Ing. Dimosthenis Trimis
Organisation: KIT Department of Chemical and Process Engineering
Part of: Specialization/ Project Work

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
12	Grade to a tenth	Each winter term	2 terms	German	4	4

Mandatory			
T-CIWVT-103527	Energy and Environmental Engineering Project Work	4 CR	Rauch, Trimis
T-CIWVT-108254	Energy and Environmental Engineering	8 CR	Rauch, Trimis

Competence Certificate
The learning control consists of two partial achievements:

- Written examination, duration 120 minutes
- Examination of another type, project work

Prerequisites
Participation requires

- minimum 60 ECTS
- minimum 1 lab course

Modeled Conditions
The following conditions have to be fulfilled:

1. You need to have earned at least 60 credits in your course of studies.

Competence Goal
The students will be able to discuss, analyze and compare applications in energy engineering and environmental protection (primary/secundary means, efficiency, raw materials etc.).

Content
Introduction into production of fuels (chemical energy carriers) from fossil and renewable sources and their use, prevention of formation of pollutants, removal of pollutants, review and selected examples, fundamentals and applications of high temperature energy conversion.

Module grade calculation
The module grade is the CP-weighted average of the two partial achievements.

Workload
Attendance time: 60 h
Excoursions: 20 h
Self-Study: 90 h
Project work: 90 h
Exam preparation: 100 h

Recommendation
Courses of 1st - 4 th semester

Literature
lecture notes and specific literature indicated during lectures, additionally:
J. Warnatz, U. Maas, R.W. Dibble: Combustion, Spinger Verlag, Berlin, Heidelberg 1997
G. Schaub, T. Turek: Energy Flows, Material Cycles and Global Development, Springer Verlag, Berlin 2011
M. Crocker (Hrsg.): Thermochemical Conversion of Biomass to Liquid Fuels and Chemicals, Springer-Verlag, Berlin 2010
E. Rebhan (Hrsg.): Energiehandbuch – Gewinnung, Wandlung und Nutzung von Energie, Springer-Verlag, Berlin 2002
B. Elvers (Hrsg.): Handbook of Fuels, Wiley-VCH, Weinheim 2008

M 4.19 Module: Engineering Mechanics: Dynamics [M-CIWVT-101128]

Responsible: TT-Prof. Dr. Christoph Klahn
Organisation: KIT Department of Chemical and Process Engineering
Part of: Fundamentals of Scientific Engineering

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	German	4	2

Mandatory			
T-CIWVT-101877	Engineering Mechanics: Dynamics, Exam	5 CR	Klahn
T-CIWVT-106290	Engineering Mechanics: Dynamics	0 CR	Klahn

Competence Certificate
The learning control consists of two partial achievements

1. Completed coursework/ prerequisite
2. a written examination lasting 120 minutes

Prerequisites
None

Competence Goal
Students possess basic knowledge in Engineering Mechanics/Dynamics, they are familiar with problem solving and able to use this knowledge for theoretical analysis and solution of practical engineering problems.

Content
Kinematics and dynamics of mass point;
Kinematics and dynamics of rigid body;
The principle of linear momentum, angular momentum, work and energy theorem;
Oscillation of the systems with one or more freedom degrees;
Relative movement of mass point;
Methods in analytical Mechanics, Lagrange equation;

Module grade calculation
grade of the written examination. Superior preliminary test can be credited according to §7,13 SPO.

Workload
lectures and exercises: 56 h
self study: 56 h
preparation for examination 40h

Recommendation
modules of 1. -2. semester.

Literature

- Gross/Ehlers/Wriggers/Schröder/Mülle: Formeln und Aufgaben zur Technischen Mechanik 3, 13. Auflage https://doi.org/10.1007/978-3-662-66190-1
- Kühlhorn/Silber: Technische Mechanik für Ingenieure, Hüthig 2000
- Hibbler: Dynamik,Pearson 2006, 10. Auflage
- Wriggers/Nackenhorst/Beuermann/Spiess/Löhnert: Technische Mechanik kompakt, Teubner2006

M 4.20 Module: Engineering Mechanics: Statics and Strength of Materials [M-CIWVT-101733]

Responsible: Prof. Dr. Norbert Willenbacher
Organisation: KIT Department of Chemical and Process Engineering
Part of: Fundamentals of Scientific Engineering

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
7	Grade to a tenth	Each winter term	2 terms	German	3	2

Mandatory			
T-CIWVT-111054	Engineering Mechanics: Statics	5 CR	Hochstein, Oelschlaeger, Willenbacher
T-CIWVT-111056	Engineering Mechanics: Strength of Materials	2 CR	Hochstein, Willenbacher

Competence Certificate
Learning control consists of two written examinations according to SPO section 4, subsection 2 No. 3:

- Statics, duration 90 minutes
- Strength of Materials, duration 60 minutes

Prerequisites
None

Module grade calculation
ECTS-weighted mean of the two written examinations.

Workload

- Lectures and exercises: 75 h
- Homework: 95 h
- Exam preparation: 40 h

M 4.21 Module: Enzyme Technology [M-CIWVT-105509]

Responsible: Prof. Dr.-Ing. Dirk Holtmann
Organisation: KIT Department of Chemical and Process Engineering
Part of: Fundamentals of Biology and Biotechnology (Usage from 10/1/2020)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	2 terms	German	3	2

Mandatory			
T-CIWVT-111074	Enzyme Technology	3 CR	Holtmann
T-CIWVT-111075	Laboratory Enzyme Technology	2 CR	

Competence Certificate
Learning Control sonsists of:

- a written examination according to § 4 Abs. 2 Nr. 1 SPO.
- lab work according to § 4 (2) No. 3 SPO.

Prerequisites
The exam must be passed in order to participate in the lab.

Workload

- Lectures: 30 h
- Homework: 20 h
- Exam Preparation: 40 h
- Lab Work: Experiments: 35 h
- Lab Work: Homework: 25 h

M 4.22 Module: Ethics and Global Material Cycles [M-CIWVT-101149]

Responsible: Prof. Dr. Reinhard Rauch
Organisation: KIT Department of Chemical and Process Engineering
Part of: Interdisciplinary Qualifications

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	pass/fail	Each summer term	1 term	German	3	4

Mandatory			
T-CIWVT-112372	Global Material Cycles	1 CR	Rauch
T-CIWVT-112373	Ethics	2 CR	Hillerbrand

Competence Certificate
Examination consists of

1. Ethics: regular attendance at lectures and exercises; short presentation; written elaboration
2. Global Material Cycles: written exmaination (ungraded), duration 60 minutes.

Prerequisites
None

Competence Goal
Basic understanding of: Examples of global material cycles and effects caused by human societies, Important limitations for material and energy conversion by human societies (civilization, industrialization), Basic knowledge in engineering ethics, Competences in "handling" with ethical questions for engineers

Content
Bio-geosphere as environment for human life. selected examples of global material cycles. limits of man-made material and energy conversion. sustainability as term. priority rules for sustainability and for shaping the future. technology assessment, engineering codes. responsibility individual, collective, corporate

Workload

- lectures and exercises: 15 h
- homework: 45 h
- preparation of examination: 30 h

Literature

- I. v. d. Poel, L. Royakkers: Ethics, Technology and Engineering: An Introduction, Wiley-Blackwell 2011
- H. Lenk, M. Maring: Natur-Umwelt-Ethik, LIT Verlag Münster 2003
- G. Schaub, Th. Turek: Energy Flows, Material Cycles, and Global Development - A Process Engineering Approach to the Earth System, Springer Verlag Berlin 2010

M 4.23 Module: Fluiddynamics [M-CIWVT-101131]

Responsible: Prof. Dr.-Ing. Hermann Nirschl
Organisation: KIT Department of Chemical and Process Engineering
Part of: Thermodynamics and Transport Processes

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German	4	2

Mandatory			
T-CIWVT-101882	Fluiddynamics, Exam	5 CR	Nirschl
T-CIWVT-101904	Fluiddynamics, Tutorial	0 CR	Nirschl

Competence Certificate
Learning control consists of:

1. written exam of 120 minutes duration according to § 4 (2) SPO.

2. Non-graded precondition for participation according to § 4 (3) SPO:
eihter 4 of 5 compulsory exercises have to be approved
or a group presentation has to be given during the lecture

Prerequisites
none

Competence Goal
The students have the ability to analyse, to structure and to describe problems in fluid dynamics. The also can use the specific methods for the calculation of specific flows with the studied tools. Besides they are able to discuss the different procedures critically.

Content
Fundamentals of fluid dynamics: hydro static, aerostatik, compressible and incompressible flows, turbulent flows, Navier-Stokes equations, boundary layer theory

Module grade calculation
grade of the written examination

Workload
lecture 2 SWH, exercises 2 SWH: 56 h
self-study: 56 h
preparation of examination: 56 h

Recommendation
Courses of 1st - 3rd semester

Literature
Nirschl, Zarzalis: Skriptum Fluidmechanik

Zierep: Grundzüge der Strömungslehre, Teubner 2008

Prandtl: Führer durch die Strömungslehre, Teubner 2008

M 4.24 Module: Food Biotechnology [M-CIWVT-101126]

Responsible: Dr.-Ing. Nico Leister
Organisation: KIT Department of Chemical and Process Engineering
Part of: Fundamentals of Biology and Biotechnology

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	German	3	2

Mandatory			
T-CIWVT-101898	Food Biotechnology	5 CR	Leister

Competence Certificate
Learning control is a written examination lasting 120 minutes

Prerequisites
None

Competence Goal
The students will know about basics to secure food (and life science product) safety.

Content
The students will learn about microorganisms being important for food safety and biotechnological food production. Based on some historical products student will learn modern process technology. Technologies to secure food (and life science product safety) will be teached. Using actual case studies students will learn how food process engineers work. Process and product design will be rehearsed and practised in exercises and commented students' presentations.

Module grade calculation
The module grade ist the grade of the written examination.

Workload
Attendance time/ lectures and exercises:

- 30 hrs self-study using the materials provided in ILIAS.
- 30 hrs lectures and exercises: discussion of the independently prepared learning content

Selbststudium:

- 50 hrs wrap-up of lectures and exercises
- 40 hrs exam preparation

Recommendation
Independent preparation of the classroom sessions using material in the ILIAS course (videos, worksheets, sample assignments) is essential for participation.

Literature

- Lebensmittelmikrobiologie (J. Krämer, UTB Ulmer)
- Lebensmittelbiotechnologie (Heinz Rutloff, Akademie Verlag)
- Lebensmittelverfahrenstechnik, Teil A (Schuchmann, Wiley)
- Lebensmittelbiotechnologie: eine Einführung (P. Czermak, GIT)
- Lebensmittelbiotechnolige (R. Heiss, Springer)
- Lexikon der Lebensmitteltechnologie (B. Kunz, Springer)
- Taschenatlas der Biotechnologie und Gentechnik (Rolf D. Schmid, Wiley)
- Mikroorganismen in Lebensmitteln (H. Keweloh, Pfanneberg)
- Mikrobiologie der Lebensmittel (G. Müller, H. Weber, Behr's)
- Grundzüge der Lebensmitteltechnik (H.-D. Tscheuschner, Behr's)
- Vorlesungsfolien, Skripte mit Übungsfragen, Vorlesungsvideos (ILIAS), FAQ zum Vorlesungsstoff und bereit gestellten Materialien (MS Teams)

Base for
special subject food technology

M 4.25 Module: Food Technology [M-CIWVT-101148]

Responsible: Dr.-Ing. Nico Leister
Organisation: KIT Department of Chemical and Process Engineering
Part of: Specialization/ Project Work

Credits	Grading scale	Duration	Language	Level	Version
12	Grade to a tenth	2 terms	German	4	5

Mandatory			
T-CIWVT-103528	Food Technology	5 CR	Leister
T-CIWVT-103529	Food Technology Project Work	7 CR	Leister

Competence Certificate
The learning control consists of two partial achievements:

1. Oral examination (in the group) lasting approx. 45 minutes
2. Project work (presentation and report of results)

Prerequisites
Participation requires

- minimum 60 ECTS
- minimum 1 lab course

Modeled Conditions
The following conditions have to be fulfilled:

1. You need to have earned at least 60 credits in your course of studies.

Competence Goal
The students are able to design and evaluate simple food products. They learned to define, focus and solve tasks milestone-oriented as an interdisciplinary team. The gained in depth insight in the influence of recipe and process parameters on food quality parameters using a selected product produced on pilot scale. They will be able to present targets and results of their team project in a clear, conceptual and comprehensible manner.

Content
Lecture: Basic introduction to the design and quality assurance of selected foods;
project work (team work): definition, production and evaluation of selected products as a team; presentation and defense of the project and its results incl. degustation in a bigger group;
field trip to industrial production plants

Module grade calculation
The module grade is the CP-weighted average of the two partial achievements.

Workload

- Attendance time: 115 hrs
  (lecture 2 SWS, project work 5 SWS)
- self study: 185 hrs
  (project design, project meetings, research on project work, lab, preparation and wrap-up)
- exam preparation: 60 hrs

Literature
Will be offered within the lecture, depending on products available

M 4.26 Module: Formulation and Characterisation of Energy Materials [M-CIWVT-106700]

Responsible: Dr.-Ing. Claude Oelschlaeger
Organisation: KIT Department of Chemical and Process Engineering
Part of: Specialization/ Project Work (Usage from 10/1/2024)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
12	Grade to a tenth	Each winter term	2 terms	German	4	1

Mandatory			
T-CIWVT-113478	Formulation and Characterisation of Energy Materials - Exam	8 CR	Oelschlaeger
T-CIWVT-113479	Formulation and Characterisation of Energy Materials - Project Work	4 CR	Oelschlaeger

Competence Certificate
The learning control consists of two partial achievements:

1. project work (teamwise)
2. oral examinations (courses)

The oral examinations have to be passed as a precondition for project work

Prerequisites
Participation requires

- minimum 60 ECTS
- minimum 1 lab course

Modeled Conditions
The following conditions have to be fulfilled:

1. You need to have earned at least 60 credits in your course of studies.

Competence Goal
Basic knowledge about the design of complex fluids based on dispersions or emulsions by chemical engineering processes. Fundamental comprehension of applications and working properties, flow behavior and colloidal stability of disperse systems. Applying this knowledge in context of their project work. They gather experience in teamoriented problem solving.

Content
Representation of a systematic of the relation between the quality aspects of products and their physico-chemical properties. Furthermore, these properties are generated in the respective production processes. This systematics is fundamentally presented in the lecture "Fabrication and rheological characterization of energy materials".The application of this systematics is practiced on specific case studies.

M 4.27 Module: Fundamentals of Heat and Mass Transfer [M-CIWVT-101132]

Responsible: Dr.-Ing. Benjamin Dietrich
Prof. Dr.-Ing. Thomas Wetzel
Organisation: KIT Department of Chemical and Process Engineering
Part of: Thermodynamics and Transport Processes

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
7	Grade to a tenth	Each summer term	1 term	German	3	2

Mandatory			
T-CIWVT-101883	Fundamentals of Heat and Mass Transfer	7 CR	Dietrich, Wetzel

Competence Certificate
Learning control is a written examination lasting 180 minutes.

Prerequisites
none

Competence Goal
Elaborating the fundamental physics and laws of heat and mass transfer and at the provision of knowledge about of the methodological tools required for solving engneering tasks in these fields.

Content
Heat Transfer: Definitions - System, balances and conservation equations, kinetics of heat transfer, heat conduction, heat radiation, heat transfer between solids and moving fluids, dimensionless numbers.

Mass Transfer: Kinetics of mass transfer, equilibrium, diffusion and mass flow, Knudsen- and multi-component diffusion, Lewis analogy of heat and mass transfer.

Module grade calculation
Grade of the written examination

Workload

- lecture: 75 h
- self-study: 55 h
- preparation of examination: 80 h

Recommendation
Courses of 1st - 3rd semester, especially fundamentals of themodynamics.

Literature
v. Boeckh, Wetzel: Wärmeübertragung, Springer 2009

M 4.28 Module: Fundamentals of Refrigeration [M-CIWVT-104457]

Responsible: Prof. Dr.-Ing. Steffen Grohmann
Organisation: KIT Department of Chemical and Process Engineering
Part of: Specialization/ Project Work

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
12	Grade to a tenth	Each winter term	2 terms	German	3	4

Mandatory			
T-CIWVT-109117	Fundamentals of Refrigeration, Oral Examination	6 CR	Grohmann
T-CIWVT-109118	Fundamentals of Refrigeration, Project Work	6 CR	Grohmann

Competence Certificate
The learning control consists of two partial achievements:

1. Project work/ presentation, examination of another type
2. Oral exam of about 30 minutes duration

The project work is a prerequisite for the oral examination.

Prerequisites
Participation requires

- minimum 60 ECTS
- minimum 1 lab course

Modeled Conditions
The following conditions have to be fulfilled:

1. You need to have earned at least 60 credits in your course of studies.

Competence Goal
Students are able to explain and apply the fundamentals of refrigeration to various refrigeration technologies. They are able to describe properties of refrigerants and working fluids, and to assess their environmental impact based in different criteria. The students can develop concepts of refrigeration and heat pump processes using phase diagrams and fluid property models, and they are able to explore the energy consumption based on first and second law analyses. They are able to design various circuit configurations, to dimension and select refrigeration compressors and heat exchangers, and to design suitable control systems.

Content
Introduction to the fundamentals of refrigeration, phase diagrams, energy transformation based on first and second law analyses, refrigerants and working fluids including their environmental impact, design of common refrigeration and heat pump processes, major circuit components and process control.

Module grade calculation
The module grade is the CP-weighted average of the two partial achievements.

Workload
Attendance time: Lecture 2 SWS, Exercises 1 SWS: 45 h
Self-Study: 60 h
Exam Praparation: 75 h
Project work including presentation: 180 h

Recommendation
None

Literature

- Jungnickel, H., Agsten, R. und Kraus, W.E., 3. Auflage (1990), Verlag Technik GmbH, Berlin
- v. Cube, H.L. (Hrsg.), Lehrbuch der Kältetechnik Band 1 und 2, 4. Auflage (1997), C.F. Müller, Heidelberg
- Gosney, W.B., Principles of Refrigeration, Cambridge University Press, Cambridge, 1982
- Berliner, P., Kältetechnik Vogel-Verlag, Würzburg (1986 und frühere)
- Kältemaschinenregeln, Deutscher Kälte- und Klimatechnischer Verein (DKV) (Herausgeber)
- DKV-Arbeitsblätter für die Wärme- und Kältetechnik in: C.F. Müller Verlag, Hüthig Gruppe, Heidelberg, wird jeweils aktualisiert (Sept. 2008)

M 4.29 Module: Further Examinations [M-CIWVT-102017]

Organisation: KIT Department of Chemical and Process Engineering
Part of: Additional Examinations

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
30	pass/fail	Each term	1 term	German	3	1

Prerequisites
None

M 4.30 Module: General Chemistry and Chemistry of Aqueous Solutions [M-CIWVT-101722]

Responsible: Prof. Dr. Harald Horn
Organisation: KIT Department of Chemical and Process Engineering
Part of: Fundamentals of Mathematics and Natural Sciences

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
10	Grade to a tenth	Each winter term	1 term	German	3	2

Mandatory			
T-CIWVT-101892	General Chemistry and Chemistry of Aqueous Solutions	6 CR	Horn
T-CIWVT-101893	Laboratory Work General Chemistry and Chemistry in Aqueous Solutions	4 CR	Horn

Competence Certificate
The grade of the module consists of two individual grades:
1. written exam, 150 min to lecture " General Chemistry and Chemistry of Aqueous Solutions" (lecture 3 SWS, exercises 2 SWS)
2. practical course with grading: preceding written exam (15 min) and protocol after the experiments.

Prerequisites
A prerequisite for admission to the lab course: written exam passed.

Competence Goal
The students receive a basic knowledge of the general chemistry. They get basic knowledge about the periodic system of the elements, the chemical bonds, and the geometry of molecules. They can describe the principles and the criteria about the reactions in aqueous solutions, about acid and bases, reaction kinetics, the chemical equilibrium and electrochemistry. They can handle chemicals and can perform qualitative and quantitative analysis in aqueous solutions. They can perform calculations, and can apply the necessary tools to understand the context.

Content
Basics of general, inorganic and physical chemistry, lab experiments of qualitative analysis and reactions.

Module grade calculation
The overall grade of the module is taken as the average from the individual grades of the written examination of the lecture and the lab course, weighted according to the credit points.

Workload

- Attendance time lecture: 60 h
- Preparation/follow-up: 60 h
- Examination + exam. preparation: 60 h
- Attendance time practical course: 40 h, Preparation/follow-up: 80 h

Learning type

- 22667 Allgemeine Chemie und Chemie in wässrigen Lösungen, V, 3 SWS, 4 LP
- 22668 Übung zu 22667, Ü, 2 SWS, 2 LP
- 22669 Praktikum zu 22667, 4 LP
- Zusäztlich werden Tutorien angeboten: 22670/ 22671

Literature

- Mortimer, Müller: Chemie, current edition, Thieme Verlag 2014
- Riedel, Meyer: Allgemeine und Anorganische Chemie, current edition, de Gruyter Verlag 2013
- Jander, Blasius: Lehrbuch der analytischen und präparativen anorganischen Chemie, current edition, Hirzel Verlag 2016
- Horn: Scriptum of the lectures, current edition, will be available in ILIAS

M 4.31 Module: Industrial Business Administration [M-WIWI-100528]

Responsible: Prof. Dr. Wolf Fichtner
Organisation: KIT Department of Economics and Management
Part of: Interdisciplinary Qualifications

Credits	Grading scale	Duration	Level	Version
3	pass/fail	1 term	3	1

Mandatory			
T-WIWI-100796	Industrial Business Administration	3 CR	Fichtner

Competence Certificate
The assessment of this course is a ungraded written examination (60 min) according to §4(2), 1 of the examination regulation.

Prerequisites
None

Competence Goal
Students are able to describe and differentiate legal forms for industrial enterprises.

Students will gain knowledge about different ways of financing to raise capital.

The students gain knowledge about the basics of financial accounting and are able to record and book performance and capital flows occurring in companies.

The students gain knowledge about different types of cost accounting and are able to apply them.

Students gain knowledge of the basics of investment planning and are able to evaluate investments economically.

The students gain knowledge about the basics of linear optimization and can solve simple optimization problems with the Simplex algorithm.

The students gain knowledge about basic marketing methods and can describe and differentiate them from each other.

The students gain knowledge about basic methods of project management and can apply them to practical examples.

Content

- Goals and basics
- Legal framework for industrial enterprises
- financial accounting
- cost accounting
- investment calculation
- optimisation
- network technique

Workload
The total workload for this course is approximately 90 hours.

M 4.32 Module: Introduction to Informatics and Algorithmic Mathematics [M-MATH-101337]

Responsible: Prof. Dr. Willy Dörfler
Organisation: KIT Department of Mathematics
Part of: Fundamentals of Mathematics and Natural Sciences

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German	3	1

Mandatory			
T-MATH-102250	Introduction to Informatics and Algorithmic Mathematics - Exam	5 CR	Dörfler, Krause

Competence Certificate
graded: written examination

Prerequisites
compulsory preconditions: none
recommendation: courses of 1st - 3rd semester

Competence Goal
Higher programming languages, design and description of algorithms, basic algorithms from mathematics and computer science, implementation of mathematical concepts on computers, modeling and simulation of scientific and technical problems.

Content
The course offers the basics to advanced studies. Key concepts of the lectures are: structured program design, iteration, recursion, data structures (in particular: arrays), procedural programming with functions and methods, developing application-oriented programs. In computer labs, the mathematical concepts will be implemented.

Module grade calculation
grade of the written examination

Workload
lectures and exercises: 56h
homework and preparation of examination: 94h

Learning type
1507 Programmieren: Einstieg in die Informatik und algorithmische Mathematik, 2V, 2LP, compulsory course
1508 Übungen zu 1507, 1Ü, 1LP, compulsory course
509 Praktikum zu 1507, 2P, 2LP, compulsory course

M 4.33 Module: Mechanical Processing [M-CIWVT-101135]

Responsible: Prof. Dr.-Ing. Achim Dittler
Organisation: KIT Department of Chemical and Process Engineering
Part of: Fundamentals of Process Engineering

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each winter term	1 term	German	3	2

Mandatory			
T-CIWVT-101886	Mechanical Processing	6 CR	Dittler

Competence Certificate
The learning control is a written examination lasting 120 minutes.

Prerequisites
None

Competence Goal
Students have a basic understanding of properties & behavior of particulate systems in important engineering applications; they are able to use this understanding for calculations and design of selected processes.

Content

- Unit operations of mechanical processing - introduction and overview
- Particle size distribution - determination, depiction, conversion
- Forces on particles in flows
- Separating function - characterization of a separations process
- Fundamentals of mixing and stirring
- Introduction to dimensional analysis
- Characterizations of packings
- Capillarity in porous systems
- Flow through porous systems, fluidized bed
- Fundamentals of agglomeration
- Fundamentals of storage and conveyance

Module grade calculation
The module grade is the grade of the written exam.

Workload

- Attendance time: Lectures and exercises: 60 hrs
- Self-study: 45 hrs (about three hours per week)
- Preparation of examination: 75 hrs

Recommendation
Courses of 1st - 4th semester

Literature

- Dittler, Skriptum MVT
- Löffler, Raasch: Grundlagen der Mechanischen Verfahrenstechnik, Vieweg 1992
- Schubert, Heidenreich, Liepe, Neeße: Mechanische Verfahrenstechnik, Deutscher Verlag Grundstoffindustrie, Leipzig 1990
- Dialer, Onken, Leschonski: Grundzüge Verfahrenstechnik&Reaktionstechnik, Hanser Verlag 1986
- Zogg: Einführung in die Mechanische Verfahrenstechnik, Teubner 1993

M 4.34 Module: Mechanical Separation Technology [M-CIWVT-101147]

Responsible: Dr.-Ing. Marco Gleiß
Organisation: KIT Department of Chemical and Process Engineering
Part of: Specialization/ Project Work

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
12	Grade to a tenth	Each winter term	2 terms	German	4	3

Mandatory			
T-CIWVT-103448	Mechanical Separation Technology Exam	8 CR	Gleiß
T-CIWVT-103452	Mechanical Separation Technology Project Work	4 CR	Gleiß

Competence Certificate
The learning control consists of two partial achievements:

1. An oral individual examination with a duration of about 30 minutes for the lecture "Mechanical Separation Technology" and related exercises

2. Project work. Practical collaboration, written report and oral presentation of the results are rated.

Prerequisites
Participation requires

- minimum 60 ECTS
- minimum 1 lab course

Modeled Conditions
The following conditions have to be fulfilled:

1. You need to have earned at least 60 credits in your course of studies.

Competence Goal
The students are able to explain the fundamental laws and the derived physical principles of the particle separation from liquids and not only to relate them to the principally suited separation apparatuses but also special variants. They have the ability to apply the relationship betwen product operation and design parameters to different separation techniques. They can analyse separation problems with scientific methods and give alternative problem solution proposals. The students are able to execute their fundamental and process knowledge practically to the example of beer brewing.

Content
Physical fundamentals, apparatuses, applications,strategies; characterisation of particle systems and slurries; pretreatment methods to enhance the separability of slurries; fundamentals, apparatuses and process technology of static and centrifugal sedimentation, flotation, depth filtration, crossflow filtration, cake forming vacuum and gas overpressure filtration, filter centrifuges and press filters; filter media; selection criteria and scale-up methods for separation apppartuses and machines; apparatus combinations; case studies to solve sparation problems.

Module grade calculation
The module grade is the CP-weighted average of the two partial achievements.

Workload
Lecture 3 SWS exercises 1 SWS:

- attendance time: 60h
- self-study: 80h
- examination preparation: 80h

project work

- attendance time and self-study: 140h

Literature
Anlauf: Script "Mechanische Separationstechnik - Fest/Flüssig-Trennung"

M 4.35 Module: Micro Process Engineering [M-CIWVT-101154]

Responsible: Prof. Dr.-Ing. Peter Pfeifer
Organisation: KIT Department of Chemical and Process Engineering
Part of: Specialization/ Project Work

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
12	Grade to a tenth	Each winter term	2 terms	German	4	3

Mandatory			
T-CIWVT-103666	Micro Process Engineering	7 CR	Pfeifer
T-CIWVT-103667	Micro Process Engineering	5 CR	Dittmeyer, Pfeifer

Competence Certificate
The learning control consists of three partial achievements:

1. Oral examination of about 25 minutes duration
2. project work

Prerequisites
Participation requires

- minimum 60 ECTS
- minimum 1 lab course

Modeled Conditions
The following conditions have to be fulfilled:

1. You need to have earned at least 60 credits in your course of studies.

Competence Goal
The students are able apply the methods of process intensification by microstructuring of the reaction zone and are capable of analyzing the advantages and disadvantages while transferring given processes into microreactors. With knowledge of special production processes for micro reactors, students are able to design microstructured systems in terms of heat exchange and to analyze the possibilities of transferring processes from conventional technology into the microreactor with regard to heat transfer performance. They understand also how the mechanisms of mass transport and mixing interact in microstructured flow mixers, and are able to apply this knowledge to the combination of mixing and reaction. They can also analyze possible limitations in the process adaptation and are thus able to design microstructured reactors for homogeneous reactions appropriately. The students understand the significance of the residence time distribution for the conversion and selectivity and are capable of analyzing the interaction of mass transport by diffusion and hydrodynamic residence time in microstructured equipment in given applications.

Content
Basic knowledge of micro process engineering systems: fabrication of microstructured systems and interaction with processes, intensification of heat exchange and special effects by heat conduction, residence time distribution in reactors and peculiarities in microstructured systems, structured flow mixers (designs and characterization) and dimensioning of structured reactors with regard to heat and mass transfer.

Module grade calculation
The module grade is the CP-weighted average of the two partial achievements.

Workload

- Attendance time: Lectures and exercises 60 hrs
- Self-study: 60 hrs
- Exam preparation: 2 weeks/ 60 hrs
- Project work: 180 hrs

Literature
Scriptum (slides collection)

text books:

- Kockmann, Norbert (Hrsg.), Micro Process Engineering, Fundamentals, Devices, Fabrication, and Applications, ISBN-10: 3-527-31246-3
- Micro Process Engineering - A Comprehens (Hardcover), Volker Hessel (Editor), Jaap C. Schouten (Editor), Albert Renken (Editor), Yong Wang (Editor), Junichi Yoshida (Editor), 3 Bände, 1500 Seiten, Wiley VCH, ISBN-10: 3527315500
- Winnacker-Küchler: Chemische Technik, Prozesse und Produkte, BAND 2: NEUE TECHNOLOGIEN, Kapitel Mikroverfahrenstechnik S. 759-819, ISBN-10: 3-527-30430-4
- Emig, Gerhard, Klemm, Elias, Technische Chemie, Einführung in die chemische Reaktionstechnik, Springer-Lehrbuch, 5., aktual. u. erg. Aufl., 2005, 568 Seiten, ISBN-10: 3-540-23452-7 (Kapitel Mikroreaktionstechnik S. 444-467)
- Chemical Kinetics, ISBN 978-953-51-0132-1 "Application of Catalysts to Metal Microreactor Systems", P. Pfeifer, http://www.intechopen.com/books/chemical-kinetics/application-of-catalysts-to-metal-microreactor-systems

M 4.36 Module: Module Bachelor's Thesis [M-CIWVT-101949]

Responsible: Prof. Dr.-Ing. Achim Dittler
Organisation: KIT Department of Chemical and Process Engineering
Part of: Bachelor's Thesis

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
12	Grade to a tenth	Each term	1 term	German	3	2

Mandatory			
T-CIWVT-103670	Bachelor's Thesis	12 CR	

Prerequisites
None

Modeled Conditions
The following conditions have to be fulfilled:

1. You need to have earned at least 120 credits in your course of studies.

M 4.37 Module: Organic Chemistry for Engineers [M-CHEMBIO-101115]

Responsible: Prof. Dr. Michael Meier
Organisation: KIT Department of Chemistry and Biosciences
Part of: Fundamentals of Mathematics and Natural Sciences

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German	3	1

Mandatory			
T-CHEMBIO-101865	Organic Chemistry for Engineers	5 CR	Meier

Competence Certificate
graded: written examination

Prerequisites
none

Competence Goal
Relevance of Organic Chemistry; fundamental and method-oriented knowledge;correlation between structure and reactivity;knowledge of important concepts and principles;self-solving of problems in Organic Chemistry

Content
Nomenclature, electronic structure and bonding of organic molecules; Organic substance classes and functional groups; Reaction mechanisms and synthesis of organic compounds; Stereoisomers and optical activity; Synthetic polymers and biopolymers;Identification of organic compounds

Module grade calculation
grade of the written examination

Workload
lectures and exercises: 34h

homework and preparation of examination: 86h

Literature
Paula Y. Bruice: Organic Chemistry, 5th ed., Prentice Hall, 2007

Paula Y. Bruice: Study guide and solutions manual, 5th ed., Prentice Hall, 2007

K.P.C. Vollhardt, Neil Schore: Organic Chemistry, 5th ed., Palgrave Macmillan, 2006

K.P.C. Vollhardt, Study guide and solutions manual, 5th ed., Palgrave Macmillan, 2006

M 4.38 Module: Orientation Exam [M-CIWVT-100877]

Organisation: KIT Department of Chemical and Process Engineering
Part of: Orientation Exam

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
0	pass/fail	Each term	2 terms	German	3	2

Mandatory			
T-MATH-100275	Advanced Mathematics I	7 CR	Arens, Griesmaier, Hettlich
T-MATH-100525	Tutorial Advanced Mathematics I	0 CR	Arens, Griesmaier, Hettlich
T-CIWVT-111062	Cell Biology	3 CR	Gottwald
T-CIWVT-111063	Genetics	2 CR	Neumann

Modelled deadline
This module must be passed until the end of the **3. term**.

Prerequisites
None

Annotation

M 4.39 Module: Process Development and Scale-up [M-CIWVT-101153]

Responsible: Prof. Dr.-Ing. Jörg Sauer
Organisation: KIT Department of Chemical and Process Engineering
Part of: Specialization/ Project Work

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
12	Grade to a tenth	Each winter term	2 terms	German	4	4

Mandatory			
T-CIWVT-103530	Process Development and Scale-up	8 CR	Sauer
T-CIWVT-103556	Process Development and Scale-up Project Work	4 CR	Sauer
T-CIWVT-111005	Exercises Process Development and Scale-up	0 CR	Sauer

Competence Certificate
The learning control consists of three partial achievements:

- Project work/ presentation and report
- Ungraded online-tests (prerequisite for oral examination)
- Individual oral examination, duration 30 minutes

Prerequisites
Participation requires

- minimum 60 ECTS
- minimum 1 lab course

Modeled Conditions
The following conditions have to be fulfilled:

1. You need to have earned at least 60 credits in your course of studies.

Competence Goal
The students are capable of developing energy and material balances for complex processes in process technology and to analyze processes in terms of potentials for optimization. They are able to derive suitable methods for the optimization of such processes.
The students are able to calculate the costs of major pieces of equipment and to apply estimation methods for investment costs of production plants. Together with the calculation of variable production costs they are able to analyze the profitability of a chemical process plant. Furthermore the students learn basic concepts of project management, they are enabled to work in teams and guided for intependent scientific work.

Content
Introduction into the basics of process development and project management for the development of chemical processes from the lab into production scale, including the design of a chemical process, design of miniplants and scale-up into production scale. Overview over methods for the economic, technical evaluation of processes and the preparation of business concepts.

Module grade calculation
50 % oral examination, 50 % project work.

Annotation
As part of the project study a visit to the IKFT and the bioliq plant at the Campus North is intended, as well as an excursion to an industrial company.

Workload
Lecture and Exercise:
Attendance time: 45 h
Self-study: 90 h
Exam preparation: 45 h
Project work: 180 h

Literature

- Vorlesungs- und Übungsfolien (KIT Studierendenportal ILIAS)
- Helmus, F. P., Process Plant Design: Project Management from Inquiry to Acceptance, Wiley-VCH, 2008.
- Towler, G., Sinnott, R. K., Chemical Engineering Design: Principles, Practice and Economics of Plant and Process Design, Butterworth-Heinemann, 2012.
- Peters, M.S., Timmerhaus, K.D., West R.E.: Plant Design and Economics for Chemical Engineers, 2003, Mc Graw-Hill, NY.
- Seider, W.D., Seader, J.D., Lewin, D. R., Widagdo, S.: Product and Process Design Principles, Wiley & Sons, NY, 2010.
- Vogel, G.H.:. Verfahrensentwicklung, Wiley-VCH, 2002.
- Belbin, R.M., Management Teams, Why They Succeed or Fail, Routledge, NY, 2013.
- Busse von Colbe, W.; Coenenberg, A.G., Kajüter, P., Linnhoff, U., Betriebswirtschaftslehre für Führungskräfte, 2002, S. 148

M 4.40 Module: Single Results [M-CIWVT-101991]

Responsible: Dr.-Ing. Barbara Freudig
Organisation: KIT Department of Chemical and Process Engineering
Part of: Master's Transfer Account

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
30	pass/fail	Each term	1 term	German	3	5

Master Transfer Examinations (Election: at least 30 credits)			
T-CIWVT-106028	Particle Technology Exam	6 CR	Dittler
T-CIWVT-106029	Biopharmaceutical Purification Processes	6 CR	Hubbuch
T-CIWVT-106032	Kinetics and Catalysis	6 CR	Wehinger
T-CIWVT-106033	Thermodynamics III	6 CR	Enders
T-CIWVT-106035	Computational Fluid Dynamics	6 CR	Nirschl
T-CIWVT-106036	Internship	14 CR	Bajohr
T-CIWVT-106148	Practical Course Process Technology and Plant Design	0 CR	Scheiff
T-CIWVT-106149	Initial Exam Process Technology and Plant Design	0 CR	Scheiff
T-CIWVT-106150	Process Technology and Plant Design Written Exam	8 CR	Scheiff
T-CIWVT-112766	Bioprocess Development	6 CR	Grünberger
T-CIWVT-113235	Excercises: Membrane Technologies	1 CR	Horn, Saravia
T-CIWVT-113236	Membrane Technologies in Water Treatment	5 CR	Horn, Saravia
T-CIWVT-114107	Thermal Process Engineering II	6 CR	Zeiner

Prerequisites
None

M 4.41 Module: SmartMentoring [M-CIWVT-105848]

Responsible: Dr.-Ing. Barbara Freudig
Organisation: KIT Department of Chemical and Process Engineering
Part of: Interdisciplinary Qualifications (Usage from 10/1/2021)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	pass/fail	Each winter term	1 term	German	3	2

Mandatory			
T-CIWVT-111761	SmartMentoring - Group Management	2 CR	Freudig

M 4.42 Module: Supplementary Studies on Science, Technology and Society [M-FORUM-106753]

Responsible: Dr. Christine Mielke
Christine Myglas

Organisation:

Part of: Additional Examinations (Usage from 10/1/2024)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
16	Grade to a tenth	Each term	3 terms	German	3	1

Election notes
Students have to self-record the achievements obtained in the Supplementary Studies on Science, Technology and Society in their study plan. FORUM (formerly ZAK) records the achievements as "non-assigned" under "ÜQ/SQ-Leistungen". Further instructions on self-recording of achievements can be found in the FAQ at https://campus.studium.kit.edu/ and on the FORUM homepage at https://www.forum.kit.edu/english/. The title of the examination and the amount of credits override the modules placeholders.

If you want to use FORUM achievements for both your Interdisciplinary Qualifications and for the Supplementary Studies, please record them in the Interdisciplinary Qualifications first. You can then get in contact with the FORUM study services (stg@forum.kit.edu) to also record them in your Supplementary Studies.

In the Advanced Unit you can choose examinations from three subject areas: "About Knowledge and Science", "Science in Society" and "Science in Social Debates". It is advised to complete courses from each of the three subject areas in the Advanced Unit.

To self-record achievements in the Advanced Unit, you have to select a free placeholder partial examination first. The placeholders' title do *not* affect which achievements the placeholder can be used for!

Mandatory			
T-FORUM-113578	Lecture Series Supplementary Studies on Science, Technology and Society - Self Registration	2 CR	Mielke, Myglas
T-FORUM-113579	Basic Seminar Supplementary Studies on Science, Technology and Society - Self Registration	2 CR	Mielke, Myglas
Advanced Unit Supplementary Studies on Science, Technology and Society (Election: at least 12 credits)			
T-FORUM-113580	Elective Specialization Supplementary Studies on Science, Technology and Society / About Knowledge and Science - Self-Registration	3 CR	Mielke, Myglas
T-FORUM-113581	Elective Specialization Supplementary Studies on Science, Technology and Society / Science in Society - Self-Registration	3 CR	Mielke, Myglas
T-FORUM-113582	Elective Specialization Supplementary Studies on Science, Technology and Society / Science in Public Debates - Self Registration	3 CR	Mielke, Myglas
Mandatory			
T-FORUM-113587	Registration for Certificate Issuance - Supplementary Studies on Science, Technology and Society	0 CR	Mielke, Myglas

Competence Certificate
The monitoring is explained in the respective partial achievement.

They are composed of:
- Protocols
- Reflection reports
- Presentations
- Preparation of a project work
- An individual term paper
- An oral examination
- A written exam

Upon successful completion of the supplementary studies, graduates receive a graded report and a certificate issued by the FORUM.

Prerequisites
The course is offered during the course of study and does not have to be completed within a defined period. Enrollment is required for all assessments of the modules in the supplementary studies.
Participation in the supplementary studies is regulated by § 3 of the statutes. KIT students register for the supplementary studies by selecting this module in the student portal and booking a performance themselves. Registration for courses, assessments, and exams is regulated by § 8 of the statutes and is usually possible shortly before the start of the semester.
The course catalog, module description (module manual), statutes (study regulations), and guidelines for creating the various written performance requirements can be downloaded from the FORUM homepage at **https://www.forum.kit.edu/begleitstudium-wtg.php**.

Registration and exam modalities

PLEASE NOTE:
Registration on the FORUM, i.e. additionally via the module selection in the student portal, enables students to receive up-to-date information about courses or study modalities. In addition, registering on the FORUM ensures that you have proof of the credits you have earned. As it is currently (as of winter semester 24-25) not yet possible to continue additional credits acquired in the Bachelor's programme electronically in the Master's programme, we strongly advise you to digitally secure the credits you have earned by archiving the Bachelor's transcript of records yourself and by registering on FORUM.
In the event that a transcript of records of the Bachelor's certificate is no longer available - we can only assign the achievements of registered students and thus take them into account when issuing the certificate.

Competence Goal
Graduates of the Supplementary Studies on Science, Technology, and Society gain a solid foundation in understanding the interplay between science, the public, business, and politics. They develop practical skills essential for careers in media, political consulting, or research management. The program prepares them to foster innovation, influence social processes, and engage in dialogue with political and societal entities. Participants are introduced to interdisciplinary perspectives, encompassing social sciences and humanities, to enhance their understanding of science, technology, and society. The teaching objectives of this supplementary degree program include equipping participants with both subject-specific knowledge and insights from epistemological, economic, social, cultural, and psychological perspectives on scientific knowledge and its application in various sectors. Students are trained to critically assess and balance the implications of their actions at the intersection of science and society. This training prepares them for roles as students, researchers, future decision-makers, and active members of society.

Through the program, participants learn to contextualize in-depth content within broader frameworks, independently analyze and evaluate selected course materials, and communicate their findings effectively in both written and oral formats. Graduates are adept at analyzing social issues and problem areas, reflecting on them critically from a socially responsible and sustainable standpoint.

Content
The Supplementary Studies on Science, Technology and Society can be started in the 1st semester of the enrolled degree programme and is not limited in time. The wide range of courses offered by FORUM makes it possible to complete the program usually within three semesters. The supplementary studies comprises 16 or more credit points (LP). It consists of **two modules: the Basic Module (4 LP) and the Advanced Module (12 LP)**.

The **basic Module** comprises the compulsory courses 'Lecture Series Supplementary Studies on Science, Technology and Society' and a basic seminar with a total of 4 LP.

The **Advanced Module** comprises courses totalling 12 LP in the humanities and social sciences subject areas 'On Knowledge and Science', 'Science in Society' and 'Science in Public Debates'. The allocation of courses to the accompanying study programme can be found on the homepage **https://www.forum.kit.edu/wtg-aktuell**and in the printed FORUM course catalogue.

The 3 thematic subject areas:

Subject area 1: About Knowledge and Science

This is about the internal perspective of science: students explore the creation of knowledge, distinguishing between scientific and non-scientific statements (e.g., beliefs, pseudo-scientific claims, ideological statements), and examining the prerequisites, goals, and methods of knowledge generation. They investigate how researchers address their own biases, analyze the structure of scientific explanatory and forecasting models in various disciplines, and learn about the mechanisms of scientific quality assurance.

After completing courses in the "Knowledge and Science" area, students can critically reflect on the ideals and realities of contemporary science. They will be able to address questions such as: How robust is scientific knowledge? What are the capabilities and limitations of predictive models? How effective is quality assurance in science, and how can it be improved? What types of questions can science answer, and what questions remain beyond its scope?

Subject area 2: Science in Society

This focuses on the interactions between science and different areas of society, such as how scientific knowledge influences social decision-making and how social demands impact scientific research. Students learn about the specific functional logics of various societal sectors and, based on this understanding, estimate where conflicts of goals and actions might arise in transfer processes—for example, between science and business, science and politics, or science and journalism. Typical questions in this subject area include: How and under what conditions does an innovation emerge from a scientific discovery? How does scientific policy advice work? How do business and politics influence science, and when is this problematic? According to which criteria do journalists incorporate scientific findings into media reporting? Where does hostility towards science originate, and how can social trust in science be strengthened?

After completing courses in the "Sciene in Society" area, students can understand and assess the goals and constraints of actors in different societal sectors. This equips them to adopt various perspectives of communication and action partners in transfer processes and to act competently at various social interfaces with research in their professional lives.

Subject area 3: Science in Public Debates

The courses in this subject area provide insights into current debates on major social issues such as sustainability, digitalization, artificial intelligence, gender equality, social justice, and educational opportunities. Public debates on complex challenges are often polarized, leading to oversimplifications, defamation, or ideological thinking. This can hinder effective social solution-finding processes and alienate people from the political process and from science. Debates about sustainable development are particularly affected, as they involve a wide range of scientific and technological knowledge in both problem diagnosis (e.g., loss of biodiversity, climate change, resource consumption) and solution development (e.g., nature conservation, CCS, circular economy).

By attending courses in "Science in Public Debates," students are trained in an application-oriented way to engage in factual debates—exchanging arguments, addressing their own prejudices, and handling contradictory information. They learn that factual debates can often be conducted more deeply and with more nuance than is often seen in public discourse. This training enables them to handle specific factual issues in their professional lives independently of their own biases and to be open to differentiated, fact-rich arguments.

Supplementary credits:
Additional LP (supplementary work) totalling a maximum of 12 LP can also be acquired from the complementary study programme (see statutes for the WTG complementary study programme § 7). § 4 and § 5 of the statutes remain unaffected by this. These supplementary credits are not included in the overall grade of the accompanying study programme. At the request of the participant, the supplementary work will be included in the certificate of the accompanying study programme and marked as such. Supplementary coursework is listed with the grades provided for in § 9.

Module grade calculation
The overall grade of the supplementary course is calculated as a credit-weighted average of the grades that were achieved in the advanced module.

Annotation
Climate change, biodiversity crisis, antibiotic resistance, artificial intelligence, carbon capture and storage, and gene editing are just a few areas where science and technology can diagnose and address numerous social and global challenges. The extent to which scientific findings are considered in politics and society depends on various factors, such as public understanding and trust, perceived opportunities and risks, and ethical, social, or legal considerations.
To enable students to use their expertise as future decision-makers in solving social and global challenges, we aim to equip them with the skills to navigate the interfaces between science, business, and politics competently and reflectively. In the Supplementary Studies, they acquire foundational knowledge about the interactions between science, technology, and society.

They learn:
- How reliable scientific knowledge is produced,
- how social expectations and demands influence scientific research, and
- how scientific knowledge is adopted, discussed, and utilized by society.

The program integrates essential insights from psychology, philosophy, economics, social sciences, and cultural studies into these topics. After completing the supplementary studies programme, students can place the content of their specialized studies within a broader social context. This prepares them, as future decision-makers, to navigate competently and reflectively at the intersections between science and various sectors of society, such as politics, business, or journalism, and to contribute effectively to innovation processes, public debates, or political decision-making.

Workload
The workload is made up of the number of hours of the individual modules:

- Basic Module approx. 120 hours
- Advanced Module approx. 390 hours
> Total: approx. 510 hours

In the form of supplementary services, up to approximately 390 hours of work can be added.

Recommendation
It is recommended to complete the supplementary study program in three or more semesters, beginning with the lecture series on science, technology, and society in the summer semester. Alternatively, you can start with the basic seminar in the winter semester and then attend the lecture series in the summer semester.

Courses in the Advanced Module can be taken simultaneously. It is also advised to complete courses from each of the three subject areas in the advanced unit.

Learning type
- Lectures
- Seminars/Project Seminars
- Workshops

M 4.43 Module: Thermal Process Engineering [M-CIWVT-101134]

Responsible: Prof. Dr.-Ing. Tim Zeiner
Organisation: KIT Department of Chemical and Process Engineering
Part of: Fundamentals of Process Engineering

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each winter term	1 term	German	3	2

Mandatory			
T-CIWVT-101885	Thermal Process Engineering	6 CR	Zeiner

Competence Certificate
Sucess control is a written examination taking 120 minutes in time according to § 4 Abs. 2 SPO.

From winter term 21/22: 180 minutes.

Prerequisites
None

Competence Goal
Students can explain fundamental knowledge in the field of Thermal Separations. Emphasis is laid on the difference between methodological tools and their application for the description of selected unit operations. They can work on standard types of problems in the field of Thermal Process Engineering. They can solve it mathematically and can apply methologocal tools adequate. Furthermore, the students can quantitatively apply these tools and skills to processes and problems which are new to them.

Content
The tought methodological tools are balancing of conservative quantities, thermodynamic equilibrium and their application to single- and multi-stage processes. Within this module the following unit operations are introduced: Distillation, Rectification, Absorption, Extraction, Evaporation, Crystallisation, Drying, Adsorption/Chromatography.

Module grade calculation
The mark of the module is equal to the mark of the written examination.

Workload
Attendence time (lecture and tutorials): 56 h
Self study: 44 h
Examination preparation: 80 h

Recommendation
Courses of 1st - 4th semester

Literature
personal prints, scientific text books

M 4.44 Module: Thermodynamics I [M-CIWVT-101129]

Responsible: Prof. Dr. Sabine Enders
Organisation: KIT Department of Chemical and Process Engineering
Part of: Thermodynamics and Transport Processes

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
7	Grade to a tenth	Each winter term	1 term	German	3	2

Mandatory			
T-CIWVT-101878	Thermodynamics I, Tutorial	0 CR	Enders
T-CIWVT-101879	Thermodynamics I, Exam	7 CR	Enders

Competence Certificate
The learning control consists of two partial achievements:

1. Written examination lasting 120 min
2. Prerequisite for participation: Completed coursework;
   2 of 3 compulsory exercises have to be approved

Prerequisites
Before taking the written exam, the compleded coursework must be passed.

Competence Goal
Students are able to analyse and to design energy conversion processes by applying the first and second law of thermodynamics. They understand the behaviour of real pure substances, and they are able to explain thermodynamic processes with and without phase change by means of state diagrams and process schemes.

Content
Fundamental terms; thermodynamic equilibrium and temperature; properties and equation of state for ideal gases; energy and first law for closed systems; balances for open systems; entropy and thermodynamic potentials; second law; equations of state for pure component caloric properties; phase change behavior of pure component systems and state diagrams; thermodynamic cycles for power generation, refrigeration and heat pumps; exergy

Module grade calculation
The module grade is the grade of the written examination.

Workload
Lectures and exercises: 70 h
Homework: 80 h
Preparation of Examination : 60 h

Recommendation
courses of 1st and 2nd semester

Literature

- Schaber, K.: Skriptum Thermodynamik I (www.ttk.uni-karlsruhe.de)
- Stephan, P., Schaber, K., Stephan, K., Mayinger, F.: Thermodynamik, Band 1 Einstoffsysteme, 18. Aufl., Springer, 2009
- Baehr, H. D.: Thermodynamik, 11.Aufl., Springer, 2002
- Sandler, S. I.: Chemical, Biochemical and Engineering Thermodynamics, J. Wiley & Sons, 2006

M 4.45 Module: Thermodynamics II [M-CIWVT-101130]

Responsible: Prof. Dr. Sabine Enders
Organisation: KIT Department of Chemical and Process Engineering
Part of: Thermodynamics and Transport Processes

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
7	Grade to a tenth	Each summer term	1 term	German	4	2

Mandatory			
T-CIWVT-101880	Thermodynamics II, Tutorial	0 CR	Enders
T-CIWVT-101881	Thermodynamics II, Exam	7 CR	Enders

Competence Certificate
The learning control consists of two partial achievements:

1. Written examination lasting 120 min
2. Prerequisite for participation: Completed coursework;
   2 of 3 compulsory exercises have to be approved

Prerequisites
Before taking the written exam, the compleded coursework must be passed.

Competence Goal
Students understand the behavior of real gases, gas-vapor mixtures, simple real mixtures, chemical equilibria of ideal gases. They are able to explain and to analyse corresponding thermodynamic processes by means of state diagrams and process schemes. They are able to analyse and to design these processes based on balance equations and phase equilibria.

Content
Real gases and liquification of gases; thermodynamic potentials; characterization of mixtures; mixtures of ideal gases; gas-vapor mixtures and processes with humid air; phase equilibria and phase diagrams, laws of Raoult and Henry, liquid-liquid equilibria; enthalpy of mixtures; general description of mixtures and chemical potential; reaction equilibria of ideal gases; fundamentals of combustion processes.

Module grade calculation
The module grade is the grade of the written examination.

Workload
Lectures and exercises: 70 h
Homework: 80 h
Preparation of Examination : 60 h

Recommendation
courses of 1st - 3rd semester

Thermodynamics I

Literature

- Stephan, P., Schaber, K., Stephan, K., Mayinger, F.: Thermodynamik, Band 2: Mehrstoffsysteme und chemische Reaktionen, 15. Aufl., Springer, 2010
- Baehr, H. D., Kabelac, S. : Thermodynamik, 14. Aufl., Springer, 2009
- Sandler, S. I.: Chemical, Biochemical and Engineering Thermodynamics, J. Wiley & Sons, 2006
- Gmehling, J., Kolbe, B.: Thermodynamik, 2. Auflage, VCH Verlag Weinheim, 1992

5 Courses

T 5.1 Course: Automation and Control Systems Engineering - Exam [T-CIWVT-113088]

Responsible: Prof. Dr.-Ing. Thomas Meurer
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-106477 - Automation and Control Systems Engineering

Type	Credits	Grading scale	Version
Oral examination	6	Grade to a third	1

Events					
WT 24/25	2243020	Advanced Methods in Linear Control	3 SWS	Lecture / Practice (/ 🗣	Meurer
WT 24/25	2243021	Exkursion im Profilfach Automatisierungs- und Regelungstechnik	1 SWS	Excursion (E / 🗣	Meurer
Exams					
ST 2025	7243020	Automation and Control Systems Engineering - Exam			Meurer, Jerono

Legend: 💻 Online, 🌸 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

T 5.2 Course: Advanced Mathematics I [T-MATH-100275]

Responsible: PD Dr. Tilo Arens
Prof. Dr. Roland Griesmaier
PD Dr. Frank Hettlich

Organisation: KIT Department of Mathematics

Part of: M-CIWVT-100877 - Orientation Exam
M-MATH-100280 - Advanced Mathematics I

Type	Credits	Grading scale	Recurrence	Version
Written examination	7	Grade to a third	Each term	3

Events					
WT 24/25	0131000	Höhere Mathematik I für die Fachrichtungen Maschinenbau, Geodäsie und Geoinformatik, Materialwissenschaft und Werkstofftechnik, und Ingenieurpädagogik	4 SWS	Lecture	Hettlich
WT 24/25	0131200	Höhere Mathematik I für die Fachrichtungen Chemieingenieurwesen und Verfahrenstechnik, Bioingenieurwesen, und Mechatronik und Informationstechnik	4 SWS	Lecture	Hettlich
Exams					
WT 24/25	6700007	Advanced Mathematics I			Arens, Griesmaier, Hettlich
ST 2025	6700025	Advanced Mathematics I			Arens, Griesmaier, Hettlich

Competence Certificate
Learning assessment is carried out by written examination of 120 minutes length.

Prerequisites
A "pass" result on the pre-requesite in AM I is a requirement for registration for the examination in AM I.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MATH-100525 - Tutorial Advanced Mathematics I must have been passed.

T 5.3 Course: Advanced Mathematics II [T-MATH-100276]

Responsible: PD Dr. Tilo Arens
Prof. Dr. Roland Griesmaier
PD Dr. Frank Hettlich

Organisation: KIT Department of Mathematics

Part of: M-MATH-100281 - Advanced Mathematics II

Type	Credits	Grading scale	Recurrence	Version
Written examination	7	Grade to a third	Each term	2

Events					
ST 2025	0180800	Höhere Mathematik II für die Fachrichtungen Maschinenbau, Geodäsie und Geoinformatik, Materialwissenschaft und Werkstofftechnik, und Ingenieurpädagogik	4 SWS	Lecture	Arens
ST 2025	0181000	Höhere Mathematik II für die Fachrichtungen Chemieingenieurwesen und Verfahrenstechnik, Bioingenieurwesen, und Mechatronik und Informationstechnik	4 SWS	Lecture	Arens
Exams					
WT 24/25	6700008	Advanced Mathematics II			Arens, Griesmaier, Hettlich
ST 2025	6700001	Advanced Mathematics II			Arens, Griesmaier, Hettlich

Competence Certificate
Learning assessment is carried out by written examination of 120 minutes length.

Prerequisites
A "pass" result on the pre-requesite in AM II is a requirement for registration for the examination in AM II.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MATH-100526 - Tutorial Advanced Mathematics II must have been passed.

T 5.4 Course: Advanced Mathematics III [T-MATH-100277]

Responsible: PD Dr. Tilo Arens
Prof. Dr. Roland Griesmaier
PD Dr. Frank Hettlich

Organisation: KIT Department of Mathematics

Part of: M-MATH-100282 - Advanced Mathematics III

Type	Credits	Grading scale	Recurrence	Version
Written examination	7	Grade to a third	Each term	2

Events					
WT 24/25	0131400	Höhere Mathematik III für die Fachrichtungen Maschinenbau, Materialwissenschaft und Werkstofftechnik, Chemieingenieurwesen und Verfahrenstechnik, Bioingenieurwesen, und Mechatronik und Informationstechnik	4 SWS	Lecture	Griesmaier
Exams					
WT 24/25	6700009	Advanced Mathematics III			Arens, Griesmaier, Hettlich
ST 2025	6700002	Advanced Mathematics III			Arens, Griesmaier, Hettlich

Competence Certificate
Learning assessment is carried out by written examination of 120 minutes length.

Prerequisites
A "pass" result on the pre-requesite in AM III is a requirement for registration for the examination in AM III.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MATH-100527 - Tutorial Advanced Mathematics III must have been passed.

T 5.5 Course: Air Pollution Control [T-CIWVT-113046]

Responsible: Prof. Dr.-Ing. Achim Dittler
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-106448 - Air Pollution Control

Type	Credits	Grading scale	Recurrence	Version
Oral examination	7	Grade to a third	Each summer term	1

Events					
WT 24/25	2244020	Gas Particle Measurement Technology	2 SWS	Lecture / 🗣	Dittler
WT 24/25	2244021	Exercises on 2244020 Gas Particle Measurement Technology	1 SWS	Practice / 🗣	Dittler, und Mitarbeitende
Exams					
WT 24/25	7244021	Air Pollution Control			Dittler

Legend: 💻 Online, 💐 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Learning control is an oral examination lasting approx. 30 minutes.

Prerequisites
None

T 5.6 Course: Air Pollution Control - Project Work [T-CIWVT-113047]

Responsible: Prof. Dr.-Ing. Achim Dittler
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-106448 - Air Pollution Control

Type	Credits	Grading scale	Version
Examination of another type	5	Grade to a third	1

Events					
ST 2025	2244022	Air Pollution Control - Project Work	2 SWS	Project (P / 🗣	Dittler, und Mitarbeitende
Exams					
WT 24/25	7244022	Air Pollution Control - Project Thesis			Dittler

Legend: 🖥 Online, 🌀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Learning control is a project work; examination of another type.

Prerequisites
None

T 5.7 Course: Automation and Control Systems Engineering - Project Work [T-CIWVT-113089]

Responsible: Prof. Dr.-Ing. Thomas Meurer
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-106477 - Automation and Control Systems Engineering

Type	Credits	Grading scale	Version
Examination of another type	6	Grade to a third	1

Events					
WT 24/25	2243020	Advanced Methods in Linear Control	3 SWS	Lecture / Practice (/ 🗣	Meurer
WT 24/25	2243021	Exkursion im Profilfach Automatisierungs- und Regelungstechnik	1 SWS	Excursion (E / 🗣	Meurer
ST 2025	2243022	Automation and Control Systems Engineering - Project Work	3 SWS	Project (P / 🗣	Meurer
Exams					
WT 24/25	7243022	Automation and Control Systems Engineering - Project Work			Meurer, Jerono

Legend: 💻 Online, 🎲 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

T 5.8 Course: Bachelor's Thesis [T-CIWVT-103670]

Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101949 - Module Bachelor's Thesis

Type	Credits	Grading scale	Version
Final Thesis	12	Grade to a third	3

Final Thesis
This course represents a final thesis. The following periods have been supplied:

Submission deadline	4 months
Maximum extension period	4 weeks
Correction period	6 weeks

T 5.9 Course: Basic Seminar Supplementary Studies on Science, Technology and Society - Self Registration [T-FORUM-113579]

Responsible: Dr. Christine Mielke
Christine Myglas

Organisation:

Part of: M-FORUM-106753 - Supplementary Studies on Science, Technology and Society

Type	Credits	Grading scale	Recurrence	Expansion	Version
Completed coursework	2	pass/fail	Each summer term	1 terms	1

Competence Certificate
Study achievement in the form of a presentation or a term paper or project work in the selected course.

Prerequisites
None

Self service assignment of supplementary stdues
This course can be used for self service assignment of grade aquired from the following study providers:

- Studium Generale. Forum Wissenschaft und Gesellschaft (FORUM) (ehem. ZAK)
- FORUM (ehem. ZAK) Begleitstudium

Recommendation
It is recommended that the basic seminar be completed during the same semester as the lecture series "Science in Society". If it is not possible to attend the lecture series and the basic seminar in the same semester, the basic seminar can also be attended in the semesters before the lecture series.
However, attending courses in the advanced unit before attending the basic seminar should be avoided.

Annotation

T 5.10 Course: Biochemistry [T-CIWVT-111064]

Responsible: PD Dr. Jens Rudat
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101622 - Biology for Engineers II

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	1

Exams			
WT 24/25	7212110-V-BC	BING Biochemistry	Rudat
ST 2025	7212110-V-BC	Biochemistry	Rudat

Competence Certificate
Written Examination with a duration of 90 minutes; Section 4, subsection 2 No. 1 SPO.

Prerequisites
None

T 5.11 Course: Biopharmaceutical Purification Processes [T-CIWVT-106029]

Responsible: Prof. Dr. Jürgen Hubbuch
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101991 - Single Results

Type	Credits	Grading scale	Version
Written examination	6	Grade to a third	1

Events					
WT 24/25	2214010	Biopharmaceutical Purification Processes	3 SWS	Lecture / 🗣	Hubbuch, Franzreb
WT 24/25	2214011	Exercises on 2214010 Biopharmaceutical Purification Processes	1 SWS	Practice / 🗣	Hubbuch, Franzreb
Exams					
WT 24/25	7223011	Biopharmaceutical Purification Processes			Hubbuch
ST 2025	7223011	Biopharmaceutical Purification Processes			Hubbuch

Legend: 💻 Online, 🎲 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The examination is a written examination with a duration of 120 minutes (section 4 subsection 2 number 1 SPO).

T 5.12 Course: Bioprocess Development [T-CIWVT-112766]

Responsible: Prof. Dr.-Ing. Alexander Grünberger
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101991 - Single Results

Type	Credits	Grading scale	Version
Written examination	6	Grade to a third	1

Events					
ST 2025	2213020	Bioprocess Development	2 SWS	Lecture / 🗣	Grünberger
ST 2025	2213021	Bioprocess Development - Exercises	2 SWS	Practice / 🗣	Grünberger
Exams					
WT 24/25	7222001	Bioprocess Development			Grünberger
ST 2025	7222001	Bioprocess Development			Grünberger

Legend: 💻 Online, 💐 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

T 5.13 Course: Bioprocess Engineering [T-CIWVT-110128]

Responsible: Prof. Dr.-Ing. Alexander Grünberger
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-105510 - Bioprocess Engineering

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each winter term	2

Events					
WT 24/25	2213010	Bioprocess Engineering	4 SWS	Lecture /	Grünberger, Hubbuch
WT 24/25	2213011	Revision Course for the Exam Bioprocess Engineering	1 SWS	Practice /	Grünberger
Exams					
WT 24/25	722122-VBP-947	Bioprocess Engineering			Grünberger, Hubbuch
ST 2025	722122-VBP-947	Bioprocess Engineering			Grünberger, Hubbuch

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
Written examination with a duration of 120 minutes (section 4 subsection 2 No. 1 SPO).

T 5.14 Course: Biotechnology [T-CIWVT-103668]

Responsible: Dr. Nadja Alina Henke
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101143 - Biotechnology

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each term	2

Events					
WT 24/25	2214215	Bioanalytics	2 SWS	Lecture / 🗣	Henke, Bleher
Exams					
WT 24/25	7214215	Bioanalytics			Henke, Bleher
ST 2025	7223003	Biotechnology			Wörner

Legend: 💻 Online, 🎲 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
None

T 5.15 Course: Biotechnology [T-CIWVT-103669]

Responsible: Dr.-Ing. Iris Perner-Nochta
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101143 - Biotechnology

Type	Credits	Grading scale	Version
Examination of another type	9	Grade to a third	2

Events					
WT 24/25	2214210	Profile Subject Biotechnology - Management of Scientific Projects	3 SWS	Lecture / Practice (/ 🗣	Perner-Nochta, Grünberger, und Mitarbeitende
WT 24/25	2214211	Profile Subject Biotechnology - Laboratory Work (2214210)	6 SWS	Practical course / 🗣	Perner-Nochta, Grünberger, und Mitarbeitende
WT 24/25	2214212	Profile Subject Biotechnology - Exercises on Management of Scientific Projects (2214210)	1 SWS	Practice / 🗣	Perner-Nochta, und Mitarbeitende
Exams					
WT 24/25	7223002	Biotechnology			Perner-Nochta, Hubbuch

Legend: 💻 Online, 💐 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Learning control is an examination of another type, project work.

Prerequisites
None

T 5.16 Course: Cell Biology [T-CIWVT-111062]

Responsible: apl. Prof. Dr. Hans-Eric Gottwald
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-100877 - Orientation Exam
M-CIWVT-101624 - Biology for Engineers I

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each winter term	1

Events					
WT 24/25	2212113	Biology for Engineers - Cell Biology	2 SWS	Lecture / 🗣	Gottwald
Exams					
WT 24/25	7212113-V-ZELL	BING Cell Biology			Gottwald
ST 2025	7212113-V-ZELL	Cell Biology			Gottwald

Legend: 💻 Online, 🌸 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Written examination with a duration of 90 minutes (section 4, subsection 2 Nr. 1 SPO).

Prerequisites
None

T 5.17 Course: Chemical Process Engineering [T-CIWVT-101884]

Responsible: Prof. Dr.-Ing. Gregor Wehinger
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101133 - Chemical Process Engineering

Type	Credits	Grading scale	Version
Written examination	6	Grade to a third	1

Events					
WT 24/25	2220010	Chemical Process Engineering	2 SWS	Lecture / 🗣	Wehinger
WT 24/25	2220011	Exercises on 2220010 Chemical Process Engineering	2 SWS	Practice / 🗣	Wehinger, und Mitarbeitende
WT 24/25	2220012	Repetitorium zur Klausur Chemische Verfahrenstechnik	2 SWS	Practice / 💻	Wehinger, und Mitarbeitende
ST 2025	2220012	Revision Course for the Chemical Process Engineering Exam	2 SWS	Practice / 💻	Wehinger, und Mitarbeitende
Exams					
WT 24/25	7210101	Chemical Process Engineering			Wehinger
ST 2025	7210101	Chemical Process Engineering			Wehinger

Legend: 💻 Online, 🎲 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Learning control is a written examination lasting 120 minutes.

Prerequisites
None

T 5.18 Course: Chemical Reaction Engineering - Exam [T-CIWVT-113695]

Responsible: Prof. Dr.-Ing. Gregor Wehinger
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-106825 - Chemical Reaction Engineering

Type	Credits	Grading scale	Version
Oral examination	6	Grade to a third	1

Events					
WT 24/25	2220020	Chemical Process Engineering II	2 SWS	Lecture / 🗣	Wehinger
WT 24/25	2220021	Exercises on 2220020 Chemical Process Engineering II	1 SWS	Practice / 🗣	Wehinger

Legend: 💻 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

T 5.19 Course: Chemical Reaction Engineering - Project Work [T-CIWVT-113696]

Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-106825 - Chemical Reaction Engineering

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Each summer term	1

Events					
ST 2025	2220023	Chemical Reaction Engineering - Project Work	3 SWS	Project (P / 🗣	Wehinger
Exams					
ST 2025	7220021	Chemical Reaction Engineering - Project Work			Wehinger

Legend: 💻 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

T 5.20 Course: Circular Economy - Oral Exam [T-CIWVT-112172]

Responsible: Prof. Dr.-Ing. Dieter Stapf
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-105995 - Circular Economy

Type	Credits	Grading scale	Recurrence	Version
Oral examination	8	Grade to a third	Each winter term	1

Events					
WT 24/25	2232220	Circular Economy	2 SWS	Lecture / 🗣	Stapf
WT 24/25	2232221	Exercises on 2232220 Circular Economy	1 SWS	Practice / 🗣	Stapf
Exams					
ST 2025	7232220	Circular Economy - Oral Exam			Stapf

Legend: 💻 Online, 🌐 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The learning control is an oral examination on lectures, exercises and case studies, duration approx. 30 minutes.

Prerequisites
None.

T 5.21 Course: Circular Economy - Project Work [T-CIWVT-112173]

Responsible: Prof. Dr.-Ing. Dieter Stapf
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-105995 - Circular Economy

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4	Grade to a third	Each summer term	1

Events					
ST 2025	2232222	Circular Economy - Project Work	2 SWS	Project (P / 🗣	Stapf, und Mitarbeitende
Exams					
WT 24/25	7231004	Circular Economy - Project Work			Stapf

Legend: 💻 Online, 🌀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Learning control is an examination of another type. The following partial aspects are included in the grading: Term paper and presentation.

Prerequisites
None.

T 5.22 Course: Computational Fluid Dynamics [T-CIWVT-106035]

Responsible: Prof. Dr.-Ing. Hermann Nirschl
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101991 - Single Results

Type	Credits	Grading scale	Recurrence	Version
Written examination	6	Grade to a third	Each term	1

Events					
WT 24/25	2245020	Computational Fluid Dynamics	2 SWS	Lecture / 🗣	Nirschl, und Mitarbeitende
WT 24/25	2245021	Exercises for 2245020 Computational Fluid Dynamics	1 SWS	Practice / 🗣	Nirschl, und Mitarbeitende
Exams					
WT 24/25	7291020	Computational Fluid Dynamics			Nirschl
ST 2025	7291932	Computational Fluid Dynamics			Nirschl

Legend: 🖥 Online, 💠 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Learning control is a written examination lasting 90 minutes.

Prerequisites
None

T 5.23 Course: Control Engineering and System Dynamics [T-CIWVT-112787]

Responsible: Prof. Dr.-Ing. Thomas Meurer
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-106308 - Control Engineering and System Dynamics

Type	Credits	Grading scale	Recurrence	Version
Written examination	5	Grade to a third	Each summer term	1

Events					
ST 2025	2243010	Control Engineering and System Dynamics	2 SWS	Lecture / 🗣	Meurer
ST 2025	2243011	Exercises on Control Engineering and System Dynamics	1 SWS	Practice / 🗣	Meurer, und Mitarbeiter
ST 2025	2243012	Tutorium zu Regelungstechnik und Systemdynamik	1 SWS	Tutorial (/ 🗣	Meurer, und Mitarbeitende
Exams					
WT 24/25	7294000	Control Engineering and System Dynamics			Meurer
ST 2025	7243010	Control Engineering and System Dynamics			Meurer

Legend: 🖥 Online, 🌐 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

T 5.24 Course: Data-Driven Modeling with Python [T-CIWVT-113190]

Responsible: Dr.-Ing. Frank Rhein
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-106534 - Data-Driven Modeling with Python

Type	Credits	Grading scale	Version
Completed coursework	3	pass/fail	1

Events					
WT 24/25	2245320	Data-Driven Modeling with Python	2 SWS	Lecture / 🗣	Rhein
Exams					
WT 24/25	7291320	Data-Driven Modeling with Python - Project			Rhein

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

T 5.25 Course: Design of Machines [T-CIWVT-103641]

Responsible: Dr.-Ing. Marco Gleiß
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101941 - Design of Machines

Type	Credits	Grading scale	Version
Completed coursework	0	pass/fail	1

Events					
ST 2025	2245210	Design of Machines	3 SWS	Lecture / 🗣	Gleiß
Exams					
ST 2025	7291959	Design of Machines			Gleiß

Legend: 💻 Online, 🌸 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The Learning control is a completed coursework (ungraded).

Prerequisites
None

T 5.26 Course: Design of Machines, Exam [T-CIWVT-103642]

Responsible: Dr.-Ing. Marco Gleiß
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101941 - Design of Machines

Type	Credits	Grading scale	Recurrence	Version
Written examination	7	Grade to a third	Each term	1

Events					
ST 2025	2245210	Design of Machines	3 SWS	Lecture /	Gleiß
Exams					
WT 24/25	7291957	Design of Machines			Gleiß
ST 2025	7291957	Apparatus Design			Gleiß

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
Written examination lasting 120 minutes.

Prerequisites
Preparatory

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-CIWVT-103641 - Design of Machines must have been passed.

T 5.27 Course: Downstream Processing [T-CIWVT-101897]

Responsible: Prof. Dr. Jürgen Hubbuch
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101124 - Downstream Processing

Type	Credits	Grading scale	Recurrence	Version
Written examination	5	Grade to a third	Each term	1

Events					
ST 2025	2214040	Biopharmaceutical Process Engineering	3 SWS	Lecture / 🗣	Hubbuch
ST 2025	2214041	Excercises on 2241040 Biopharmaceutical Process Engineering	1 SWS	Practice / 🗣	Hubbuch, und Mitarbeiter
Exams					
WT 24/25	7223001	Downstream Processing			Hubbuch
ST 2025	7223001	Biopharmaceutical Process Engineering (previously Downstream Processing)			Hubbuch

Legend: 💻 Online, 🎲 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
None

Workload
150 hours

T 5.28 Course: Elective Specialization Supplementary Studies on Science, Technology and Society / About Knowledge and Science - Self-Registration [T-FORUM-113580]

Responsible: Dr. Christine Mielke
Christine Myglas

Organisation:

Part of: M-FORUM-106753 - Supplementary Studies on Science, Technology and Society

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Competence Certificate
Another type of examination assessment under § 5, section 3 involves a presentation, term paper, or project work within the chosen course.

Prerequisites
None

Self service assignment of supplementary stdues
This course can be used for self service assignment of grade aquired from the following study providers:

- Studium Generale. Forum Wissenschaft und Gesellschaft (FORUM) (ehem. ZAK)
- FORUM (ehem. ZAK) Begleitstudium

Recommendation
The contents of the basic module are helpful. The basic module should be completed or attended in parallel, but not after the advanced module.
The reading recommendations for primary and specialist literature are determined individually by the respective lecturers according to the subject area and course.

Annotation
This placeholder can be used for any achievement in the Advanced Unit of the Supplementary Studies.

In the Advanced Module, students can choose their own individual focus, e.g. sustainable development, data literacy, etc. The focus should be discussed with the module coordinator at the FORUM.

T 5.29 Course: Elective Specialization Supplementary Studies on Science, Technology and Society / Science in Public Debates - Self Registration [T-FORUM-113582]

Responsible: Dr. Christine Mielke
Christine Myglas
Organisation:
Part of: M-FORUM-106753 - Supplementary Studies on Science, Technology and Society

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Competence Certificate
Another type of examination assessment under § 5, section 3 involves a presentation, term paper, or project work within the chosen course.

Prerequisites
None

Self service assignment of supplementary stdues
This course can be used for self service assignment of grade aquired from the following study providers:

- Studium Generale. Forum Wissenschaft und Gesellschaft (FORUM) (ehem. ZAK)
- FORUM (ehem. ZAK) Begleitstudium

Recommendation
The contents of the basic module are helpful. The basic module should be completed or attended in parallel, but not after the advanced module.
The reading recommendations for primary and specialist literature are determined individually by the respective lecturers according to the subject area and course.

Annotation
This placeholder can be used for any achievement in the Advanced Unit of the Supplementary Studies.

T 5.30 Course: Elective Specialization Supplementary Studies on Science, Technology and Society / Science in Society - Self-Registration [T-FORUM-113581]

Responsible: Dr. Christine Mielke
Christine Myglas

Organisation:

Part of: M-FORUM-106753 - Supplementary Studies on Science, Technology and Society

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Competence Certificate
Another type of examination assessment under § 5, section 3 involves a presentation, term paper, or project work within the chosen course.

Prerequisites
None

Self service assignment of supplementary stdues
This course can be used for self service assignment of grade aquired from the following study providers:

- Studium Generale. Forum Wissenschaft und Gesellschaft (FORUM) (ehem. ZAK)
- FORUM (ehem. ZAK) Begleitstudium

Recommendation
The contents of the basic module are helpful. The basic module should be completed or attended in parallel, but not after the advanced module.
The reading recommendations for primary and specialist literature are determined individually by the respective lecturers according to the subject area and course.

Annotation
This placeholder can be used for any achievement in the Advanced Unit of the Supplementary Studies.

T 5.31 Course: Elementary Physics [T-PHYS-101577]

Responsible: Prof. Dr. Wolfgang Wernsdorfer
Organisation: KIT Department of Physics
Part of: M-PHYS-100993 - Elementary Physics

Type	Credits	Grading scale	Version
Written examination	7	Grade to a third	1

Events					
WT 24/25	4040321	Physikalische Grundlagen für die Studiengänge Chemie- und Bioingenieurwesen sowie Verfahrenstechnik	4 SWS	Lecture / 🗣	Wernsdorfer
WT 24/25	4040322	Übungen zu Physikalische Grundlagen für die Studiengänge Chemie- und Bioingenieurwesen sowie Verfahrenstechnik	2 SWS	Practice / 🗣	Wernsdorfer, Reisinger
Exams					
WT 24/25	7800108	Elementary Physics			Wernsdorfer
ST 2025	7800108	Elementary Physics			Wernsdorfer

Legend: 💻 Online, 💐 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Written exam (usually about 180 min)

T 5.32 Course: Energy and Environmental Engineering [T-CIWVT-108254]

Responsible: Prof. Dr. Reinhard Rauch
Prof. Dr.-Ing. Dimosthenis Trimis

Organisation: KIT Department of Chemical and Process Engineering

Part of: M-CIWVT-101145 - Energy and Environmental Engineering

Type	Credits	Grading scale	Version
Written examination	8	Grade to a third	1

Events					
WT 24/25	2231150	Processes for the Production of Chemical Energy Carriers	2 SWS	Lecture / 🗣	Rauch
WT 24/25	2232050	Fundamentals of High Temperature Energy Conversion	2 SWS	Lecture / 🗣	Trimis
Exams					
WT 24/25	7230500-1	Energy and Environmental Engineering			Rauch, Trimis
ST 2025	7230500	Energy and Environmental Engineering			Trimis, Rauch

Legend: 💻 Online, 🎲 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Learning control is a written examination lasting 120 minutes.

Prerequisites
None

T 5.33 Course: Energy and Environmental Engineering Project Work [T-CIWVT-103527]

Responsible: Prof. Dr. Reinhard Rauch
Prof. Dr.-Ing. Dimosthenis Trimis

Organisation: KIT Department of Chemical and Process Engineering

Part of: M-CIWVT-101145 - Energy and Environmental Engineering

Type	Credits	Grading scale	Version
Examination of another type	4	Grade to a third	1

Events					
ST 2025	2231151	Projektarbeit im Profilfach Energie- und Umwelttechnik	3 SWS	Project (P / 🗣)	Rauch, Trimis, Scheiff
Exams					
WT 24/25	7230501	Energy and Environmental Engineering Project Work			Rauch, Trimis

Legend: 🖥 Online, 🖥🗣 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The learning control is an examination of another type; project work.

Prerequisites
None

T 5.34 Course: Engineering Mechanics: Dynamics [T-CIWVT-106290]

Responsible: TT-Prof. Dr. Christoph Klahn
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101128 - Engineering Mechanics: Dynamics

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	0	pass/fail	Each winter term	1

Events					
WT 24/25	2241010	Engineering Mechanics: Dynamics	2 SWS	Lecture / 🗣	Klahn
WT 24/25	2241011	Exercises on 2241010 Engineering Mechanics: Dynamics	2 SWS	Practice / 🗣	Klahn, Rentschler
WT 24/25	2241012	Tutorial on 2241010 Engineering Mechanics: Dynamics	1 SWS	Tutorial (/ 🗣	Klahn
Exams					
WT 24/25	7210201	Engineering Mechanics: Dynamics			Klahn

Legend: 🖥 Online, 🌐 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The learning control is a completed coursework: 3 of 4 exercises have to be passed.

T 5.35 Course: Engineering Mechanics: Dynamics, Exam [T-CIWVT-101877]

Responsible: TT-Prof. Dr. Christoph Klahn
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101128 - Engineering Mechanics: Dynamics

Type	Credits	Grading scale	Recurrence	Version
Written examination	5	Grade to a third	Each term	2

Events					
WT 24/25	2241010	Engineering Mechanics: Dynamics	2 SWS	Lecture / 🗣	Klahn
WT 24/25	2241011	Exercises on 2241010 Engineering Mechanics: Dynamics	2 SWS	Practice / 🗣	Klahn, Rentschler
WT 24/25	2241012	Tutorial on 2241010 Engineering Mechanics: Dynamics	1 SWS	Tutorial (/ 🗣	Klahn
Exams					
WT 24/25	7210200	Engineering Mechanics: Dynamics, Exam			Klahn
ST 2025	7210200	Engineering Mechanics: Dynamics, Exam			Klahn

Legend: 📱 Online, 🔗 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Learming control is a written examination lasting 120 minutes.

Prerequisites
Prerequisite: 3 of 4 exercises have to be passed.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-CIWVT-106290 - Engineering Mechanics: Dynamics must have been passed.

T 5.36 Course: Engineering Mechanics: Statics [T-CIWVT-111054]

Responsible: Dr.-Ing. Bernhard Hochstein
Dr.-Ing. Claude Oelschlaeger
Prof. Dr. Norbert Willenbacher

Organisation: KIT Department of Chemical and Process Engineering

Part of: M-CIWVT-101733 - Engineering Mechanics: Statics and Strength of Materials

Type	Credits	Grading scale	Recurrence	Version
Written examination	5	Grade to a third	Each winter term	1

Events					
WT 24/25	2242210	Engineering Mechanics: Statics	2 SWS	Lecture / 🗣	Willenbacher, Hochstein, Oelschlaeger
WT 24/25	2242211	Exercises on 2242210 Engineering Mechanics: Statics	2 SWS	Practice / 🗣	Oelschlaeger, Hochstein, und Mitarbeitende
Exams					
WT 24/25	7290003	Engineering Mechanics: Statics			Oelschlaeger, Hochstein
ST 2025	7290003	Engineering Mechanics: Statics			Hochstein, Oelschlaeger

Legend: 💻 Online, 🌸 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
None

T 5.37 Course: Engineering Mechanics: Strength of Materials [T-CIWVT-111056]

Responsible: Dr.-Ing. Bernhard Hochstein
Prof. Dr. Norbert Willenbacher

Organisation: KIT Department of Chemical and Process Engineering

Part of: M-CIWVT-101733 - Engineering Mechanics: Statics and Strength of Materials

Type	Credits	Grading scale	Recurrence	Version
Written examination	2	Grade to a third	Each summer term	1

Events					
ST 2025	2242222	Seminar zur Technischen Mechanik – Festigkeitslehre	2 SWS	Seminar /	Oelschlaeger, Hochstein, und Mitarbeitende
Exams					
WT 24/25	7290005	Engineering Mechanics: Strength of Materials			Oelschlaeger, Hochstein
ST 2025	7290005	Engineering Mechanics: Strength of Materials			Hochstein, Oelschlaeger

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Prerequisites
None

T 5.38 Course: Enzyme Technology [T-CIWVT-111074]

Responsible: Prof. Dr.-Ing. Dirk Holtmann
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-105509 - Enzyme Technology

Type	Credits	Grading scale	Version
Written examination	3	Grade to a third	1

Events					
WT 24/25	2212030	Enzyme Technology	2 SWS	Lecture /	Holtmann
Exams					
WT 24/25	7212030-V-ET	Enzyme Technology			Holtmann
ST 2025	7212030-V-ET	Enzyme Technology			Holtmann

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
Written examination with a duration of 90 minutes (section 4 subsection 2 No. 1 SPO).

Prerequisites
None

T 5.39 Course: Ethics [T-CIWVT-112373]

Responsible: Prof. Dr. Dr. Rafaela Hillerbrand
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101149 - Ethics and Global Material Cycles

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	2	pass/fail	Each summer term	1

Events					
ST 2025	2231160	Ethics and Global Material Cycles	2 SWS	Lecture / 🗣	Hillerbrand, Rauch
Exams					
ST 2025	7230001	Ethics			Hillerbrand

Legend: 💻 Online, 🌸 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
None.

T 5.40 Course: Excercises: Membrane Technologies [T-CIWVT-113235]

Responsible: Prof. Dr. Harald Horn
Dr.-Ing. Florencia Saravia

Organisation: KIT Department of Chemical and Process Engineering

Part of: M-CIWVT-101991 - Single Results

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	1	pass/fail	Each summer term	1

Events					
ST 2025	2233011	Membrane Technologies in Water Treatment - Excercises	1 SWS	Practice /	Horn, Saravia, und Mitarbeitende
Exams					
ST 2025	7233011	Excercises for Membrane Technologies			Horn, Saravia

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Learning control is a completed coursework: Submission of exercises, membrane design and short presentation (5 minutes, group work).

T 5.41 Course: Exercises Process Development and Scale-up [T-CIWVT-111005]

Responsible: Prof. Dr.-Ing. Jörg Sauer
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101153 - Process Development and Scale-up

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	0	pass/fail	Each winter term	1

Exams			
WT 24/25	7200027	Exercises Process Development and Scale-up	Sauer

T 5.42 Course: Fluiddynamics, Exam [T-CIWVT-101882]

Responsible: Prof. Dr.-Ing. Hermann Nirschl
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101131 - Fluiddynamics

Type	Credits	Grading scale	Version
Written examination	5	Grade to a third	1

Events					
ST 2025	2245010	Fluiddynamics	2 SWS	Lecture / 🗣	Nirschl
ST 2025	2245011	Fluiddynamics - Exercises	2 SWS	Practice / 🗣	Nirschl
Exams					
WT 24/25	7291944	Fluiddynamics			Nirschl
ST 2025	7291944	Fluiddynamics			Nirschl

Legend: 💻 Online, 🎲 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Learning control is a written examination lasting 120 minutes.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-CIWVT-101904 - Fluiddynamics, Tutorial must have been passed.

T 5.43 Course: Fluiddynamics, Tutorial [T-CIWVT-101904]

Responsible: Prof. Dr.-Ing. Hermann Nirschl
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101131 - Fluiddynamics

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	0	pass/fail	Each summer term	1

Events					
ST 2025	2245010	Fluiddynamics	2 SWS	Lecture / 🗣	Nirschl
ST 2025	2245011	Fluiddynamics - Exercises	2 SWS	Practice / 🗣	Nirschl
Exams					
WT 24/25	7291943	Fluiddynamics, Tutorial			Nirschl
ST 2025	7291943	Fluiddynamics, Tutorial			Nirschl

Legend: 💻 Online, 🌐 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Learning control is a completed coursework.

T 5.44 Course: Food Biotechnology [T-CIWVT-101898]

Responsible: Dr.-Ing. Nico Leister
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101126 - Food Biotechnology

Type	Credits	Grading scale	Recurrence	Version
Written examination	5	Grade to a third	Each winter term	2

Events					
WT 24/25	2211020	Food Biotechnology	2 SWS	Lecture / ✕	N. N.
WT 24/25	2211021	Exercises on 2211020 Food Biotechnology	2 SWS	Practice / ✕	N. N.
Exams					
WT 24/25	7220006	Food Biotechnology			Leister
ST 2025	7220006	Food Biotechnology			Leister

Legend: Online, Blended (On-Site/Online), On-Site, ✕ Cancelled

Competence Certificate
This module is sucessfully completed by a written exam of 120 min (according to § 4 Abs. 2 Nr. 1 SPO.

Prerequisites
The Pre-Condition must be passed.

Workload
150 hours

T 5.45 Course: Food Technology [T-CIWVT-103528]

Responsible: Dr.-Ing. Nico Leister
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101148 - Food Technology

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Each summer term	3

Events					
WT 24/25	2211040	Einführung in das Profilfach Lebensmitteltechnologie	2 SWS	Lecture / 🗣	Leister, und Mitarbeitende
WT 24/25	2211041		1 SWS	Project (P / 🗣	Leister, und Mitarbeitende
ST 2025	2211043	Exkursion im Profilfach Lebensmitteltechnologie	1 SWS	Excursion (E / 🗣	Leister, und Mitarbeitende
Exams					
WT 24/25	7220010	Food Technology			Leister

Legend: 📱 Online, 🎛 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
None.

T 5.46 Course: Food Technology Project Work [T-CIWVT-103529]

Responsible: Dr.-Ing. Nico Leister
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101148 - Food Technology

Type	Credits	Grading scale	Version
Examination of another type	7	Grade to a third	1

Events					
ST 2025	2211041	Projektarbeit im Profilfach Lebensmitteltechnologie	4 SWS	Project (P / 🗣	Leister, und Mitarbeitende
Exams					
WT 24/25	7220011	Food Technology Project Work			Leister

Legend: 💻 Online, Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Learning control is a projekt work/ examination of another type.

Prerequisites
None

T 5.47 Course: Formulation and Characterisation of Energy Materials - Exam [T-CIWVT-113478]

Responsible: Dr.-Ing. Claude Oelschlaeger
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-106700 - Formulation and Characterisation of Energy Materials

Type	Credits	Grading scale	Version
Oral examination	8	Grade to a third	1

Events					
WT 24/25	2242025	Formulation and Characterization of Energy Materials	3 SWS	Lecture / 🗣	Willenbacher, Hochstein, Oelschlaeger
WT 24/25	2242026	Exercises on 2242025 Formulation and Characterization of Energy Materials	1 SWS	Practice / 🗣	Willenbacher, Oelschlaeger, und Mitarbeitende
Exams					
ST 2025	7242025	Formulation and Characterisation of Energy Materials - Exam			Oelschlaeger

Legend: 💻 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

T 5.48 Course: Formulation and Characterisation of Energy Materials - Project Work [T-CIWVT-113479]

Responsible: Dr.-Ing. Claude Oelschlaeger
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-106700 - Formulation and Characterisation of Energy Materials

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4	Grade to a third	Each summer term	1

Exams			
ST 2025	7242026	Formulation and Characterisation of Energy Materials - Project Work	Oelschlaeger

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-CIWVT-113478 - Formulation and Characterisation of Energy Materials - Exam must have been passed.

T 5.49 Course: Fundamentals of Heat and Mass Transfer [T-CIWVT-101883]

Responsible: Dr.-Ing. Benjamin Dietrich
Prof. Dr.-Ing. Thomas Wetzel
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101132 - Fundamentals of Heat and Mass Transfer

Type	Credits	Grading scale	Recurrence	Version
Written examination	7	Grade to a third	Each term	1

Events					
ST 2025	2260030	Heat and Mass Transfer	3 SWS	Lecture / 🗣	Wetzel, Dietrich
ST 2025	2260031	Heat and Mass Transfer - Exercises	2 SWS	Practice / 🗣	Wetzel, Dietrich, und Mitarbeitende
Exams					
WT 24/25	7280001	Fundamentals of Heat and Mass Transfer			Wetzel, Dietrich
ST 2025	7280001	Fundamentals of Heat and Mass Transfer			Wetzel, Dietrich

Legend: 💻 Online, 💐 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Learning control is a written examination lasting 180 minutes.

Prerequisites
None

T 5.50 Course: Fundamentals of Refrigeration, Oral Examination [T-CIWVT-109117]

Responsible: Prof. Dr.-Ing. Steffen Grohmann
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-104457 - Fundamentals of Refrigeration

Type	Credits	Grading scale	Recurrence	Version
Oral examination	6	Grade to a third	Each summer term	3

Events					
WT 24/25	2250110	Refrigeration A	2 SWS	Lecture / 🗣	Grohmann
WT 24/25	2250111	Refrigeration A - Exercises	1 SWS	Practice / 🗣	Grohmann, und Mitarbeitende
Exams					
WT 24/25	7250110	Fundamentals of Refrigeration, oral examination			Grohmann
ST 2025	7200005	Fundamentals of Refrigeration, oral examination			Grohmann

Legend: 💻 Online, 🎭 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Learning Control is an oral examination about the lecture "Grundlagen der Kältetechnik" lasting approx. 30 minutes.

Prerequisites
Projects Work

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-CIWVT-109118 - Fundamentals of Refrigeration, Project Work must have been started.

T 5.51 Course: Fundamentals of Refrigeration, Project Work [T-CIWVT-109118]

Responsible: Prof. Dr.-Ing. Steffen Grohmann
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-104457 - Fundamentals of Refrigeration

Type	Credits	Grading scale	Version
Examination of another type	6	Grade to a third	1

Events					
ST 2025	2250112	Fundamentals of Refrigeration - Project Work	2 SWS	Practice / 🗣	Grohmann
Exams					
WT 24/25	7250112	Fundamentals of Refrigeration, Project Work			Grohmann
ST 2025	7200006	Fundamentals of Refrigeration, Project Work			Grohmann

Legend: 🖥 Online, 🖧 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Learning control is a completed coursework: groupwork, project presentation.

Prerequisites
None

T 5.52 Course: General Chemistry and Chemistry of Aqueous Solutions [T-CIWVT-101892]

Responsible: Prof. Dr. Harald Horn
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101722 - General Chemistry and Chemistry of Aqueous Solutions

Type	Credits	Grading scale	Recurrence	Version
Written examination	6	Grade to a third	Each winter term	1

Events					
WT 24/25	2233050	General Chemistry and Chemistry in Aqueous Solutions	3 SWS	Lecture /	Horn
WT 24/25	2233051	Excercises on 2233050: General Chemistry and Chemistry in Aqueous Solutions	2 SWS	Practice /	Horn, Guthausen, Wagner
WT 24/25	2233052	Tutorial A to 2233050: General Chemistry and Chemistry in Aqueous Solutions	2 SWS	Tutorial (/	Guthausen, Wagner
WT 24/25	2233053	Tutorial B to 2233050: General Chemistry and Chemistry in Aqueous Solutions	2 SWS	Tutorial (/	Guthausen, Wagner
Exams					
WT 24/25	7232667	General Chemistry and Chemistry of Aqueous Solutions			Horn, Guthausen
WT 24/25	7232668	General Chemistry and Chemistry of Aqueous Solutions			Horn, Guthausen

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Learning control is a written exam lasting 150 minutes to lecture " General Chemistry and Chemistry of Aqueous Solutions" (lecture 3 SWS, exercises 2 SWS).

Prerequisites
None

Workload
180 hours

T 5.53 Course: Genetics [T-CIWVT-111063]

Responsible: Dr. Anke Neumann
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-100877 - Orientation Exam
M-CIWVT-101624 - Biology for Engineers I

Type	Credits	Grading scale	Recurrence	Version
Written examination	2	Grade to a third	Each winter term	1

Events					
WT 24/25	2212111	Biology for Engineers - Genetics	2 SWS	Lecture /	Neumann
Exams					
WT 24/25	7212114-V-GEN	Genetics			Neumann
ST 2025	7212114-V-GEN	Genetics			Neumann

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
Written examination with a duration of 90 minutes (section 4 subsection 2 No. 1 SPO).

Prerequisites
None

T 5.54 Course: Global Material Cycles [T-CIWVT-112372]

Responsible: Prof. Dr. Reinhard Rauch
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101149 - Ethics and Global Material Cycles

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	1	pass/fail	Each summer term	1

Events					
ST 2025	2231160	Ethics and Global Material Cycles	2 SWS	Lecture / 🗣	Hillerbrand, Rauch
Exams					
WT 24/25	7230000	Ethics and Global Material Cycles			Rauch
ST 2025	7230000	Global Material Cycles			Rauch

Legend: 💻 Online, 🎲 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
None.

T 5.55 Course: Industrial Business Administration [T-WIWI-100796]

Responsible: Prof. Dr. Wolf Fichtner
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-100528 - Industrial Business Administration

Type	Credits	Grading scale	Recurrence	Version
Completed coursework (written)	3	pass/fail	Each winter term	1

Events					
WT 24/25	2581040	Industrial Business Administration	2 SWS	Lecture /	Fichtner
Exams					
WT 24/25	7981040	Industrial Business Administration			Fichtner
ST 2025	7981040	Industrial Business Administration			Fichtner

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
The assessment of this course is a ungraded written examination (60 min).

Prerequisites
None

T 5.56 Course: Initial Exam Process Technology and Plant Design [T-CIWVT-106149]

Responsible: Dr. Frederik Scheiff
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101991 - Single Results

Type	Credits	Grading scale	Recurrence	Version
Completed coursework (written)	0	pass/fail	Each winter term	1

Events					
WT 24/25	2231010	Process Technology and Plant Design I	2 SWS	Lecture / 🗣	Scheiff, Bajohr
WT 24/25	2231012	Practical Course Process Technology and Plant Design	1 SWS	Practical course / 🗣	Scheiff, und Mitarbeitende
Exams					
WT 24/25	7230100				Scheiff
WT 24/25	7230100-2	Initial Exam Process Technology and Plant Design			Scheiff

Legend: 💻 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Completed coursework; ungraded exam

Prerequisites
None

T 5.57 Course: Internship [T-CIWVT-106036]

Responsible: Dr.-Ing. Siegfried Bajohr
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101991 - Single Results

Type	Credits	Grading scale	Version
Completed coursework	14	pass/fail	1

Exams			
WT 24/25	7200000	Internship	Bajohr

T 5.58 Course: Introduction to Informatics and Algorithmic Mathematics - Exam [T-MATH-102250]

Responsible: Prof. Dr. Willy Dörfler
PD Dr. Mathias Krause

Organisation: KIT Department of Mathematics

Part of: M-MATH-101337 - Introduction to Informatics and Algorithmic Mathematics

Type	Credits	Grading scale	Version
Written examination	5	Grade to a third	1

Events					
WT 24/25	0101100	Einstieg in die Informatik und algorithmische Mathematik	2 SWS	Lecture / 🗣	Dörfler
WT 24/25	0101200	Übungen zu 0101100	2 SWS	Practice / 🗣	Dörfler
WT 24/25	0101300	Rechnerpraktikum zu 0101100	2 SWS	Practical course	Dörfler
ST 2025	0150700	Einstieg in die Informatik und Algorithmische Mathematik (für Bio- und Chemie-Ingenieurwesen)	2 SWS	Lecture	Krause, Karch, Doll
ST 2025	0150800	Übungen zu 0150700	1 SWS	Practice	Krause, Karch, Doll
ST 2025	0150900	Praktikum zu 0150700	2 SWS	Practical course	Krause, Karch, Doll
Exams					
WT 24/25	7700003_02	Introduction to Informatics and Algorithmic Mathematics - Post-Exam (C++)			Dörfler
ST 2025	7700003_01	Introduction to Informatics and Algorithmic Mathematics - C++-Exam			Krause

Legend: 🖥 Online, 🖧 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

T 5.59 Course: Kinetics and Catalysis [T-CIWVT-106032]

Responsible: Prof. Dr.-Ing. Gregor Wehinger
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101991 - Single Results

Type	Credits	Grading scale	Recurrence	Version
Written examination	6	Grade to a third	Each term	1

Events					
ST 2025	2220030	Kinetics and Catalysis	2 SWS	Lecture / 🗣	Wehinger
ST 2025	2220031	Kinetics and Catalysis - Exercises	1 SWS	Practice / 🗣	Wehinger, und Mitarbeitende
Exams					
WT 24/25	7210102	Kinetics and Catalysis			Wehinger
ST 2025	7210102	Kinetics and Catalysis			Wehinger

Legend: 💻 Online, 💐 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Learning control is a written examination lasting 60 minutes.

Prerequisites
None

T 5.60 Course: Laboratory Enzyme Technology [T-CIWVT-111075]

Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-105509 - Enzyme Technology

Type	Credits	Grading scale	Version
Examination of another type	2	Grade to a third	2

Exams			
WT 24/25	7212160-P-ET	Laboratory Enzyme Technology	Neumann
ST 2025	7212160-P-ET	Laboratory Enzyme Technology	Grünberger

Prerequisites
The written examination has to be passed.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-CIWVT-111074 - Enzyme Technology must have been passed.

T 5.61 Course: Laboratory Work Bioprocess Engineering [T-CIWVT-111073]

Responsible: Dr. Anke Neumann
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-105510 - Bioprocess Engineering

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	2	Grade to a third	Each winter term	2

Exams			
WT 24/25	7212165-P-BVT	Laboratory Work Bioprocess Engineering	Neumann

Prerequisites
None

T 5.62 Course: Laboratory Work General Chemistry and Chemistry in Aqueous Solutions [T-CIWVT-101893]

Responsible: Prof. Dr. Harald Horn
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101722 - General Chemistry and Chemistry of Aqueous Solutions

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4	Grade to a third	Each winter term	1

Exams			
WT 24/25	7232669	Laboratory Work General Chemistry and Chemistry in Aqueous Solutions	Horn

Competence Certificate
Sucess control is a practical course with grading: preceding written exam (15 min) and protocol after the experiments. (According to § 4 Abs. 2 Nr. 3 of SPO Bachelor Bioingenieurwesen 2015)

Prerequisites
Written exam "General Chemistry and Chemistry of Aqueous Solutions" must be passed.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-CIWVT-101892 - General Chemistry and Chemistry of Aqueous Solutions must have been passed.

Workload
120 hours

T 5.63 Course: Laboratory Work: Biology for Engineers [T-CIWVT-103331]

Responsible: PD Dr. Jens Rudat
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101622 - Biology for Engineers II

Type	Credits	Grading scale	Recurrence	Version
Completed coursework (practical)	2	pass/fail	Each winter term	2

Exams			
WT 24/25	7212150-GP2-MIBI	Laboratory Work: Microbiology for Engineers	Neumann

Prerequisites
None.

T 5.64 Course: Laboratory Work: Downstream Processing [T-CIWVT-111097]

Responsible: Prof. Dr. Jürgen Hubbuch
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101124 - Downstream Processing

Type	Credits	Grading scale	Version
Examination of another type	2	Grade to a third	2

Events					
ST 2025	2214060	Laboratory Work: Downstream Processing	2 SWS	Practical course / 🗣	Hubbuch, und Mitarbeiter
Exams					
ST 2025	7223004	Laboratory Work: Downstream Processing			Hubbuch

Legend: 🖥 Online, 🌸 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
None.

T 5.65 Course: Lecture Series Supplementary Studies on Science, Technology and Society - Self Registration [T-FORUM-113578]

Responsible: Dr. Christine Mielke
Christine Myglas

Organisation:

Part of: M-FORUM-106753 - Supplementary Studies on Science, Technology and Society

Type	Credits	Grading scale	Recurrence	Expansion	Version
Completed coursework	2	pass/fail	Each summer term	1 terms	1

Competence Certificate
Active participation, learning protocols, if applicable.

Prerequisites
None

Self service assignment of supplementary stdues
This course can be used for self service assignment of grade aquired from the following study providers:

- Studium Generale. Forum Wissenschaft und Gesellschaft (FORUM) (ehem. ZAK)
- FORUM (ehem. ZAK) Begleitstudium

Recommendation
It is recommended that you complete the lecture series "Science in Society" before attending events in the advanced module and in parallel with attending the basic seminar.
If it is not possible to attend the lecture series and the basic seminar in the same semester, the lecture series can also be attended after attending the basic seminar.
However, attending events in the advanced module before attending the lecture series should be avoided.

Annotation
The basic module consists of the lecture series "Science in Society" and the basic seminar. The lecture series is only offered during the summer semester.
The basic seminar can be attended in the summer or winter semester.

T 5.66 Course: Mechanical Processing [T-CIWVT-101886]

Responsible: Prof. Dr.-Ing. Achim Dittler
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101135 - Mechanical Processing

Type	Credits	Grading scale	Recurrence	Version
Written examination	6	Grade to a third	Each term	1

Events					
WT 24/25	2244010	Mechanical Processing	2 SWS	Lecture / 🗣	Dittler
WT 24/25	2244011	Exercises on 2244010 Mechanical Processing	2 SWS	Practice / 🗣	Dittler, und Mitarbeitende
Exams					
WT 24/25	7244010	Mechanical Processing			Dittler
ST 2025	7244010	Mechanical Processing			Dittler

Legend: 💻 Online, 💐 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Learning control is a written examination lasting 120 minutes.

Prerequisites
None

T 5.67 Course: Mechanical Separation Technology Exam [T-CIWVT-103448]

Responsible: Dr.-Ing. Marco Gleiß
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101147 - Mechanical Separation Technology

Type	Credits	Grading scale	Recurrence	Version
Oral examination	8	Grade to a third	Each summer term	1

Events					
WT 24/25	2245230	Mechanical Separation Technology	3 SWS	Lecture / 🗣	Gleiß
WT 24/25	2245231	Exercises for 2245230 Mechanical Separation Technology	1 SWS	Practice / 🗣	Gleiß
Exams					
WT 24/25	7291231	Mechanical Separation Technology Exam			Gleiß

Legend: 💻 Online, 💐 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Learning control is an oral examination lasting approx. 30 minutes.

Prerequisites
None

T 5.68 Course: Mechanical Separation Technology Project Work [T-CIWVT-103452]

Responsible: Dr.-Ing. Marco Gleiß
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101147 - Mechanical Separation Technology

Type	Credits	Grading scale	Version
Examination of another type	4	Grade to a third	1

Events					
ST 2025	2245232	Project Work for Profile Subject Mechanical Separation Techniques	1 SWS	Practice / 🗣	Gleiß, und Mitarbeitende
Exams					
WT 24/25	7291300	Mechanical Separation Technology Project Work			Gleiß

Legend: 💻 Online, 🌸 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Learning control is a project work; examination of another type.

Prerequisites
none

T 5.69 Course: Membrane Technologies in Water Treatment [T-CIWVT-113236]

Responsible: Prof. Dr. Harald Horn
Dr.-Ing. Florencia Saravia
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101991 - Single Results

Type	Credits	Grading scale	Recurrence	Version
Written examination	5	Grade to a third	Each summer term	1

Events					
ST 2025	2233010	Membrane Technologies in Water Treatment	2 SWS	Lecture / 🗣	Horn, Saravia
ST 2025	2233011	Membrane Technologies in Water Treatment - Excercises	1 SWS	Practice / 🏵	Horn, Saravia, und Mitarbeitende
Exams					
WT 24/25	7232605	Membrane Technologies in Water Treatment			Horn, Saravia
ST 2025	7233010	Membrane Technologies in Water Treatment			Horn, Saravia

Legend: 🖥 Online, 🏵 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Learning control is an written examination lasting 90 minutes.

Prerequisites
Prerequisite: Submission of exercises, membrane design and short presentation (5 minutes, group work).

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-CIWVT-113235 - Excercises: Membrane Technologies must have been passed.

T 5.70 Course: Micro Process Engineering [T-CIWVT-103667]

Responsible: Prof. Dr.-Ing. Roland Dittmeyer
Prof. Dr.-Ing. Peter Pfeifer
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101154 - Micro Process Engineering

Type	Credits	Grading scale	Version
Examination of another type	5	Grade to a third	1

Events					
ST 2025	2220221	Micro Process Engineering - Project Work	2 SWS	Practice / 🗣	Dittmeyer, Pfeifer, und Mitarbeitende
Exams					
ST 2025	7210202	Micro Process Engineering			Pfeifer

Legend: 💻 Online, 🌀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Die Erfolgskontrolle ist eine Prüfungsleistung anderer Art (Projektarbeit) nach § 4 Abs. 2 Nr. 3 der SPO Bachelor Bioingenieurwesen 2015. Es werden die praktische Mitarbeit, der schriftliche Bericht sowie die mündliche Präsentation der Ergebnisse individuell bewertet.

Prerequisites
None

T 5.71 Course: Micro Process Engineering [T-CIWVT-103666]

Responsible: Prof. Dr.-Ing. Peter Pfeifer
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101154 - Micro Process Engineering

Type	Credits	Grading scale	Recurrence	Version
Oral examination	7	Grade to a third	Each summer term	1

Events					
WT 24/25	2220220	Design of Micro Reactors	4 SWS	Lecture / Practice (/ 🗣	Pfeifer
Exams					
ST 2025	7210201	Micro Process Engineering			Pfeifer

Legend: 💻 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Die Erfolgskontrolle ist eine mündliche Einzelprüfung nach § 4 Abs. 2 Nr. 2 der SPO Bachelor Bioingenieurwesen 2015 im Umfang von ca. 25 Minuten zu Lehrveranstaltung "Auslegung von Mikroreaktoren".

Prerequisites
None

T 5.72 Course: Microbiology [T-CIWVT-111065]

Responsible: Dr. Anke Neumann
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101622 - Biology for Engineers II

Type	Credits	Grading scale	Recurrence	Version
Written examination	2	Grade to a third	Each winter term	1

Exams			
WT 24/25	7212112-V-MIBI	BING Microbiology	Neumann
ST 2025	7212112-V-MIBI	Microbiology	Neumann

Competence Certificate
Written Examination with a duration of 90 minutes.

T 5.73 Course: Organic Chemistry for Engineers [T-CHEMBIO-101865]

Responsible: Prof. Dr. Michael Meier
Organisation: KIT Department of Chemistry and Biosciences
Part of: M-CHEMBIO-101115 - Organic Chemistry for Engineers

Type	Credits	Grading scale	Version
Written examination	5	Grade to a third	2

Events					
ST 2025	5142	Organische Chemie für CIW/VT und BIW	2 SWS	Lecture / 🗣	Levkin
ST 2025	5143	Übungen zu Organische Chemie für CIW/VT und BIW	2 SWS	Practice / 🗣	Levkin
Exams					
ST 2025	7100017	Organic Chemistry for CIW, BIW, VT und MWT			Levkin, Podlech
ST 2025	7100029	Organic Chemistry for CIW, BIW, VT und MWT, second exam			Levkin, Podlech

Legend: 💻 Online, 🌸 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
acc. to module description

T 5.74 Course: Particle Technology Exam [T-CIWVT-106028]

Responsible: Prof. Dr.-Ing. Achim Dittler
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101991 - Single Results

Type	Credits	Grading scale	Version
Written examination	6	Grade to a third	1

Events					
ST 2025	2244030	Particle Technology	2 SWS	Lecture / 🗣	Dittler
ST 2025	2244031	Particle Technology - Exercises	1 SWS	Practice / 🗣	Dittler, und Mitarbeitende
Exams					
WT 24/25	7244030	Particle Technology Exam			Dittler
ST 2025	7244030	Particle Technology Exam			Dittler

Legend: 💻 Online, 💐 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Learning control is a written examination lasting 120 minutes.

Prerequisites
None

T 5.75 Course: Practical Course Process Technology and Plant Design [T-CIWVT-106148]

Responsible: Dr. Frederik Scheiff
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101991 - Single Results

Type	Credits	Grading scale	Recurrence	Version
Completed coursework (practical)	0	pass/fail	Each winter term	1

Events					
WT 24/25	2231012	Practical Course Process Technology and Plant Design	1 SWS	Practical course / 🗣	Scheiff, und Mitarbeitende
Exams					
WT 24/25	7230101	practical course Process Technology and Plant Design			Scheiff

Legend: 💻 Online, 🌸 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Compleded coursework/ practical course

Prerequisites
Ungraded exam

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-CIWVT-106149 - Initial Exam Process Technology and Plant Design must have been passed.

T 5.76 Course: Process Development and Scale-up [T-CIWVT-103530]

Responsible: Prof. Dr.-Ing. Jörg Sauer
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101153 - Process Development and Scale-up

Type	Credits	Grading scale	Recurrence	Version
Oral examination	8	Grade to a third	Each summer term	2

Events					
WT 24/25	2231310	Process Development and Scale-Up	2 SWS	Lecture / 🗣	Sauer
WT 24/25	2231311	Exercises on 2231310 Process Development and Scale-Up	2 SWS	Practice / 🗣	Sauer, und Mitarbeitende
Exams					
ST 2025	7200025	Process Development and Scale-up			Sauer

Legend: 💻 Online, 💐 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-CIWVT-111005 - Exercises Process Development and Scale-up must have been passed.

T 5.77 Course: Process Development and Scale-up Project Work [T-CIWVT-103556]

Responsible: Prof. Dr.-Ing. Jörg Sauer
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101153 - Process Development and Scale-up

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4	Grade to a third	Each summer term	1

Events					
ST 2025	2231312	Project Work in the Profile Course "Process Development and Scale-up"	2 SWS	Project (P / 🗣	Sauer, und Mitarbeitende
ST 2025	2231313	Presentation Profile Course "Process Development and Scale-up"		Others (sons / 🗣	Sauer
Exams					
ST 2025	7200026	Process Development and Scale-up Project Work			Sauer

Legend: 🖥 Online, 🖧 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Learning control is an examination of another type: Project work.

Prerequisites
None.

T 5.78 Course: Process Technology and Plant Design Written Exam [T-CIWVT-106150]

Responsible: Dr. Frederik Scheiff
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101991 - Single Results

Type	Credits	Grading scale	Recurrence	Version
Written examination	8	Grade to a third	Each term	1

Events					
WT 24/25	2231010	Process Technology and Plant Design I	2 SWS	Lecture / 🗣	Scheiff, Bajohr
WT 24/25	2231012	Practical Course Process Technology and Plant Design	1 SWS	Practical course / 🗣	Scheiff, und Mitarbeitende
ST 2025	2231011	Process Technology and Plant Design II	3 SWS	Lecture / 🗣	Scheiff, Bajohr
Exams					
WT 24/25	7230102	Process Technology and Plant Design Written Exam			Scheiff
ST 2025	7230102	Process Technology and Plant Design Written Exam			Scheiff

Legend: 🖥 Online, 🌸 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Learning control is a written examination lasting 180 minutes.

Prerequisites
None

T 5.79 Course: Registration for Certificate Issuance - Supplementary Studies on Science, Technology and Society [T-FORUM-113587]

Responsible: Dr. Christine Mielke
Christine Myglas

Organisation:

Part of: M-FORUM-106753 - Supplementary Studies on Science, Technology and Society

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	0	pass/fail	Each term	1

Prerequisites
In order to register, it is mandatory that the basic module and the advanced module have been completed and that the grades for the partial performances in the advanced module are available.

Registration as a partial achievement means the issue of a certificate.

T 5.80 Course: SmartMentoring - Group Management [T-CIWVT-111761]

Responsible: Dr.-Ing. Barbara Freudig
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-105848 - SmartMentoring

Type	Credits	Grading scale	Version
Completed coursework	2	pass/fail	1

Exams			
WT 24/25	72000001	SmartMentoring - Group Management	

T 5.81 Course: Thermal Process Engineering [T-CIWVT-101885]

Responsible: Prof. Dr.-Ing. Tim Zeiner
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101134 - Thermal Process Engineering

Type	Credits	Grading scale	Version
Written examination	6	Grade to a third	1

Events					
WT 24/25	2260110	Fluid Separation Processes	2 SWS	Lecture / 🗣	Zeiner
WT 24/25	2260111	Exercises for 2260110 Thermal Process Engineering	2 SWS	Practice / 🗣	Zeiner, und Mitarbeitende
Exams					
WT 24/25	7280002	Thermal Process Engineering			Zeiner
ST 2025	7280002	Thermal Process Engineering			Zeiner

Legend: 💻 Online, 💐 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

T 5.82 Course: Thermal Process Engineering II [T-CIWVT-114107]

Responsible: Prof. Dr.-Ing. Tim Zeiner
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101991 - Single Results

Type	Credits	Grading scale	Version
Written examination	6	Grade to a third	1

Events					
ST 2025	2260150	Thermal Process Engineering II	2 SWS	Lecture / 🗣	Zeiner
ST 2025	2260151	Thermal Process Engineering - Exercises	2 SWS	Practice / 🗣	Zeiner, und Mitarbeitende
Exams					
ST 2025	7260150	Thermal Process Engineering II (previously Thermal Transport Processes)			Zeiner

Legend: 🖥 Online, 🌸 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
None.

T 5.83 Course: Thermodynamics I, Exam [T-CIWVT-101879]

Responsible: Prof. Dr. Sabine Enders
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101129 - Thermodynamics I

Type	Credits	Grading scale	Version
Written examination	7	Grade to a third	1

Events					
WT 24/25	2250010	Thermodynamics I	3 SWS	Lecture / 🗣	Enders
WT 24/25	2250011	Thermodynamics I - Exercises	2 SWS	Practice / 🗣	Enders, und Mitarbeitende
WT 24/25	2250022	Tutorial Thermodynamics I and II	2 SWS	Tutorial (/ 🗣	Enders, und Mitarbeitende
Exams					
WT 24/25	7200002	Thermodynamics I Exam			Enders
ST 2025	7200002	Thermodynamics I Exam			Enders

Legend: 🖥 Online, 🖧 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Learning control is a written examination lastin 120 minutes.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-CIWVT-101878 - Thermodynamics I, Tutorial must have been passed.

T 5.84 Course: Thermodynamics I, Tutorial [T-CIWVT-101878]

Responsible: Prof. Dr. Sabine Enders
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101129 - Thermodynamics I

Type	Credits	Grading scale	Version
Completed coursework	0	pass/fail	1

Events					
WT 24/25	2250010	Thermodynamics I	3 SWS	Lecture / 🗣	Enders
WT 24/25	2250011	Thermodynamics I - Exercises	2 SWS	Practice / 🗣	Enders, und Mitarbeitende
WT 24/25	2250022	Tutorial Thermodynamics I and II	2 SWS	Tutorial (/ 🗣	Enders, und Mitarbeitende
Exams					
WT 24/25	7200001	Thermodynamics I, Tutorial			Enders

Legend: 💻 Online, 💠 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
None

T 5.85 Course: Thermodynamics II, Exam [T-CIWVT-101881]

Responsible: Prof. Dr. Sabine Enders
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101130 - Thermodynamics II

Type	Credits	Grading scale	Version
Written examination	7	Grade to a third	1

Events					
ST 2025	2250020	Thermodynamics II	3 SWS	Lecture / 🗣	Enders
ST 2025	2250021	Thermodynamics II - Exercises	2 SWS	Practice / 🗣	Enders, und Mitarbeitende
ST 2025	2250022	Tutorial Thermodynamics I and II	2 SWS	Tutorial (/ 🗣	Enders, und Mitarbeitende
Exams					
WT 24/25	7200004	Thermodynamics II, Exam			Enders
ST 2025	7200004	Thermodynamics II, Exam			Enders

Legend: 💻 Online, 🖧 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Learning control is a written examination lastin 120 minutes.

Prerequisites
Precondition for participation: 2 of 3 compulsory exercises have to be approved

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-CIWVT-101880 - Thermodynamics II, Tutorial must have been passed.

T 5.86 Course: Thermodynamics II, Tutorial [T-CIWVT-101880]

Responsible: Prof. Dr. Sabine Enders
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101130 - Thermodynamics II

Type	Credits	Grading scale	Version
Completed coursework	0	pass/fail	1

Events					
ST 2025	2250020	Thermodynamics II	3 SWS	Lecture / 🗣	Enders
ST 2025	2250021	Thermodynamics II - Exercises	2 SWS	Practice / 🗣	Enders, und Mitarbeitende
ST 2025	2250022	Tutorial Thermodynamics I and II	2 SWS	Tutorial (/ 🗣	Enders, und Mitarbeitende
Exams					
ST 2025	7200003	Thermodynamics II, Tutorial			Enders

Legend: 📱 Online, 💮 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The learning control is a completed coursework; prerequisite for the written exam.

Prerequisites
None

T 5.87 Course: Thermodynamics III [T-CIWVT-106033]

Responsible: Prof. Dr. Sabine Enders
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101991 - Single Results

Type	Credits	Grading scale	Version
Written examination	6	Grade to a third	1

Events					
WT 24/25	2250030	Thermodynamics III	2 SWS	Lecture / 🗣	Enders
WT 24/25	2250031	Thermodynamics III - Exercises	1 SWS	Practice / 🗣	Enders, und Mitarbeitende
Exams					
WT 24/25	7200104	Thermodynamics III			Enders
ST 2025	7200104	Thermodynamics III			Enders

Legend: 💻 Online, 💐 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Learning control is a written examination lasting 90 minutes.

Prerequisites
None

T 5.88 Course: Tutorial Advanced Mathematics I [T-MATH-100525]

Responsible: PD Dr. Tilo Arens
Prof. Dr. Roland Griesmaier
PD Dr. Frank Hettlich

Organisation: KIT Department of Mathematics

Part of: M-CIWVT-100877 - Orientation Exam
M-MATH-100280 - Advanced Mathematics I

Type	Credits	Grading scale	Recurrence	Version
Completed coursework (written)	0	pass/fail	Each winter term	2

Events					
WT 24/25	0131100	Übungen zu 0131000	2 SWS	Practice	Hettlich
WT 24/25	0131300	Übungen zu 0131200	2 SWS	Practice	Hettlich
Exams					
WT 24/25	6700005	Problem Class for Advanced Mathematics I			Arens, Griesmaier, Hettlich

Competence Certificate
Learning assessment is carried out by written assigments (pre-requesite). Exact requirements will be communicated in the lectures.

Prerequisites
None.

T 5.89 Course: Tutorial Advanced Mathematics II [T-MATH-100526]

Responsible: PD Dr. Tilo Arens
Prof. Dr. Roland Griesmaier
PD Dr. Frank Hettlich

Organisation: KIT Department of Mathematics

Part of: M-MATH-100281 - Advanced Mathematics II

Type	Credits	Grading scale	Recurrence	Version
Completed coursework (written)	0	pass/fail	Each summer term	2

Events					
ST 2025	0180900	Übungen zu 0180800	2 SWS	Practice	Arens
ST 2025	0181100	Übungen zu 0181000	2 SWS	Practice	Arens
Exams					
ST 2025	7700024	Problem Class for Advanced Mathematics II			Hettlich, Arens, Griesmaier

Competence Certificate
Learning assessment is carried out by written assigments (pre-requesite). Exact requirements will be communicated in the lectures.

Prerequisites
None.

T 5.90 Course: Tutorial Advanced Mathematics III [T-MATH-100527]

Responsible: PD Dr. Tilo Arens
Prof. Dr. Roland Griesmaier
PD Dr. Frank Hettlich

Organisation: KIT Department of Mathematics

Part of: M-MATH-100282 - Advanced Mathematics III

Type	Credits	Grading scale	Recurrence	Version
Completed coursework (written)	0	pass/fail	Each winter term	2

Events					
WT 24/25	0131500	Übungen zu 0131400	2 SWS	Practice	Griesmaier
Exams					
WT 24/25	6700006	Tutorial Advanced Mathematics III			Arens, Griesmaier, Hettlich

Competence Certificate
Learning assessment is carried out by written assigments (pre-requesite). Exact requirements will be communicated in the lectures.

Prerequisites
None.