Karlsruher Institut für Technologie

Module Handbook
Mechatronics and Information Technology Bachelor 2023 (B.Sc.)

SPO 2023

Winter term 2023/24

Date: November 2nd, 2023

KIT DEPARTMENT OF MECHANICAL ENGINEERING / KIT DEPARTMENT OF ELECTRICAL ENGINEERING AND INFORMATION TECHNOLOGY

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1 About this handbook

1.1 Notes and rules

The program exists of several **subjects** (e.g. Fundamentals of Engineering). Every subject is split into **modules** and every module itself consists of one or more interrelated **module component exams**. The extent of every module is indicated by credit points (CP), which will be credited after the successful completion of the module. Some of the modules are **obligatory**. According to the interdisciplinary character of the program, a great variety of **individual specialization and deepening possibilities** exists for a large number of modules. This enables the student to customize content and time schedule of the program according to personal needs, interest and job perspective. The **module handbook** describes the modules belonging to the program. It describes particularly:

- the structure of the modules
- the extent (in CP),
- the dependencies of the modules,
- the learning outcomes,
- the assessment and examinations.

The module handbook serves as a necessary orientation and as a helpful guide throughout the studies. The module handbook does not replace the **course catalog**, which provides important information concerning each semester and variable course details (e.g. time and location of the course).

1.1.1 Begin and completion of a module

Each module and each examination can only be selected once. The decision on the assignment of an examination to a module (if, for example, an examination in several modules is selectable) is made by the student at the moment when he / she is registered for the appropriate examination. A module is completed or passed when the module examination is passed (grade 4.0 or better). For modules in which the module examination is carried out over several partial examinations, the following applies: The module is completed when all necessary module partial examinations have been passed. In the case of modules which offer alternative partial examinations, the module examination is concluded with the examination with which the required total credit points are reached or exceeded. The module grade, however, is combined with the weight of the predefined credit points for the module in the overall grade calculation.

1.1.2 Module versions

It is not uncommon for modules to be revised due to, for example, new courses or cancelled examinations. As a rule, a new module version is created, which applies to all students who are new to the module. On the other hand, students who have already started the module enjoy confidence and remain in the old module version. These students can complete the module on the same conditions as at the beginning of the module (exceptions are regulated by the examination committee). The date of the student's "`binding declaration"' on the choice of the module in the sense of §5(2) of the Study and Examination Regulation is decisive. This binding declaration is made by registering for the first examination in this module.

In the module handbook, all modules are presented in their current version. The version number is given in the module description. Older module versions can be accessed via the previous module handbooks in the archive.

1.1.3 General and partial examinations

Module examinations can be either taken in a general examination or in partial examinations. If the module examination is offered as a general examination, the entire learning content of the module will be examined in a single examamination. If the module examination is subdivided into partial examinations, the content of each course will be examined in corresponding partial examinations. Registration for examinations can be done online at the campus management portal. The following functions can be accessed on https://campus.studium.kit.edu/:

- Register/unregister for examinations
- Check for examination results
- Create transcript of records

For further and more detailed information, https://studium.kit.edu/Seiten/FAQ.aspx.

1.1.4 Types of exams

Exams are split into written exams, oral exams and alternative exam assessments. Exams are always graded. Non exam assessments can be repeated several times and are not graded.

1.1.5 Repeating exams

Principally, a failed written exam, oral exam or alternative exam assessment can repeated only once. If the repeat examination (including an eventually provided verbal repeat examination) will be failed as well, the examination claim is lost. A request for a second repetition has to be made in written form to the examination committee two months after loosing the examination claim.

1.1.6 Additional accomplishments

Additional accomplishments are voluntarily taken exams, which have no impact on the overall grade of the student and can take place on the level of single courses or on entire modules. It is also mandatory to declare an additional accomplishment as such at the time of registration for an exam.

1.1.7 Further information

More detailed information about the legal and general conditions of the program can be found in the examination regulation of the program (http://www.sle.kit.edu/amtlicheBekanntmachungen.php).

Qualification Objectives of the Bachelor Program Mechatronics and Information Technology at KIT

Through a research and practical orientation of the six-semester Bachelor's degree program in Mechatronics and Information Technology at KIT, graduates of the program are prepared for lifelong learning and employment in typical professional fields of mechatronics in industry, services and public administration. They acquire the academic qualifications to pursue a master's degree program in Mechatronics and Information Technology or related disciplines.

In the fundamental area of the studies, graduates acquire sound basic knowledge in mathematics, engineering mechanics and electrical engineering.
This is complemented by basic knowledge of mechanical design, automation and information technology, production technology and mechatronic systems and products. With this in-depth knowledge of scientific theories, principles and methods, graduates can successfully deal with clearly specified problems that have a unique solution approach in mechatronics.

In the specialization field and the bachelor thesis, cross-disciplinary problem-solving and synthesis skills for engineering systems are developed. Graduates are able to generate new solutions in the areas of their choice of engineering.

Graduates of the Bachelor program in Mechatronics and Information Technology at KIT can select basic methods in order to create models and compare them in familiar situations. They are able to take over and to work independently on preset problems and resulting tasks in organized teams, to integrate the results of others and to present and interpret their own results in written form. They can identify, analyze and develop systems and processes and apply predefined assessment criteria.

Karlsruher Institut für Technologie

Die Forschungsuniversität in der Helmholtz-Gemeinschaft

Amtliche Bekanntmachung

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Studien- und Prüfungsordnung des Karlsruher Instituts für Technologie (KIT) für den Bachelorstudiengang Mechatronik und Informationstechnik

vom 24. Juli 2023

Aufgrund von § 10 Absatz 2 Ziffer 4 und § 20 Absatz 2 KIT-Gesetz in der Fassung vom 14. Juli 2009 (GBl. S. 317 f), zuletzt geändert durch Artikel 2 des Gesetzes zur Änderung des Universitätsklinika-Gesetzes und anderer Gesetze vom 15. November 2022 (GBl. S. 585), und § 32 Absatz 3 Satz 1, 32 a Absatz 1 Satz 1 Landeshochschulgesetz in der Fassung vom 1. Januar 2005 (GBl. S. 1 f), zuletzt geändert durch Artikel 8 des Gesetzes zum Erlass eines Klimaschutz- und Klimawandelanpassungsgesetz und zur Verankerung des Klimabelangs in weiteren Rechtsvorschriften vom 07. Februar 2023 (GBl. S. 26, 43) hat der KIT-Senat am 17. Juli 2023 die folgende Studien- und Prüfungsordnung für den Bachelorstudiengang Mechatronik und Informationstechnik beschlossen.

Der Präsident hat seine Zustimmung gemäß § 20 Absatz 2 KIT-Gesetz i.V.m. § 32 Absatz 3 Satz 1 Landeshochschulgesetz am 24. Juli 2023 erteilt.

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Präambel

Das KIT hat sich im Rahmen der Umsetzung des Bolognaprozesses zum Aufbau eines Europäischen Hochschulraumes zum Ziel gesetzt, dass am Abschluss des Studiums am KIT der Mastergrad stehen soll. Das KIT sieht daher die am KIT angebotenen konsekutiven Bachelor- und Masterstudiengänge als Gesamtkonzept mit konsekutivem Curriculum.

I. Allgemeine Bestimmungen

§ 1 Geltungsbereich

[1]Diese Bachelorprüfungsordnung regelt Studienablauf, Prüfungen und den Abschluss des Studiums im Bachelorstudiengang Mechatronik und Informationstechnik am KIT. [2]Dieser Studiengang wird gemeinsam von der KIT-Fakultät für Elektrotechnik und Informationstechnik sowie der KIT-Fakultät für Maschinenbau am KIT angeboten.

§ 2 Ziel des Studiums, akademischer Grad

(1) [1]Im Bachelorstudium sollen die wissenschaftlichen Grundlagen und die Methodenkompetenz der Fachwissenschaften vermittelt werden. [2]Ziel des Studiums ist die Fähigkeit, einen konsekutiven Masterstudiengang erfolgreich absolvieren zu können sowie das erworbene Wissen berufsfeldbezogen anwenden zu können.

(2) [1]Aufgrund der bestandenen Bachelorprüfung wird der akademische Grad „Bachelor of Science (B.Sc.)“ für den Bachelorstudiengang Mechatronik und Informationstechnik verliehen.

§ 3 Regelstudienzeit, Studienaufbau, Leistungspunkte

(1) [1]Der Studiengang nimmt teil am Programm „Studienmodelle individueller Geschwindigkeit“. [2]Die Studierenden haben im Rahmen der dortigen Kapazitäten und Regelungen bis einschließlich drittem Fachsemester Zugang zu den Veranstaltungen des MINT-Kollegs Baden-Württemberg (im folgenden MINT-Kolleg).

(2) [1]Die Regelstudienzeit beträgt sechs Semester. [2]Bei einer qualifizierten Teilnahme am MINT-Kolleg bleiben bei der Anrechnung auf die Regelstudienzeit bis zu zwei Semester unberücksichtigt. [3]Die konkrete Anzahl der Semester richtet sich nach § 8 Absatz 2 Satz 3 bis 5. [4]Eine qualifizierte Teilnahme liegt vor, wenn die/der Studierende Veranstaltungen des MINT-Kollegs für die Dauer von mindestens einem Semester im Umfang von mindestens zwei Fachkursen (Gesamtworkload 10 Semesterwochenstunden) belegt hat. [5]Das MINT-Kolleg stellt hierüber eine Bescheinigung aus.

(3) [1]Das Lehrangebot des Studiengangs ist in Fächer, die Fächer sind in Module, die jeweiligen Module in Lehrveranstaltungen gegliedert. [2]Die Fächer und ihr Umfang werden in § 20 festgelegt. [3]Näheres beschreibt das Modulhandbuch.

(4) [1]Der für das Absolvieren von Lehrveranstaltungen und Modulen vorgesehene Arbeitsaufwand wird in Leistungspunkten (LP) ausgewiesen. [2]Die Maßstäbe für die Zuordnung von Leistungspunkten entsprechen dem European Credit Transfer System (ECTS). [3]Ein Leistungspunkt entspricht einem Arbeitsaufwand von etwa 30 Zeitstunden. [4]Die Verteilung der Leistungspunkte auf die Semester hat in der Regel gleichmäßig zu erfolgen.

(5) [1]Der Umfang der für den erfolgreichen Abschluss des Studiums erforderlichen Studien- und Prüfungsleistungen wird in Leistungspunkten gemessen und beträgt insgesamt 180 Leistungspunkte.

(6) [1]Lehrveranstaltungen können nach vorheriger Ankündigung auch in englischer Sprache angeboten werden, sofern es deutschsprachige Wahlmöglichkeiten gibt.

§ 4 Modulprüfungen, Studien- und Prüfungsleistungen

(1) [1]Die Bachelorprüfung besteht aus Modulprüfungen. [2]Modulprüfungen bestehen aus einer oder mehreren Erfolgskontrollen.

[3]Erfolgskontrollen gliedern sich in Studien- oder Prüfungsleistungen.

(2) [1]Prüfungsleistungen sind:

1. schriftliche Prüfungen,
2. mündliche Prüfungen oder
3. Prüfungsleistungen anderer Art.

(3) [1]Studienleistungen sind schriftliche, mündliche oder praktische Leistungen, die von den Studierenden in der Regel lehrveranstaltungsbegleitend erbracht werden.

(4) [1]Von den Modulprüfungen sollen mindestens 70 % benotet sein.

(5) [1]Bei sich ergänzenden Inhalten können die Modulprüfungen mehrerer Module durch eine auch modulübergreifende Prüfungsleistung (Absatz 2 Nummer 1 bis 3) ersetzt werden.

§ 5 Anmeldung und Zulassung zu den Modulprüfungen und Lehrveranstaltungen

(1) [1]Um an den Modulprüfungen teilnehmen zu können, müssen sich die Studierenden online im Studierendenportal zu den jeweiligen Erfolgskontrollen anmelden. [2]In Ausnahmefällen kann eine Anmeldung schriftlich beim jeweils zuständigen Prüfungssekretariat nach § 17 Absatz 2 Satz 3 erfolgen. [3]Für die Erfolgskontrollen können durch die Prüfenden Anmeldefristen festgelegt werden. [4]Die Anmeldung der Bachelorarbeit erfolgt im Studierendenportal, Näheres ist im Modulhandbuch geregelt.

(2) [1]Sofern Wahlmöglichkeiten bestehen, müssen Studierende, um zu einer Prüfung in einem bestimmten Modul zugelassen zu werden, vor der ersten Prüfung in diesem Modul mit der Anmeldung zu der Prüfung eine bindende Erklärung über die Wahl des betreffenden Moduls und dessen Zuordnung zu einem Fach abgeben. [2]Auf Antrag des/der Studierenden an den Prüfungsausschuss kann die Wahl oder die Zuordnung nachträglich geändert werden. [3]Sofern bereits ein Prüfungsverfahren in einem Modul begonnen wurde, ist die Änderung der Wahl oder der Zuordnung erst nach Beendigung des Prüfungsverfahrens zulässig.

(3) [1]Zu einer Erfolgskontrolle ist zuzulassen, wer

1. in den Bachelorstudiengang Mechatronik und Informationstechnik am KIT eingeschrieben ist; die Zulassung beurlaubter Studierender ist auf Prüfungsleistungen im Sinne des § 14 Absatz 7 Satz 1 der Zulassungs- und Immatrikulationsordnung des KIT beschränkt; und
2. nachweist, dass er die im Modulhandbuch für die Zulassung zu einer Erfolgskontrolle festgelegten Voraussetzungen erfüllt, und
3. nachweist, dass er in dem Bachelorstudiengang Mechatronik und Informationstechnik den Prüfungsanspruch nicht verloren hat und
4. die in § 20 a genannte Voraussetzung erfüllt.

(4) [1]Nach Maßgabe von § 30 Absatz 5 Landeshochschulgesetz kann die Zulassung zu einzelnen Pflichtveranstaltungen beschränkt werden. [2]Der/die Prüfende entscheidet über die Auswahl unter den Studierenden, die sich rechtzeitig bis zu dem von dem/der Prüfenden festgesetzten Termin angemeldet haben unter Berücksichtigung des Studienfortschritts dieser Studierenden und unter Beachtung von § 4 Absatz 1 Satz 1 und 2 der Satzung über nachteilsausgleichende Regelungen in den Bachelor- und Masterstudiengängen am Karlsruher Institut für Technologie (KIT) in der jeweils geltenden Fassung, sofern ein Abbau des Überhangs durch andere oder zusätzli-

che Veranstaltungen nicht möglich ist. [3]Für den Fall gleichen Studienfortschritts sind durch die KIT-Fakultäten weitere Kriterien festzulegen. [4]Das Ergebnis wird den Studierenden rechtzeitig bekannt gegeben.

(5) [1]Die Zulassung ist abzulehnen, wenn die in Absatz 3 und 4 genannten Voraussetzungen nicht erfüllt sind.

§ 6 Durchführung von Erfolgskontrollen

(1) [1]Erfolgskontrollen werden studienbegleitend, in der Regel im Verlauf der Vermittlung der Lehrinhalte der einzelnen Module oder zeitnah danach, durchgeführt.

(2) [1]Die Art der Erfolgskontrolle (§ 4 Absatz 2 Nummer 1 bis 3, Absatz 3) wird von der/dem Prüfenden der betreffenden Lehrveranstaltung in Bezug auf die Lerninhalte der Lehrveranstaltung und die Qualifikationsziele des Moduls festgelegt. [2]Die Art der Erfolgskontrolle, ihre Häufigkeit, Reihenfolge und Gewichtung sowie gegebenenfalls die Bildung der Modulnote müssen mindestens sechs Wochen vor Vorlesungsbeginn im Modulhandbuch bekannt gemacht werden. [3]Im Einvernehmen von Prüfender bzw. Prüfendem und Studierender bzw. Studierendem können die Art der Prüfungsleistung sowie die Prüfungssprache auch nachträglich geändert werden; im ersten Fall ist jedoch § 4 Absatz 5 zu berücksichtigen. [4]Bei der Prüfungsorganisation sind die Belange Studierender mit in besonderen Lebenslagen gemäß § 4 Absatz 1 der Satzung über nachteilsausgleichende Regelungen in den Bachelor- und Masterstudiengängen am Karlsruher Institut für Technologie (KIT) in der jeweils geltenden Fassung zu berücksichtigen. [5]§ 2 und § 4 Absatz 1 Satz 3 der Satzung über nachteilsausgleichende Regelungen in den Bachelor- und Masterstudiengängen am Karlsruher Institut für Technologie (KIT) in der jeweils geltenden Fassung gelten entsprechend.

(3) [1]Bei unvertretbar hohem Prüfungsaufwand kann eine schriftlich durchzuführende Prüfungsleistung auch mündlich, oder eine mündlich durchzuführende Prüfungsleistung auch schriftlich abgenommen werden. [2]Diese Änderung muss mindestens sechs Wochen vor der Prüfungsleistung bekannt gegeben werden.

(4) [1]Bei Lehrveranstaltungen in englischer Sprache (§ 3 Absatz 5) können die entsprechenden Erfolgskontrollen in dieser Sprache abgenommen werden. [2]§ 6 Absatz 2 gilt entsprechend.

(5) [1]*Schriftliche Prüfungen* (§ 4 Absatz 2 Nummer 1) sind in der Regel von einer/einem Prüfenden nach § 18 Absatz 2 oder 3 zu bewerten. [2]Sofern eine Bewertung durch mehrere Prüfende erfolgt, ergibt sich die Note aus dem arithmetischen Mittel der Einzelbewertungen. [3]Entspricht das arithmetische Mittel keiner der in § 7 Absatz 2 Satz 2 definierten Notenstufen, so ist auf die nächstliegende Notenstufe auf- oder abzurunden. [4]Bei gleichem Abstand ist auf die nächstbessere Notenstufe zu runden. [5]Das Bewertungsverfahren soll sechs Wochen nicht überschreiten. [6]Schriftliche Prüfungen dauern mindestens 60 und höchstens 300 Minuten.

(6) [1]*Mündliche Prüfungen* (§ 4 Absatz 2 Nummer 2) sind von mehreren Prüfenden (Kollegialprüfung) oder von einer/m Prüfenden in Gegenwart einer oder eines Beisitzenden als Gruppen- oder Einzelprüfungen abzunehmen und zu bewerten. [2]Vor der Festsetzung der Note hört die/der Prüfende die anderen an der Kollegialprüfung mitwirkenden Prüfenden an. [3]Mündliche Prüfungen dauern in der Regel mindestens 15 Minuten und maximal 60 Minuten pro Studierenden.

[4]Die wesentlichen Gegenstände und Ergebnisse der *mündlichen Prüfung* sind in einem Protokoll festzuhalten. [5]Das Ergebnis der Prüfung ist den Studierenden im Anschluss an die mündliche Prüfung bekannt zu geben.

[6]Studierende, die sich in einem späteren Semester der gleichen Prüfung unterziehen wollen, werden entsprechend den räumlichen Verhältnissen und nach Zustimmung des Prüflings als Zuhörerinnen und Zuhörer bei mündlichen Prüfungen zugelassen. [7]Die Zulassung erstreckt sich nicht auf die Beratung und Bekanntgabe der Prüfungsergebnisse.

(7) [1]Für *Prüfungsleistungen anderer Art* (§ 4 Absatz 2 Nummer 3) sind angemessene Bearbeitungsfristen einzuräumen und Abgabetermine festzulegen. [2]Dabei ist durch die Art der Aufgabenstellung und durch entsprechende Dokumentation sicherzustellen, dass die erbrachte Prü-

fungsleistung dem/der Studierenden zurechenbar ist. [3]Die wesentlichen Gegenstände und Ergebnisse einer solchen Erfolgskontrolle sind in einem Protokoll festzuhalten.

[4]Bei *mündlich* durchgeführten *Prüfungsleistungen anderer Art* muss neben der/dem Prüfenden ein/e Beisitzende/r anwesend sein, die/der zusätzlich zum/r Prüfenden das Protokoll zeichnet.

[5]*Schriftliche Arbeiten* im Rahmen einer *Prüfungsleistung anderer Art* haben dabei die folgende Erklärung zu tragen: „Ich versichere wahrheitsgemäß, die Arbeit selbstständig angefertigt, alle benutzten Hilfsmittel vollständig und genau angegeben und alles kenntlich gemacht zu haben, was aus Arbeiten anderer unverändert oder mit Abänderungen entnommen wurde.“ [6]Trägt die Arbeit diese Erklärung nicht, wird sie nicht angenommen. [7]Die wesentlichen Gegenstände und Ergebnisse der Erfolgskontrolle sind in einem Protokoll festzuhalten.

§ 6 a Erfolgskontrollen im Antwort-Wahl-Verfahren

[1]Für die Durchführung von Erfolgskontrollen im Antwort-Wahl-Verfahren findet die Satzung des Karlsruher Instituts für Technologie (KIT) zur Durchführung von Erfolgskontrollen im Antwort-Wahl-Verfahren in der jeweils gültigen Fassung Anwendung.

§ 6 b Online-Prüfungen

[1]Für die Durchführung von Online-Prüfungen findet die Satzung zur Durchführung von Online-Prüfungen am Karlsruher Institut für Technologie (KIT) in der jeweils gültigen Fassung Anwendung.

§ 7 Bewertung von Studien- und Prüfungsleistungen

(1) [1]Das Ergebnis einer Prüfungsleistung wird von den jeweiligen Prüfenden in Form einer Note festgesetzt.

(2) [1]Folgende Noten sollen verwendet werden:

sehr gut (very good)	:	hervorragende Leistung,
gut (good)	:	eine Leistung, die erheblich über den durchschnittlichen Anforderungen liegt,
befriedigend (satisfactory)	:	eine Leistung, die durchschnittlichen Anforderungen entspricht,
ausreichend (sufficient)	:	eine Leistung, die trotz ihrer Mängel noch den Anforderungen genügt,
nicht ausreichend (failed)	:	eine Leistung, die wegen erheblicher Mängel nicht den Anforderungen genügt.

[2]Zur differenzierten Bewertung einzelner Prüfungsleistungen sind nur folgende Noten zugelassen:

1,0; 1,3	:	sehr gut
1,7; 2,0; 2,3	:	gut
2,7; 3,0; 3,3	:	befriedigend
3,7; 4,0	:	ausreichend
5,0	:	nicht ausreichend.

(3) [1]Studienleistungen werden mit „bestanden“ oder mit „nicht bestanden“ gewertet.

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(4) [1]Bei der Bildung der gewichteten Durchschnitte der Modulnoten, der Fachnoten und der Gesamtnote wird nur die erste Dezimalstelle hinter dem Komma berücksichtigt; alle weiteren Stellen werden ohne Rundung gestrichen.

(5) [1]Jedes Modul und jede Erfolgskontrolle darf in demselben Studiengang nur einmal gewertet werden.

(6) [1]Eine Prüfungsleistung ist bestanden, wenn die Note mindestens „ausreichend“ (4,0) ist.

(7) [1]Die Modulprüfung ist bestanden, wenn alle erforderlichen Erfolgskontrollen bestanden sind. [2]Die Modulprüfung und die Bildung der Modulnote sollen im Modulhandbuch geregelt werden. [3]Sofern das Modulhandbuch keine Regelung über die Bildung der Modulnote enthält, errechnet sich die Modulnote aus einem nach den Leistungspunkten der einzelnen Teilmodule gewichteten Notendurchschnitt. [4]Die differenzierten Noten (Absatz 2) sind bei der Berechnung der Modulnoten als Ausgangsdaten zu verwenden.

(8) [1]Die Ergebnisse der Erfolgskontrollen sowie die erworbenen Leistungspunkte werden durch den zuständigen Prüfer bzw. die zuständige Prüferin, unterstützt durch deren Institutsverwaltung, und, sofern erforderlich, durch den Studiengangservice der KIT-Fakultät für Elektrotechnik und Informationstechnik verwaltet.

(9) [1]Die Noten der Module eines Faches gehen in die Fachnote mit einem Gewicht proportional zu den ausgewiesenen Leistungspunkten der Module ein.

(10) [1]Die Gesamtnote der Bachelorprüfung, die Fachnoten und die Modulnoten lauten:

		bis	1,5	=	sehr gut
von	1,6	bis	2,5	=	gut
von	2,6	bis	3,5	=	befriedigend
von	3,6	bis	4,0	=	ausreichend.

§ 8 Orientierungsprüfungen, Verlust des Prüfungsanspruchs

(1) [1]Die Teilmodulprüfung „Technische Mechanik I“ im Modul „Technische Mechanik“ und die Modulprüfung im Modul „Lineare Elektrische Netze“ sind bis zum Ende des zweiten Fachsemesters abzulegen (Orientierungsprüfungen).

(2) [1]Wer die Orientierungsprüfungen einschließlich etwaiger Wiederholungen bis zum Ende des dritten Fachsemesters nicht erfolgreich abgelegt hat, verliert den Prüfungsanspruch im Studiengang, es sei denn, dass die Fristüberschreitung nicht selbst zu vertreten ist; hierüber entscheidet der Prüfungsausschuss auf Antrag der oder des Studierenden. [2]Eine zweite Wiederholung der Orientierungsprüfungen ist ausgeschlossen.

[3]Die Fristüberschreitung hat die/der Studierende insbesondere dann nicht zu vertreten, wenn eine qualifizierte Teilnahme am MINT-Kolleg im Sinne von § 3 Absatz 2 vorliegt. [4]Ohne ausdrückliche Genehmigung des Vorsitzenden des Prüfungsausschusses gilt eine Fristüberschreitung von

1. einem Semester als genehmigt, wenn die/der Studierende eine qualifizierte Teilnahme am MINT-Kolleg gemäß § 3 Absatz 2 im Umfang von einem Semester nachweist oder

2. zwei Semestern als genehmigt, wenn die/der Studierende eine qualifizierte Teilnahme am MINT-Kolleg gemäß § 3 Absatz 2 im Umfang von zwei Semestern nachweist.

[5]Als Nachweis gilt die vom MINT-Kolleg gemäß § 3 Absatz 2 auszustellende Bescheinigung, die beim Studierendenservice des KIT einzureichen ist. [6]Im Falle von Nummer 1 kann der Vorsitzende des Prüfungsausschusses auf Antrag der Studierenden die Frist um ein weiteres Semester verlängern, wenn dies aus studienorganisatorischen Gründen für das fristgerechte Ablegen der Orientierungsprüfung erforderlich ist, insbesondere weil die Module, die Bestandteil der Orientierungsprüfung sind, nur einmal jährlich angeboten werden.

(3) [1]Ist die Bachelorprüfung bis zum Ende des zehnten Fachsemesters einschließlich etwaiger Wiederholungen nicht vollständig abgelegt, so erlischt der Prüfungsanspruch im Bachelorstudiengang Mechatronik und Informationstechnik, es sei denn, dass die Fristüberschreitung nicht selbst zu vertreten ist. [2]Die Entscheidung über eine Fristverlängerung und über Ausnahmen von der Fristregelung trifft der Prüfungsausschuss unter Beachtung der in § 32 Absatz 6 Landeshochschulgesetz genannten Tätigkeiten auf Antrag des/der Studierenden. [3]Der Antrag ist schriftlich in der Regel bis sechs Wochen vor Ablauf der in Satz 1 genannten Studienhöchstdauer zu stellen. [4]Absatz 2 Sätze 3 bis 5 gelten entsprechend.

(4) [1]Der Prüfungsanspruch geht auch verloren, wenn eine nach dieser Studien- und Prüfungsordnung erforderliche Studien- oder Prüfungsleistung endgültig nicht bestanden ist.

§ 9 Wiederholung von Erfolgskontrollen, endgültiges Nichtbestehen

(1) [1]Studierende können eine nicht bestandene schriftliche Prüfung (§ 4 Absatz 2 Nummer 1) einmal wiederholen. [2]Wird eine schriftliche Wiederholungsprüfung mit „nicht ausreichend“ (5,0) bewertet, so erfolgt in zeitlichem Zusammenhang eine mündliche Fortsetzung der Wiederholungsprüfung (mündliche Nachprüfung). [3]Die Note der Wiederholungsprüfung, die in diesem Fall nur „ausreichend“ (4,0) oder „nicht ausreichend“ (5,0) lauten kann, wird von den Prüfenden bzw. der/dem Prüfenden unter angemessener Berücksichtigung der schriftlichen Leistung und des Ergebnisses der mündlichen Nachprüfung festgesetzt. [4]Mündliche Nachprüfungen dauern in der Regel mindestens 15 Minuten und maximal 30 Minuten. [5]§ 6 Absatz 6 Satz 1 und 2 sowie Satz 4 und 5 gelten entsprechend. [6]Sofern gemäß § 11 eine schriftliche Wiederholungsprüfung als mit „nicht ausreichend“ (5,0) bewertet gilt, ist eine mündliche Nachprüfung ausgeschlossen.

(2) [1]Studierende können eine nicht bestandene mündliche Prüfung (§ 4 Absatz 2 Nummer 2) einmal wiederholen.

(3) [1]Wiederholungsprüfungen nach Absatz 1 und 2 müssen in Inhalt, Umfang und Form (mündlich oder schriftlich) der ersten entsprechen. [2]Ausnahmen kann der zuständige Prüfungsausschuss auf Antrag zulassen.

(4) [1]Prüfungsleistungen anderer Art (§ 4 Absatz 2 Nummer 3) können einmal wiederholt werden.

(5) [1]Studienleistungen können mehrfach wiederholt werden.

(6) [1]Die Prüfungsleistung ist endgültig nicht bestanden, wenn die mündliche Nachprüfung im Sinne des Absatzes 1 mit „nicht ausreichend“ (5,0) bewertet wurde. [2]Die Prüfungsleistung ist ferner endgültig nicht bestanden, wenn die mündliche Prüfung im Sinne des Absatzes 2 oder die Prüfungsleistung anderer Art gemäß Absatz 4 zweimal mit „nicht bestanden“ bewertet wurde.

(7) [1]Das Modul ist endgültig nicht bestanden, wenn eine für sein Bestehen erforderliche Prüfungsleistung endgültig nicht bestanden ist.

(8) [1]Eine zweite Wiederholung derselben Prüfungsleistung gemäß § 4 Absatz 2 ist nur in Ausnahmefällen auf Antrag des/der Studierenden zulässig („Antrag auf Zweitwiederholung“). [2]Der Antrag ist schriftlich beim Prüfungsausschuss in der Regel bis zwei Monate nach Bekanntgabe der Note zu stellen.

[3]Über den ersten Antrag eines/r Studierenden auf Zweitwiederholung entscheidet der Prüfungsausschuss, wenn er den Antrag genehmigt. [4]Wenn der Prüfungsausschuss diesen Antrag ablehnt, entscheidet ein Mitglied des Präsidiums. [5]Über weitere Anträge auf Zweitwiederholung entscheidet nach Stellungnahme des Prüfungsausschusses ein Mitglied des Präsidiums. [6]Wird der Antrag genehmigt, hat die Zweitwiederholung spätestens zum übernächsten Prüfungstermin zu erfolgen. [7]Absatz 1 Satz 2 bis 6 gelten entsprechend.

(9) [1]Die Wiederholung einer bestandenen Prüfungsleistung ist nicht zulässig.

(10) [1]Die Bachelorarbeit kann bei einer Bewertung mit „nicht ausreichend“ (5,0) einmal wiederholt werden. [2]Eine zweite Wiederholung der Bachelorarbeit ist ausgeschlossen.

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§ 10 Abmeldung; Versäumnis, Rücktritt

(1) [1]Studierende können ihre Anmeldung zu *schriftlichen Prüfungen* ohne Angabe von Gründen bis zur Ausgabe der Prüfungsaufgaben widerrufen (Abmeldung). [2]Eine Abmeldung kann online im Studierendenportal bis 24:00 Uhr des Vortages der Prüfung oder in begründeten Ausnahmefällen beim jeweils zuständigen Prüfungssekretariat nach § 17 Absatz 2 Satz 3 erfolgen. [3]Erfolgt die Abmeldung gegenüber dem/der Prüfenden, hat diese/r Sorge zu tragen, dass die Abmeldung im Campus Management System verbucht wird.

(2) [1]Bei *mündlichen Prüfungen* muss die Abmeldung spätestens drei Werktage vor dem betreffenden Prüfungstermin gegenüber dem/der Prüfenden erklärt werden. [2]Der Rücktritt von einer mündlichen Prüfung weniger als drei Werktage vor dem betreffenden Prüfungstermin ist nur unter den Voraussetzungen des Absatzes 5 möglich. [3]Der Rücktritt von mündlichen Nachprüfungen im Sinne von § 9 Absatz 1 ist grundsätzlich nur unter den Voraussetzungen von Absatz 5 möglich.

(3) [1]Die Abmeldung von *Prüfungsleistungen anderer Art* sowie von *Studienleistungen* ist im Modulhandbuch geregelt.

(4) [1]Eine Erfolgskontrolle gilt als mit „nicht ausreichend“ (5,0) bewertet, wenn die Studierenden einen Prüfungstermin ohne triftigen Grund versäumen oder wenn sie nach Beginn der Erfolgskontrolle ohne triftigen Grund von dieser zurücktreten. [2]Dasselbe gilt, wenn die Bachelorarbeit nicht innerhalb der vorgesehenen Bearbeitungszeit erbracht wird, es sei denn, der/die Studierende hat die Fristüberschreitung nicht zu vertreten.

(5) [1]Der für den Rücktritt nach Beginn der Erfolgskontrolle oder das Versäumnis geltend gemachte Grund muss dem Prüfungsausschuss unverzüglich schriftlich angezeigt und glaubhaft gemacht werden. [2]Bei Krankheit des/der Studierenden oder eines allein zu versorgenden Kindes oder pflegebedürftigen Angehörigen kann die Vorlage eines ärztlichen Attestes verlangt werden.

§ 11 Täuschung, Ordnungsverstoß

(1) [1]Versuchen Studierende das Ergebnis ihrer Erfolgskontrolle durch Täuschung oder Benutzung nicht zugelassener Hilfsmittel zu beeinflussen, gilt die betreffende Erfolgskontrolle als mit „nicht ausreichend“ (5,0) bewertet.

(2) [1]Studierende, die den ordnungsgemäßen Ablauf einer Erfolgskontrolle stören, können von der/dem Prüfenden oder der Aufsicht führenden Person von der Fortsetzung der Erfolgskontrolle ausgeschlossen werden. [2]In diesem Fall gilt die betreffende Erfolgskontrolle als mit „nicht ausreichend“ (5,0) bewertet. [3]In schwerwiegenden Fällen kann der Prüfungsausschuss diese Studierenden von der Erbringung weiterer Erfolgskontrollen ausschließen.

(3) [1]Näheres regelt die Allgemeine Satzung des KIT zur Redlichkeit bei Prüfungen und Praktika in der jeweils gültigen Fassung.

§ 12 Mutterschutz, Elternzeit, Wahrnehmung von Familienpflichten

[1]Für den Ausgleich von Nachteilen bei Studierenden in besonderen Lebenslagen findet die Satzung über nachteilsausgleichende Regelungen in den Bachelor- und Masterstudiengängen am Karlsruher Institut für Technologie (KIT) in der jeweils geltenden Fassung Anwendung.

§ 13 Studierende mit Behinderung oder chronischer Erkrankung

[1]Für den Ausgleich von Nachteilen bei Studierenden in besonderen Lebenslagen findet die Satzung über nachteilsausgleichende Regelungen in den Bachelor- und Masterstudiengängen am Karlsruher Institut für Technologie (KIT) in der jeweils geltenden Fassung Anwendung.

§ 14 Modul Bachelorarbeit

(1) [1]Voraussetzung für die Zulassung zum Modul Bachelorarbeit ist, dass die/der Studierende Modulprüfungen im Umfang von 120 LP erfolgreich abgelegt hat. [2]Über Ausnahmen entscheidet der Prüfungsausschuss auf Antrag der/des Studierenden.

(1 a) [1]Dem Modul Bachelorarbeit sind 15 LP zugeordnet. [2]Es besteht aus der Bachelorarbeit mit 12 LP und einer Präsentation mit 3 LP. [3]Die Präsentation hat innerhalb der maximalen Bearbeitungsdauer gemäß Absatz 4 Satz 2, jedoch spätestens sechs Wochen nach Abgabe der Bachelorarbeit zu erfolgen.

(2) [1]Die Bachelorarbeit kann von Hochschullehrerinnen und Hochschullehrern am KIT vergeben werden. [2]Darüber hinaus kann der Prüfungsausschuss weitere Prüfende gemäß § 18 Absatz 2 und 3 zur Vergabe des Themas berechtigen. [3]Den Studierenden ist Gelegenheit zu geben, für das Thema Vorschläge zu machen. [4]Soll die Bachelorarbeit außerhalb der nach § 1 Satz 2 beteiligten KIT-Fakultäten angefertigt werden, so bedarf dies der Genehmigung durch den Prüfungsausschuss. [5]Die Bachelorarbeit kann auch in Form einer Gruppenarbeit zugelassen werden, wenn der als Prüfungsleistung zu bewertende Beitrag der/des einzelnen Studierenden aufgrund objektiver Kriterien, die eine eindeutige Abgrenzung ermöglichen, deutlich unterscheidbar ist und die Anforderung nach Absatz 4 erfüllt. [6]In Ausnahmefällen sorgt die/der Vorsitzende des Prüfungsausschusses auf Antrag der oder des Studierenden dafür, dass die/der Studierende innerhalb von vier Wochen ein Thema für die Bachelorarbeit erhält. [7]Die Ausgabe des Themas erfolgt in diesem Fall über die/den Vorsitzende/n des Prüfungsausschusses.

(3) [1]Thema, Aufgabenstellung und Umfang der Bachelorarbeit sind von dem Betreuer bzw. der Betreuerin so zu begrenzen, dass sie mit dem in Absatz 4 festgelegten Arbeitsaufwand bearbeitet werden kann.

(4) [1]Die Bachelorarbeit soll zeigen, dass die Studierenden in der Lage sind, ein Problem aus ihrem Studienfach selbstständig und in begrenzter Zeit nach wissenschaftlichen Methoden zu bearbeiten. [2]Der Umfang der Bachelorarbeit entspricht 12 Leistungspunkten. [3]Die maximale Bearbeitungsdauer beträgt sechs Monate. [4]Thema und Aufgabenstellung sind an den vorgesehenen Umfang anzupassen. [5]Der Prüfungsausschuss legt fest, in welchen Sprachen die Bachelorarbeit geschrieben werden kann. [6]Auf Antrag des Studierenden kann der/die Prüfende genehmigen, dass die Bachelorarbeit in einer anderen Sprache als Deutsch geschrieben wird.

(5) [1]Bei der Abgabe der Bachelorarbeit haben die Studierenden schriftlich zu versichern, dass sie die Arbeit selbstständig verfasst und keine anderen als die angegebenen Quellen und Hilfsmittel benutzt haben, die wörtlich oder inhaltlich übernommenen Stellen als solche kenntlich gemacht und die Satzung des KIT zur Sicherung guter wissenschaftlicher Praxis in der jeweils gültigen Fassung beachtet haben. [2]Wenn diese Erklärung nicht enthalten ist, wird die Arbeit nicht angenommen. [3]Die Erklärung kann wie folgt lauten: „Ich versichere wahrheitsgemäß, die Arbeit selbstständig verfasst, alle benutzten Quellen und Hilfsmittel vollständig und genau angegeben und alles kenntlich gemacht zu haben, was aus Arbeiten anderer unverändert oder mit Abänderungen entnommen wurde sowie die Satzung des KIT zur Sicherung guter wissenschaftlicher Praxis in der jeweils gültigen Fassung beachtet zu haben.“ [4]Bei Abgabe einer unwahren Versicherung wird die Bachelorarbeit mit „nicht ausreichend“ (5,0) bewertet.

(6) [1]Der Zeitpunkt der Ausgabe des Themas der Bachelorarbeit ist durch die Betreuerin/den Betreuer und die/den Studierenden festzuhalten und dies beim Prüfungsausschuss aktenkundig zu machen. [2]Der Zeitpunkt der Abgabe der Bachelorarbeit ist durch den/die Prüfende/n beim Prüfungsausschuss aktenkundig zu machen. [3]Das Thema kann nur einmal und nur innerhalb des ersten Monats der Bearbeitungszeit zurückgegeben werden. [4]Macht der oder die Studierende einen triftigen Grund geltend, kann der Prüfungsausschuss die in Absatz 4 festgelegte Bearbeitungszeit auf Antrag der oder des Studierenden um höchstens einen Monat verlängern. [5]Wird die Bachelorarbeit nicht fristgerecht abgeliefert, gilt sie als mit „nicht ausreichend“ (5,0) bewertet, es sei denn, dass die Studierenden dieses Versäumnis nicht zu vertreten haben.

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(7) [1]Die Bachelorarbeit wird von mindestens einer Hochschullehrerin oder einem Hochschullehrer am KIT bzw. einem habilitierten Mitglied der gemäß § 1 Satz 2 beteiligten KIT-Fakultäten und einem/einer weiteren Prüfenden bewertet. [2]In der Regel ist eine/r der Prüfenden die Person, die die Arbeit gemäß Absatz 2 vergeben hat. [3]Bei nicht übereinstimmender Beurteilung dieser beiden Personen setzt der Prüfungsausschuss im Rahmen der Bewertung dieser beiden Personen die Note der Bachelorarbeit fest; er kann auch eine/n weitere/n Gutachter/in bestellen. [4]Die Bewertung hat innerhalb von sechs Wochen nach Abgabe der Bachelorarbeit zu erfolgen.

§ 14 a Berufspraktikum

(1) [1]Während des Bachelorstudiums ist ein mindestens 13-wöchiges Berufspraktikum abzuleisten, welches geeignet ist, den Studierenden eine Anschauung von berufspraktischer Tätigkeit auf dem Gebiet der Mechatronik und Informationstechnik zu vermitteln. [2]Dem Berufspraktikum sind 15 Leistungspunkte zugeordnet.

(2) [1]Die Studierenden setzen sich in eigener Verantwortung mit geeigneten privaten oder öffentlichen Einrichtungen in Verbindung, an denen das Praktikum abgeleistet werden kann. [2]Das Nähere regelt das Modulhandbuch.

§ 15 Zusatzleistungen

(1) [1]Es können auch weitere Leistungspunkte (Zusatzleistungen) im Umfang von höchstens 30 LP aus dem Gesamtangebot des KIT erworben werden. [2]§ 3 und § 4 der Prüfungsordnung bleiben davon unberührt. [3]Diese Zusatzleistungen gehen nicht in die Festsetzung der Gesamt- und Modulnoten ein. [4]Die bei der Festlegung der Modulnote nicht berücksichtigten LP werden als Zusatzleistungen im Transcript of Records aufgeführt und als Zusatzleistungen gekennzeichnet. [5]Auf Antrag der/des Studierenden werden die Zusatzleistungen in das Bachelorzeugnis aufgenommen und als Zusatzleistungen gekennzeichnet. [6]Zusatzleistungen werden mit den nach § 7 vorgesehenen Noten gelistet.

(2) [1]Die Studierenden haben bereits bei der Anmeldung zu einer Prüfung in einem Modul diese als Zusatzleistung zu deklarieren.

§ 15 a Mastervorzug

[1]Studierende, die im Bachelorstudium bereits mindestens 120 LP erworben haben, können zusätzlich zu den in § 15 Absatz 1 genannten Zusatzleistungen Leistungspunkte aus einem konsekutiven Masterstudiengang am KIT im Umfang von höchstens 30 LP erwerben (Mastervorzugsleistungen). [2]§ 3 und § 4 der Prüfungsordnung bleiben davon unberührt. [3]Die Mastervorzugsleistungen gehen nicht in die Festsetzung der Gesamt-, Fach- und Modulnoten ein. [4]Sie werden im Transcript of Records aufgeführt und als solche gekennzeichnet sowie mit den nach § 7 vorgesehenen Noten gelistet. [5]§ 15 Absatz 2 gilt entsprechend.

§ 16 Überfachliche Qualifikationen

[1]Neben der Vermittlung von fachlichen Qualifikationen ist der Auf- und Ausbau überfachlicher Qualifikationen im Umfang von mindestens 6 LP Bestandteil eines Bachelorstudiums. [2]Überfachliche Qualifikationen können additiv oder integrativ vermittelt werden.

§ 17 Prüfungsausschuss

(1) [1]Für den Bachelorstudiengang Mechatronik und Informationstechnik wird ein Prüfungsausschuss gebildet. [2]Er besteht aus vier stimmberechtigten Mitgliedern: zwei Hochschullehrerinnen bzw. Hochschullehrer am KIT / Privatdozentinnen bzw. -dozenten, zwei akademischen Mitarbeiterinnen und akademischen Mitarbeitern am KIT aus den nach § 1 Satz 2 beteiligten KIT-Fakultäten und zwei Studierenden mit beratender Stimme. [3]Im Falle der Einrichtung eines ge-

meinsamen Prüfungsausschusses für den Bachelor- und den Masterstudiengang Mechatronik und Informationstechnik erhöht sich die Anzahl der Studierenden auf vier Mitglieder mit beratender Stimme, wobei jeweils zwei aus dem Bachelor- und aus dem Masterstudiengang stammen. [4]Die Amtszeit der nichtstudentischen Mitglieder beträgt zwei Jahre, die der studentischen Mitglieder ein Jahr.

(2) [1]Die/der Vorsitzende, ihre/sein Stellvertreter/in, die weiteren Mitglieder des Prüfungsausschusses sowie deren Stellvertreter/innen werden von den KIT-Fakultätsräten der gemäß § 1 Satz 2 beteiligten KIT-Fakultäten bestellt, die akademischen Mitarbeiterinnen bzw. akademischen Mitarbeiter am KIT und die Studierenden auf Vorschlag der Mitglieder der jeweiligen Gruppe; Wiederbestellung ist möglich. [2]Die/der Vorsitzende und deren/dessen Stellvertreter/in müssen Hochschullehrerinnen oder Hochschullehrer am KIT sein. [3]Die/der Vorsitzende des Prüfungsausschusses nimmt die laufenden Geschäfte wahr und wird durch das jeweilige Prüfungssekretariat unterstützt.

(3) [1]Der Prüfungsausschuss achtet auf die Einhaltung der Bestimmungen dieser Studien- und Prüfungsordnung und fällt die Entscheidungen in Prüfungsangelegenheiten. [2]Er entscheidet über die Anerkennung von Studienzeiten sowie Studien- und Prüfungsleistungen und trifft die Feststellung gemäß § 19 Absatz 1 Satz 1. [3]Er berichtet den gemäß § 1 Satz 2 beteiligten KIT-Fakultäten regelmäßig über die Entwicklung der Prüfungs- und Studienzeiten, einschließlich der Bearbeitungszeiten für die Bachelorarbeiten und die Verteilung der Modul- und Gesamtnoten. [4]Er ist zuständig für Anregungen zur Reform der Studien- und Prüfungsordnung und zu Modulbeschreibungen. [5]Der Prüfungsausschuss entscheidet mit der Mehrheit seiner Stimmen. [6]Bei Stimmengleichheit entscheidet die/der Vorsitzende des Prüfungsausschusses.

(4) [1]Der Prüfungsausschuss kann die Erledigung seiner Aufgaben für alle Regelfälle auf die/den Vorsitzende/n des Prüfungsausschusses übertragen. [2]In dringenden Angelegenheiten, deren Erledigung nicht bis zu der nächsten Sitzung des Prüfungsausschusses warten kann, entscheidet die/der Vorsitzende des Prüfungsausschusses.

(5) [1]Die Mitglieder des Prüfungsausschusses haben das Recht, der Abnahme von Prüfungen beizuwohnen. [2]Die Mitglieder des Prüfungsausschusses, die Prüfenden und die Beisitzenden unterliegen der Verschwiegenheit. [3]Sofern sie nicht im öffentlichen Dienst stehen, sind sie durch die/den Vorsitzende/n zur Verschwiegenheit zu verpflichten.

(6) [1]In Angelegenheiten des Prüfungsausschusses, die eine an einer anderen KIT-Fakultät zu absolvierende Prüfungsleistung betreffen, ist auf Antrag eines Mitgliedes des Prüfungsausschusses eine fachlich zuständige und von der betroffenen KIT-Fakultät zu nennende prüfungsberechtigte Person hinzuzuziehen.

(7) [1]Belastende Entscheidungen des Prüfungsausschusses sind schriftlich mitzuteilen. [2]Sie sind zu begründen und mit einer Rechtsbehelfsbelehrung zu versehen. [3]Vor einer Entscheidung ist Gelegenheit zur Äußerung zu geben. [4]Widersprüche gegen Entscheidungen des Prüfungsausschusses sind innerhalb eines Monats nach Zugang der Entscheidung bei diesem einzulegen. [5]Über Widersprüche entscheidet das für Lehre zuständige Mitglied des Präsidiums.

§ 18 Prüfende und Beisitzende

(1) [1]Der Prüfungsausschuss bestellt die Prüfenden. [2]Er kann die Bestellung der/dem Vorsitzenden übertragen.

(2) [1]Prüfende sind Hochschullehrinnen bzw. Hochschullehrer am KIT, habilitierte Mitglieder und akademische Mitarbeiterinnen und Mitarbeiter am KIT, welche einer der gemäß § 1 Satz 2 beteiligten KIT-Fakultäten und denen die Prüfungsbefugnis gemäß § 14 Absatz 2, § 14 b Absatz 1 Nummer 1 KIT-Gesetz i.V.m. § 52 Absatz Satz 6 Halbsatz 2 Landeshochschulgesetz übertragen wurde. [2]Bestellt werden darf nur, wer mindestens die dem jeweiligen Prüfungsgegenstand entsprechende fachwissenschaftliche Qualifikation erworben hat.

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(3) [1]Soweit Lehrveranstaltungen von anderen als den unter Absatz 2 genannten Personen durchgeführt werden, sollen diese zu Prüfenden bestellt werden, sofern sie die gemäß Absatz 2 Satz 2 vorausgesetzte Qualifikation nachweisen können.

(4) [1]Die Beisitzenden werden durch die Prüfenden benannt. [2]Zu Beisitzenden darf nur benannt werden, wer eine dem jeweiligen Prüfungsgegenstand entsprechende fachwissenschaftliche Qualifikation erworben hat.

§ 19 Anerkennung von Studien- und Prüfungsleistungen, Studienzeiten

(1) [1]Studien- und Prüfungsleistungen sowie Studienzeiten, die in Studiengängen an staatlichen oder staatlich anerkannten Hochschulen und Berufsakademien der Bundesrepublik Deutschland oder an ausländischen staatlichen oder staatlich anerkannten Hochschulen erbracht wurden, werden auf Antrag der Studierenden anerkannt, sofern hinsichtlich der erworbenen Kompetenzen kein wesentlicher Unterschied zu den Leistungen oder Abschlüssen besteht, die ersetzt werden sollen. [2]Dabei ist kein schematischer Vergleich, sondern eine Gesamtbetrachtung vorzunehmen. [3]Bezüglich des Umfangs einer zur Anerkennung vorgelegten Studien- und Prüfungsleistung (Anrechnung) werden die Grundsätze des ECTS herangezogen.

(2) [1]Die Studierenden haben die für die Anerkennung erforderlichen Unterlagen vorzulegen. [2]Studierende, die neu in den Studiengang Mechatronik und Informationstechnik immatrikuliert wurden, haben den Antrag mit den für die Anerkennung erforderlichen Unterlagen innerhalb eines Semesters nach Immatrikulation zu stellen. [3]Bei Unterlagen, die nicht in deutscher oder englischer Sprache vorliegen, kann eine amtlich beglaubigte Übersetzung verlangt werden. [4]Die Beweislast dafür, dass der Antrag die Voraussetzungen für die Anerkennung nicht erfüllt, liegt beim Prüfungsausschuss.

(3) [1]Werden Leistungen angerechnet, die nicht am KIT erbracht wurden, werden sie im Zeugnis als „anerkannt“ ausgewiesen. [2]Liegen Noten vor, werden die Noten, soweit die Notensysteme vergleichbar sind, übernommen und in die Berechnung der Modulnoten und der Gesamtnote einbezogen. [3]Sind die Notensysteme nicht vergleichbar, können die Noten umgerechnet werden. [4]Liegen keine Noten vor, wird der Vermerk „bestanden“ aufgenommen.

(4) [1]Bei der Anerkennung von Studien- und Prüfungsleistungen, die außerhalb der Bundesrepublik Deutschland erbracht wurden, sind die von der Kultusministerkonferenz und der Hochschulrektorenkonferenz gebilligten Äquivalenzvereinbarungen sowie Absprachen im Rahmen der Hochschulpartnerschaften zu beachten.

(5) [1]Außerhalb des Hochschulsystems erworbene Kenntnisse und Fähigkeiten werden angerechnet, wenn sie nach Inhalt und Niveau den Studien- und Prüfungsleistungen gleichwertig sind, die ersetzt werden sollen und die Institution, in der die Kenntnisse und Fähigkeiten erworben wurden, ein genormtes Qualitätssicherungssystem hat. [2]Die Anrechnung kann in Teilen versagt werden, wenn mehr als 50 Prozent des Hochschulstudiums ersetzt werden soll.

(6) [1]Zuständig für Anerkennung und Anrechnung ist der Prüfungsausschuss. [2]Im Rahmen der Feststellung, ob ein wesentlicher Unterschied im Sinne des Absatz 1 vorliegt, sind die zuständigen Fachvertreter/innen zu hören.

II. Bachelorprüfung

§ 20 Umfang und Art der Bachelorprüfung

(1) [1]Die Bachelorprüfung besteht aus den Modulprüfungen nach Absatz 2 sowie dem Modul Bachelorarbeit (§ 14) und dem Berufspraktikum (§ 14 a).

(2) [1]Es sind Modulprüfungen in folgenden Pflichtfächern abzulegen:

1. Ingenieurwissenschaftliche Grundlagen: Modul(e) im Umfang von 111 LP,
2. Vertiefung in der Mechatronik: Modul(e) im Umfang von 35 LP,
3. Überfachliche Qualifikationen im Umfang von 4 LP gemäß § 16.

[2]Die Vermittlung weiterer überfachlicher Qualifikationen im Umfang von 2 LP gemäß § 16 findet im Rahmen der fachwissenschaftlichen Module Lineare Elektrische Netze, Elektronische Schaltungen sowie Signale und Systeme im Pflichtfach Ingenieurwissenschaftliche Grundlagen statt.

[3]Die Festlegung der zur Auswahl stehenden Module und deren Fachzuordnung werden im Modulhandbuch getroffen.

§ 21 Bestehen der Bachelorprüfung, Bildung der Gesamtnote

(1) [1]Die Bachelorprüfung ist bestanden, wenn alle in § 20 genannten Modulprüfungen bestanden sind.

(2) [1]Die Gesamtnote der Bachelorprüfung errechnet sich als ein mit Leistungspunkten gewichteter Notendurchschnitt der Fachnoten in § 20 Absatz 2 Nummer 1 und 2 sowie des Moduls Bachelorarbeit.

[2]Dabei wird die Note des Moduls Bachelorarbeit mit dem doppelten Gewicht der Noten der übrigen Fächer berücksichtigt.

(3) [1]Haben Studierende die Bachelorarbeit mit der Note 1,0 und die Bachelorprüfung mit einem Durchschnitt von 1,2 oder besser abgeschlossen, so wird das Prädikat „mit Auszeichnung“ (with distinction) verliehen.

§ 22 Bachelorzeugnis, Bachelorurkunde, Diploma Supplement und Transcript of Records

(1) [1]Über die Bachelorprüfung werden nach Bewertung der letzten Prüfungsleistung eine Bachelorurkunde und ein Zeugnis erstellt. [2]Die Ausfertigung von Bachelorurkunde und Zeugnis soll nicht später als drei Monate nach Ablegen der letzten Prüfungsleistung erfolgen. [3]Bachelorurkunde und Bachelorzeugnis werden in deutscher und englischer Sprache ausgestellt. [4]Bachelorurkunde und Zeugnis tragen das Datum der erfolgreichen Erbringung der letzten Prüfungsleistung. [5]Diese Dokumente werden den Studierenden zusammen ausgehändigt. [6]In der Bachelorurkunde wird die Verleihung des akademischen Bachelorgrades beurkundet. [7]Die Bachelorurkunde wird von dem Präsidenten und den KIT-Dekaninnen/den KIT-Dekanen der gemäß § 1 Satz 2 beteiligten KIT-Fakultäten unterzeichnet und mit dem Siegel des KIT versehen.

(2) [1]Das Zeugnis enthält die Fach- und Modulnoten sowie die den Modulen und Fächern zugeordneten Leistungspunkte und die Gesamtnote. [2]Sofern gemäß § 7 Absatz 2 Satz 2 eine differenzierte Bewertung einzelner Prüfungsleistungen vorgenommen wurde, wird auf dem Zeugnis auch die entsprechende Dezimalnote ausgewiesen; § 7 Absatz 4 bleibt unberührt. [3]Das Zeugnis ist von den KIT-Dekaninnen/den KIT-Dekanen der gemäß § 1 Satz 2 beteiligten KIT-Fakultäten und von der/dem Vorsitzenden des Prüfungsausschusses zu unterzeichnen.

(3) [1]Mit dem Zeugnis erhalten die Studierenden ein Diploma Supplement in deutscher und englischer Sprache, das den Vorgaben des jeweils gültigen ECTS Users‘ Guide entspricht, sowie ein Transcript of Records in deutscher und englischer Sprache.

(4) [1]Das Transcript of Records enthält in strukturierter Form alle erbrachten Studien- und Prüfungsleistungen. [2]Dies beinhaltet alle Fächer und Fachnoten samt den zugeordneten Leistungspunkten, die dem jeweiligen Fach zugeordneten Module mit den Modulnoten und zugeordneten Leistungspunkten sowie die den Modulen zugeordneten Erfolgskontrollen samt Noten und zugeordneten Leistungspunkten. [3]Absatz 2 Satz 2 gilt entsprechend. [4]Aus dem Transcript of Records soll die Zugehörigkeit von Erfolgskontrollen zu den einzelnen Modulen deutlich erkennbar sein. [5]Angerechnete Studien- und Prüfungsleistungen sind im Transcript of Records aufzunehmen. [6]Alle Zusatzleistungen werden im Transcript of Records aufgeführt.

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(5) [1]Die Bachelorurkunde, das Bachelorzeugnis und das Diploma Supplement einschließlich des Transcript of Records werden vom Studierendenservice des KIT ausgestellt.

III. Schlussbestimmungen

§ 23 Bescheinigung von Prüfungsleistungen

[1]Haben Studierende die Bachelorprüfung endgültig nicht bestanden, wird ihnen auf Antrag und gegen Vorlage der Exmatrikulationsbescheinigung eine schriftliche Bescheinigung ausgestellt, die die erbrachten Studien- und Prüfungsleistungen und deren Noten enthält und erkennen lässt, dass die Prüfung insgesamt nicht bestanden ist. [2]Dasselbe gilt, wenn der Prüfungsanspruch erloschen ist.

§ 24 Aberkennung des Bachelorgrades

(1) [1]Haben Studierende bei einer Prüfungsleistung getäuscht und wird diese Tatsache nach der Aushändigung des Zeugnisses bekannt, so können die Noten der Modulprüfungen, bei denen getäuscht wurde, berichtigt werden. [2]Gegebenenfalls kann die Modulprüfung für „nicht ausreichend“ (5,0) und die Bachelorprüfung für „nicht bestanden“ erklärt werden.

(2) [1]Waren die Voraussetzungen für die Zulassung zu einer Prüfung nicht erfüllt, ohne dass die/der Studierende darüber täuschen wollte, und wird diese Tatsache erst nach Aushändigung des Zeugnisses bekannt, wird dieser Mangel durch das Bestehen der Prüfung geheilt. [2]Hat die/der Studierende die Zulassung vorsätzlich zu Unrecht erwirkt, so kann die Modulprüfung für „nicht ausreichend“ (5,0) und die Bachelorprüfung für „nicht bestanden“ erklärt werden.

(3) [1]Vor einer Entscheidung des Prüfungsausschusses ist Gelegenheit zur Äußerung zu geben.

(4) [1]Das unrichtige Zeugnis ist zu entziehen und gegebenenfalls ein neues zu erteilen. [2]Mit dem unrichtigen Zeugnis ist auch die Bachelorurkunde einzuziehen, wenn die Bachelorprüfung aufgrund einer Täuschung für „nicht bestanden“ erklärt wurde.

(5) [1]Eine Entscheidung nach Absatz 1 und Absatz 2 Satz 2 ist nach einer Frist von fünf Jahren ab dem Datum des Zeugnisses ausgeschlossen.

(6) [1]Die Aberkennung des akademischen Grades richtet sich nach § 36 Absatz 7 Landeshochschulgesetz

§ 25 Einsicht in die Prüfungsakten

(1) [1]Nach Abschluss der Bachelorprüfung wird den Studierenden auf Antrag innerhalb eines Jahres Einsicht in das Prüfungsexemplar ihrer Bachelorarbeit, die darauf bezogenen Gutachten und in die Prüfungsprotokolle gewährt.

(2) [1]Für die Einsichtnahme in die schriftlichen Modulprüfungen, schriftlichen Modulteilprüfungen bzw. Prüfungsprotokolle gilt eine Frist von einem Monat nach Bekanntgabe des Prüfungsergebnisses.

(3) [1]Der/die Prüfende bestimmt Ort und Zeit der Einsichtnahme.

(4) [1]Prüfungsunterlagen sind mindestens fünf Jahre aufzubewahren.

§ 26 Inkrafttreten, Übergangsvorschriften

(1) [1]Diese Studien- und Prüfungsordnung tritt am 1. Oktober 2023 in Kraft und gilt für

1. Studierende, die ihr Studium im Bachelorstudiengang Mechatronik und Informationstechnik am KIT im ersten Fachsemester aufnehmen, sowie für

2. Studierende, die ihr Studium im Bachelorstudiengang Mechatronik und Informationstechnik am KIT in einem höheren Fachsemester aufnehmen, sofern dieses Fachsemester nicht über dem Fachsemester liegt, das der erste Jahrgang nach Ziffer 1 erreicht.

(2) [1]Die Studien- und Prüfungsordnung des KIT für den Bachelorstudiengang Mechatronik und Informationstechnik vom 10. Mai 2016 (Amtliche Bekanntmachung des KIT Nummer 29 vom 10. Mai 2016) zuletzt geändert durch Artikel 24 der Satzung zur Änderung der Regelung über die mündliche Nachprüfung in den Studien- und Prüfungsordnungen des Karlsruher Institut für Technologie (KIT) vom 29. März 2023 (Amtliche Bekanntmachung des KIT Nummer 29 vom 30. März 2023) behält Gültigkeit für

1. Studierende, die ihr Studium im Bachelorstudiengang Mechatronik und Informationstechnik am KIT zuletzt im Sommersemester 2023 aufgenommen haben, sowie für

2. Studierende, die ihr Studium im Bachelorstudiengang Mechatronik und Informationstechnik am KIT ab dem Wintersemester 2023/2024 in einem höheren Fachsemester aufnehmen, sofern das Fachsemester über dem liegt, das der erste Jahrgang nach Absatz 1 Ziff. 1 erreicht hat.

[2]Im Übrigen tritt sie außer Kraft.

(3) [1]Studierende, die auf Grundlage der Studien- und Prüfungsordnung für den Bachelorstudiengang Mechatronik und Informationstechnik vom 10. Mai 2016 (Amtliche Bekanntmachung des KIT Nummer 29 vom 10. Mai 2016) zuletzt geändert durch Artikel 24 der Satzung zur Änderung der Regelung über die mündliche Nachprüfung in den Studien- und Prüfungsordnungen des Karlsruher Institut für Technologie (KIT) vom 29. März 2023 (Amtliche Bekanntmachung des KIT Nummer 29 vom 30. März 2023) ihr Studium am KIT aufgenommen haben, können Prüfungen auf Grundlage dieser Studien- und Prüfungsordnung letztmalig am 30. September 2029 ablegen.

Karlsruhe, den 24. Juli 2023

gez. Prof. Dr.-Ing. Holger Hanselka
(Präsident)

Studienplan für den Bachelorstudiengang Mechatronik und Informationstechnik

Dieser Studienplan tritt zum 01.10.2023 in Kraft und ist gültig für den Bachelorstudiengang Mechatronik und Informationstechnik gemäß der SPO 2023 (2016_AB_029 vom 10.05.2016).

Alle Informationen rund um die rechtlichen und amtlichen Rahmenbedingungen des Studiums finden Sie in der jeweiligen Studien- und Prüfungsordnung Ihres Studiengangs. Diese ist unter den Amtlichen Bekanntmachungen des KIT (https://www.sle.kit.edu/amtlicheBekanntmachungen.php) abrufbar.

Zusammensetzung der Leistungspunkte (LP)

- Pflichtfach „Ingenieurwissenschaftliche Grundlagen“: 111 LP
- Vertiefungsfach „Vertiefung in der Mechatronik“: 35 LP
- Fach „Überfachliche Qualifikationen“: 4 LP
- Berufspraktikum: 15 LP
- Bachelorarbeit: 15 LP

Module im Pflichtfach „Ingenieurwissenschaftliche Grundlagen“

M-ETIT-106337 – Elektrische Energietechnik (6 LP)

M-ETIT-106419 – Elektromagnetische Felder (4 LP)

M-ETIT-104465 – Elektronische Schaltungen (7 LP)

M-ETIT-106407 – Grundlagen der Digitaltechnik (4 LP)

M-MACH-106535 – Grundlagen der Fertigungstechnik (3 LP)

M-MATH-102859 – Höhere Mathematik (21 LP)

M-ETIT-106336 – Informations- und Automatisierungstechnik (7 LP)

M-ETIT-106417 – Lineare Elektrische Netze (8 LP)

M-MACH-106527 – Maschinenkonstruktionslehre A (7 LP)

M-MACH-106493 – Mechatronische Systeme und Produkte (7 LP)

M-ETIT-106339 – Mess- und Regelungstechnik (6 LP)

M-ETIT-106372 – Signale und Systeme (8 LP)

M-ETIT-106415 – Systemmodellierung (2 LP)

M-MACH-106374 – Technische Mechanik (21 LP)

Module im Vertiefungsfach „Vertiefung in der Mechatronik“

Die Vertiefung in der Mechatronik erlaubt die Abbildung einer Präferenz Richtung „Elektrotechnik und Informationstechnik“ oder „Maschinenbau“ und in geringerem Umfang Richtung „Informatik“ oder „Wirtschaftswissenschaften“. Es wird empfohlen, die gewünschten Module zuerst in Wahlblock 1 und 2 zu wählen und dann im Wahlblock 3 die offenen Leistungspunkte aufzufüllen.
Das Vertiefungsfach setzt sich aus 3 Wahlblöcken zusammen. Die Wahlblöcke und die jeweiligen Wahlmöglichkeiten sind im Modulhandbuch beschrieben.

Wahlblock 1: „Elektrotechnik und Informationstechnik“
Im Wahlblock 1 sind zwei Module zu wählen, es können aber auch drei Module gewählt werden.

Wahlblock 2: „Maschinenbau“
Im Wahlblock 2 ist ein Modul zu wählen, es können aber auch zwei Module gewählt werden.

Wahlblock 3:
„Elektrotechnik und Informationstechnik, Maschinenbau, Informatik, Wirtschaftswissenschaften)
Nachdem die Wahlblöcke 1 und 2 gewählt wurden, werden im Wahlblock 3 so viele Module gewählt, bis in der Vertiefung der Mechatronik insgesamt 35 LP erreicht sind.

Modul im Fach „Überfachliche Qualifikationen“

Das Fach „überfachliche Qualifikationen“ besteht aus dem Modul M-MACH-106583 Schlüsselqualifikationen (4 LP) mit den Wahlblöcken „Technikethik“ und „Schlüsselqualifikation“.
In jedem Wahlblock wird jeweils eine Lehrveranstaltung absolviert.

Die Vermittlung weiterer überfachlicher Qualifikationen im Umfang von 2 LP gemäß § 16 SPO findet im Rahmen der fachwissenschaftlichen Module „Lineare Elektrische Netze“, „Elektronische Schaltungen“ und „Signale und Systeme“ im Pflichtfach „Ingenieurwissenschaftliche Grundlagen“ statt.
Weitere überfachliche Qualifikationen können als Zusatzleistung erworben werden.

Modul Berufspraktikum

Modul M-MACH-104265 - Berufspraktikum (15 LP)
Während des Bachelorstudiums ist ein mindestens 13-wöchiges Berufspraktikum nachweislich abzuleisten, welches geeignet ist, dem Studierenden eine Anschauung von berufspraktischer Tätigkeit in Mechatronik und Informationstechnik zu vermitteln. Näheres regeln die Praktikantenrichtlinien. Dem Berufspraktikum sind 15 Leistungspunkte zugeordnet. Das Berufspraktikum geht nicht in die Gesamtnote ein. Zeiten einer Berufsausbildung können als Berufspraktikum anerkannt werden. Die Anerkennung erfolgt durch das zuständige Praktikantenamt.

Modul Bachelorarbeit

Modul M-MACH-106579 - Bachelorarbeit (15 LP)
Das Modul Bachelorarbeit hat einen Umfang von 15 LP. Es besteht aus der Bachelorarbeit mit 12 LP und einer Präsentation mit 3 LP. Die Bachelorarbeit kann von jedem Hochschullehrer/in der KIT-Fakultäten Elektrotechnik und Informationstechnik und Maschinenbau vergeben und betreut werden.
Die maximale Bearbeitungsdauer beträgt sechs Monate. Voraussetzung zur Zulassung zur Bachelorarbeit ist, dass der/die Studierende Modulprüfungen im Umfang von 120 LP erfolgreich abgelegt hat.
Die Note des Moduls Bachelorarbeit wird bei der Bildung der Gesamtnote mit dem doppelten Gewicht berücksichtigt (SPO § 21(2)).

Modul Orientierungsprüfung

Die Orientierungsprüfung nach SPO § 8 besteht aus der Teilmodulprüfung „Technische Mechanik I“ im Modul „Technische Mechanik“ und der Modulprüfung „Lineare elektrische Netze“.

Modul Zusatzleistungen

Es können nach SPO § 15 (1) auch Leistungen mit bis zu 30 Leistungspunkten mehr erworben werden, als für das Bestehen der Bachelorprüfung erforderlich sind. Die Studierenden haben bereits bei der Anmeldung zu einer Prüfung in einem Modul diese als Zusatzleistung zu deklarieren.

Modul Mastervorzug

Studierende, die bereits mindestens 120 LP erworben haben, können gemäß SPO § 15 a Leistungspunkte aus einem konsekutiven Masterstudiengang am KIT im Umfang von höchstens 30 LP erwerben. Die Studierenden haben bereits bei der Anmeldung zu einer Prüfung in einem Modul diese als Mastervorzug zu deklarieren.

Prüfungsart und -dauer

Angaben über Prüfungsart oder -dauer werden nach § 6 Absatz 2 der Prüfungsordnung für den Bachelorstudiengang fristgerecht bekannt gegeben. Prüfungsart und/oder -dauer können nach § 6 Absatz 2 und 3 geändert werden.

Exemplarischer Studienablaufplan

Sem.	Fach	Modul	Teilleistungen	LP	Prüfung / Studienleistung
1	Ingenieurwissenschaftliche Grundlagen	M-MATH-102859	T-MATH-100525 - Übungen zu Höhere Mathematik I T-MATH-100275 - Höhere Mathematik I	7	Studienleistung Prüfung
		M-MACH-106374	T-MACH-112907 - Übungen zu Technische Mechanik I T-MACH-112904 - Technische Mechanik I	1 6	Studienleistung Prüfung
		M-ETIT-106417	T-ETIT-109317 - Lineare Elektrische Netze - Workshop A T-ETIT-109811 - Lineare Elektrische Netze - Workshop B T-ETIT-113001 - Lineare Elektrische Netze	1 1 6	Studienleistung Studienleistung Prüfung
		M-ETIT-106407	T-ETIT-112872 – Grundlagen der Digitaltechnik	4	Prüfung
		M-MACH-106527	T-MACH-112981 - Workshop zu Maschinenkonstruktionslehre A T-MACH-112984 - Maschinenkonstruktionslehre A	1 6	Studienleistung Prüfung
2	Überfachliche Qualifikationen	M-MACH-106583	Teilleistung aus Wahlpflichtblock: Technikethik	2	Studienleistung
	Ingenieurwissenschaftliche Grundlagen	M-MATH-102859	T-MATH-100526 - Übungen zu Höhere Mathematik II T-MATH-100276 - Höhere Mathematik II	7	Studienleistung Prüfung
		M-MACH-106374	T-MACH-112908 – Übungen zu Technische Mechanik II T-MACH-112905 – Technische Mechanik II	1 6	Studienleistung Prüfung
		M-ETIT-104465	T-ETIT-109138 - Elektronische Schaltungen - Workshop T-ETIT-109318 - Elektronische Schaltungen	1 6	Studienleistung Prüfung
		M-ETIT-106336	T-ETIT-112879 – Informations- und Automatisierungstechnik – Praktikum T-ETIT-112878 – Informations- und Automatisierungstechnik	2 5	Studienleistung Prüfung
3	Ingenieurwissenschaftliche Grundlagen	M-MATH-102859	T-MATH-100527 - Übungen zu Höhere Mathematik III T-MATH-100277 – Höhere Mathematik III	7	Studienleistung Prüfung
		M-MACH-106374	T-MACH-112909 – Übungen zu Technische Mechanik III T-MACH-112906 – Technische Mechanik III	1 6	Studienleistung Prüfung
		M-MACH-106535	T-MACH-112928 – Grundlagen der Fertigungstechnik	3	Prüfung
		M-ETIT-106415	T-ETIT-112989 – Systemmodellierung	2	Prüfung
		M-ETIT-106372	T-ETIT-112860 – Signale und Systeme	7	Prüfung
		M-ETIT-106419	T-ETIT-113004 – Elektromagnetische Felder	4	Prüfung

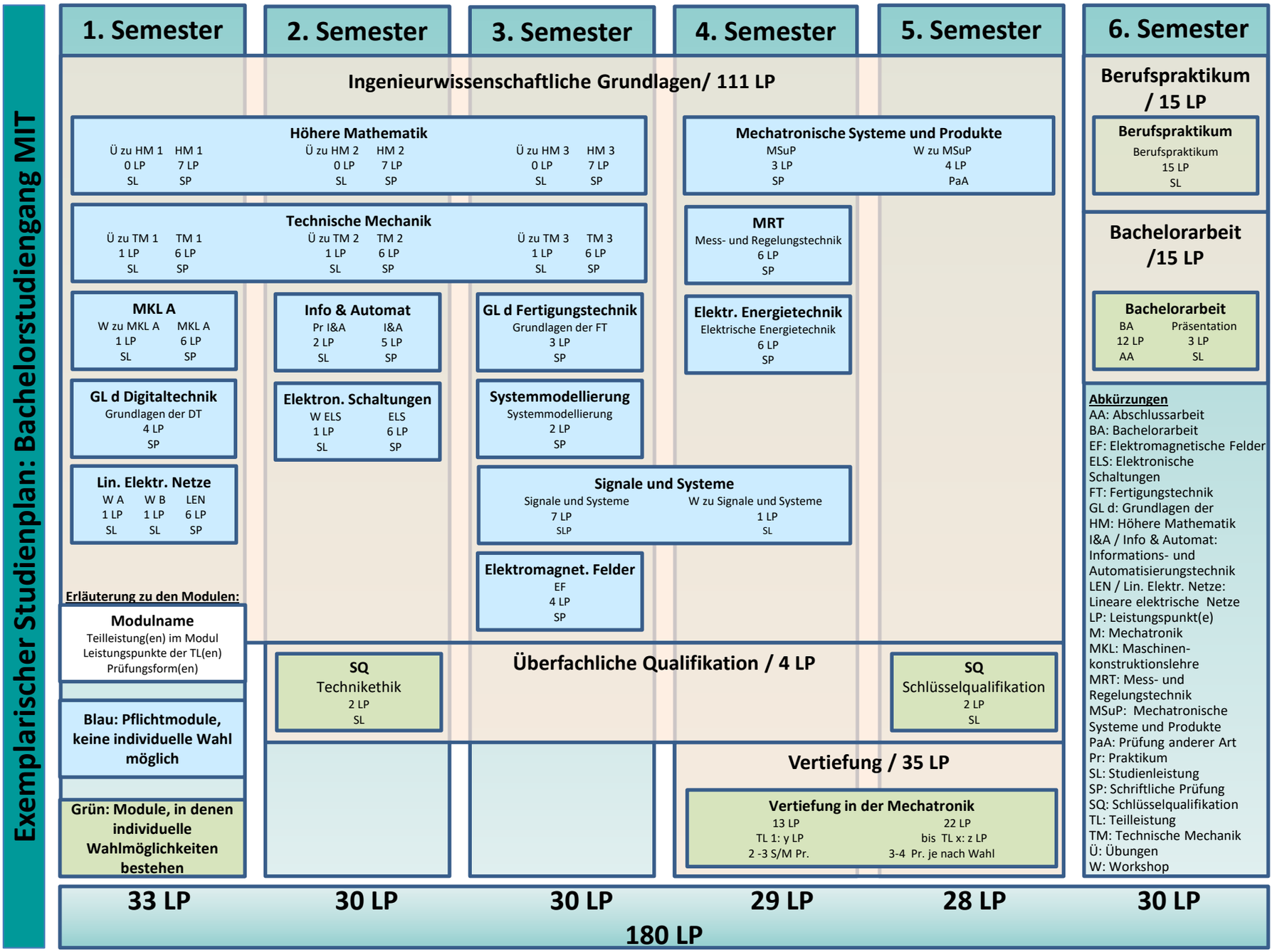
Studienplan B.Sc. Mechatronik und Informationstechnik SPO 2023

Sem.	Fach	Modul	Teilleistungen	LP	Prüfung / Studienleistung
4	Ingenieurwissenschaftliche Grundlagen	M-ETIT-106372	T-ETIT-112861 – Signale und Systeme - Workshop	1	Studienleistung
		M-MACH-106493	T-MACH-112988 – Mechatronische Systeme und Produkte	3	Prüfung
		M-ETIT-106339	T-ETIT-112852 – Mess- und Regelungstechnik	6	Prüfung
		M-ETIT-106337	T-ETIT-112850 – Elektrische Energietechnik	6	Prüfung
	Vertiefung in der Mechatronik		Beispiel siehe S. 5	13	
5	Ingenieurwissenschaftliche Grundlagen	M-MACH-106493	T-MACH-108680 Workshop Mechatronische Systeme und Produkte	4	Prüfungsleistungen anderer Art
	Überfachliche Qualifikationen	M-MACH-106583	Teilleistung aus Wahlpflichtblock: Schlüsselqualifikation	2	Studienleistung
	Vertiefung in der Mechatronik		Beispiel siehe S. 5	22	
6		M-MACH-106582	T-MACH-113256 – Berufspraktikum	15	Studienleistung
		M-MACH-106579	T-MACH-113254 – Präsentation T-MACH-113253 – Bachelorarbeit	3 12	Studienleistung Abschlussarbeit

Exemplarische Wahloption

Die exemplarische Wahloption zeigt beispielhaft ***eine*** zulässige Kombination von Modulen im ***Vertiefungsfach***, mit der exakt die angegebenen Leistungspunkte im 4. und 5. Semester erreicht werden können.

Sem.	Wahlblock	Modul	Teilleistungen	LP	Prüfung / Studienleistung
4	1	M-ETIT-106474	Systems Engineering und KI-Verfahren	6	Prüfung
	2	M-MACH-106378	Strömungslehre	7	Prüfung
5	1	M-ETIT-100514	Hybride und elektrische Fahrzeuge	4	Prüfung
	2	M-MACH-102386	Technische Thermodynamik und Wärmeübertragung I	7	Prüfung
	3	M-ETIT-102104	Wahrscheinlichkeitstheorie	5	Prüfung
	3	M-INFO-100893	Robotik I - Einführung in die Robotik	6	Prüfung


Exemplarischer Studienplan: Bachelorstudiengang MIT
1. Semester
2. Semester
3. Semester
4. Semester
5. Semester
6. Semester
Ingenieurwissenschaftliche Grundlagen/ 111 LP
Höhere Mathematik
Ü zu HM 1 0 LP SL
HM 1 7 LP SP
Ü zu HM 2 0 LP SL
HM 2 7 LP SP
Ü zu HM 3 0 LP SL
HM 3 7 LP SP
Technische Mechanik
Ü zu TM 1 1 LP SL
TM 1 6 LP SP
Ü zu TM 2 1 LP SL
TM 2 6 LP SP
Ü zu TM 3 1 LP SL
TM 3 6 LP SP
MKL A
W zu MKL A 1 LP SL
MKL A 6 LP SP
GL d Digitaltechnik
Grundlagen der DT
4 LP
SP
Lin. Elektr. Netze
W A 1 LP SL
W B 1 LP SL
LEN 6 LP SP
Info & Automat
Pr I&A 2 LP SL
I&A 5 LP SP
Elektron. Schaltungen
W ELS 1 LP SL
ELS 6 LP SP
GL d Fertigungstechnik
Grundlagen der FT
3 LP
SP
Systemmodellierung
Systemmodellierung
2 LP
SP
Signale und Systeme
Signale und Systeme 7 LP SLP
W zu Signale und Systeme 1 LP SL
Elektromagnet. Felder
EF
4 LP
SP
Mechatronische Systeme und Produkte
MSuP 3 LP SP
W zu MSuP 4 LP PaA
MRT
Mess- und Regelungstechnik
6 LP
SP
Elektr. Energietechnik
Elektrische Energietechnik
6 LP
SP
Berufspraktikum / 15 LP
Berufspraktikum
Berufspraktikum
15 LP
SL
Bachelorarbeit /15 LP
Bachelorarbeit
BA 12 LP AA
Präsentation 3 LP SL
Abkürzungen
AA: Abschlussarbeit
BA: Bachelorarbeit
EF: Elektromagnetische Felder
ELS: Elektronische Schaltungen
FT: Fertigungstechnik
GL d: Grundlagen der
HM: Höhere Mathematik
I&A / Info & Automat: Informations- und Automatisierungstechnik
LEN / Lin. Elektr. Netze: Lineare elektrische Netze
LP: Leistungspunkt(e)
M: Mechatronik
MKL: Maschinen-konstruktionslehre
MRT: Mess- und Regelungstechnik
MSuP: Mechatronische Systeme und Produkte
PaA: Prüfung anderer Art
Pr: Praktikum
SL: Studienleistung
SP: Schriftliche Prüfung
SQ: Schlüsselqualifikation
TL: Teilleistung
TM: Technische Mechanik
Ü: Übungen
W: Workshop
Erläuterung zu den Modulen:
Modulname
Teilleistung(en) im Modul
Leistungspunkte der TL(en)
Prüfungsform(en)
Blau: Pflichtmodule, keine individuelle Wahl möglich
Grün: Module, in denen individuelle Wahlmöglichkeiten bestehen
SQ Technikethik 2 LP SL
Überfachliche Qualifikation / 4 LP
SQ Schlüsselqualifikation 2 LP SL
Vertiefung / 35 LP
Vertiefung in der Mechatronik
13 LP
TL 1: y LP
2 -3 S/M Pr.
22 LP
bis TL x: z LP
3-4 Pr. je nach Wahl
33 LP
30 LP
30 LP
29 LP
28 LP
30 LP
180 LP

Ansprechpersonen
im Bachelorstudiengang Mechatronik und Informationstechnik

Studiengangservice Bachelor und Prüfungsausschuss

Beim MIT-Beratungsteam der Fakultät ETIT finden Sie Ihre Ansprechpersonen bei Fragen zum Studiengang, Studienverlauf und Verwaltungsabläufen. Sie sind außerdem Ihre erste Anlaufstelle bei Anfragen oder Anträgen an den Prüfungsausschuss.

Studiengangservice ETIT (Geb. 30.36, Raum 115 &117)
Tel.: 0721/608-42636 oder -42746, E-Mail: Bachelor-Info@etit.kit.edu

Praktikantenamt

Fragen zum Berufspraktikum stellen Studierende an das Praktikantenamt der Fakultät ETIT,
E-Mail: praktikantenamt@etit.kit.edu

Fachstudienberatung

Studiendekane:
Prof. Dr.-Ing. Martin Doppelbauer (martin.doppelbauer@kitedu) und .
Prof. Dr.-Ing. Marcus Geimer (marcus.geimer@kit.edu)

Studierendenservice

Bei organisatorischen Fragen zum Studium (Bewerbung, Einschreibung, Rückmeldung, Abschlussdokumente, Bescheinigungen, …):
https://www.sle.kit.edu/wirueberuns/studierendenservice.php
Kontaktpersonen bezüglich des Studienganges:
https://www.sle.kit.edu/wirueberuns/studierendenservice_team4.php

Auslandsaufenthalt

Sie können einen Auslandsaufenthalt über beide Fakultäten planen:

ETIT: https://www.etit.kit.edu/internationales.php

MACH: International Studieren im Maschinenbau (ISIM), E-Mail: isim@mach.kit.edu
https://www.mach.kit.edu/4201.php

Anerkennung von Studien- und Prüfungsleistungen im Bachelorstudiengang Mechatronik und Informationstechnik

Grundsätzliche Regelungen

Die grundsätzlichen Regelungen finden sich in den Studien- und Prüfungsordnungen:
Bachelor MIT SPO 2023 vom 24.07.2023, §19

Danach können die im Studienplan jeweils geforderten Leistungen auch durch Anerkennung externer Leistungen erbracht werden.

Externe Leistungen können dabei wie folgt erworben sein:

1. innerhalb des Hochschulsystems (weltweit)
2. außerhalb des Hochschulsystems (an Institutionen mit genormtem Qualitätssicherungssystemen; die Anerkennung kann versagt werden, wenn mehr als 50 Prozent des Hochschulstudiums ersetzt werden sollen)

Die Anerkennung erfolgt auf Antrag der Studierenden, unter der Voraussetzung, dass hinsichtlich der erworbenen Kompetenzen kein wesentlicher Unterschied zu den Leistungen oder Abschlüssen besteht, die ersetzt werden sollen. Der Antrag muss innerhalb des ersten Semesters nach Immatrikulation am KIT gestellt werden. Zuständig für Anerkennung und Anrechnung ist der Prüfungsausschuss, der unter Einbeziehung der fachlichen Prüfung durch den zuständigen Fachvertreter über die Anerkennung entscheidet. Anerkannte Leistungen, die nicht am KIT erbracht wurden, werden im Notenauszug als „anerkannt“ ausgewiesen.

Benotung

Wenn es sich um ein vergleichbares Notensystem handelt, wird die Note der anzuerkennenden Leistung übernommen. Bei nicht vergleichbaren Notensystemen wird die Note umgerechnet. Prüfungsleistungen, die anstelle einer benoteten Prüfungsleistung anerkannt werden sollen, müssen ebenfalls benotet sein.

Vorgehensweise

I. Gehen Sie zunächst zu einer Fachprüferin oder einem Fachprüfer* und legen Sie dort das Antragsformular zusammen mit den erforderlichen Unterlagen vor**.
Wichtig: Anerkennungen müssen innerhalb des ersten Semesters nach Immatrikulation beim Prüfungsausschuss beantragt werden.

II. Besteht Gleichwertigkeit im Hinblick auf die erworbenen Kompetenzen (Qualifikationsziele), wird dies mit Stempel und Unterschrift durch die Fachprüferin oder den Fachprüfer bestätigt.

III. Geben Sie dann den fertig ausgefüllten und unterschriebenen Antrag zusammen mit dem entsprechenden Notenauszug im Büro des Prüfungsausschusses ab.

Hinweis zu Auslandsprüfungsleistungen

Bei Anerkennung von Prüfungsleistungen aus einem Auslandssemester ist es empfehlenswert, vor dem Auslandsaufenthalt die geplanten Auslandsprüfungsleistungen im Hinblick auf die spätere Anerkennung mit einem Fachstudienberater zu besprechen.

*Wenn Sie eine Leistung anstelle eines KIT-Moduls anerkennen lassen möchten, wenden Sie sich für die Fachprüfung an die/den Modulverantwortliche/n des KIT-Moduls. Für Anerkennungen im Wahlbereich/Interdisziplinären Fach/Profilierungsfach wenden Sie sich an eine/n der Fachstudienberater*innen der Fakultät ETIT.

**Für die Anerkennung erforderlich sind Unterlagen, auf denen die der Anerkennung zugrundeliegenden Prüfungsleistungen dokumentiert sind. (Zeugnisse, Transcript of Records, Auszüge aus dem Modulhandbuch, Skripte o.ä.). Bei Unterlagen, die nicht in deutscher oder englischer Sprache vorliegen, kann eine amtlich beglaubigte Übersetzung verlangt werden.

Falls Sie weitere Fragen haben, wenden Sie sich gerne an den Studiengangservice Bachelor:
bachelor-info@etit.kit.edu, Tel.: 0721/608-42636 oder -42746, Geb. 30.36, 1. OG, Raum 117

Stand 15.10.2023

8 Field of study structure

Mandatory	
Orientation Exam *This field will not influence the calculated grade of its parent.*	
Bachelor's Thesis	15 CR
Internship	15 CR
Engineering Fundamentals	111 CR
Specialization in Mechatronics	35 CR
Interdisciplinary Qualifications	4 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.*	

8.1 Orientation Exam

Mandatory		
M-MACH-106549	Orientation Exam	0 CR

8.2 Bachelor's Thesis

Credits
15

Mandatory		
M-MACH-106579	Bachelor's Thesis	15 CR

8.3 Internship

Credits
15

Mandatory		
M-MACH-106582	Internship	15 CR

8.4 Engineering Fundamentals

Credits
111

Mandatory		
M-ETIT-106337	Electric Energy Systems	6 CR
M-ETIT-106419	Electromagnetic Fields	4 CR
M-ETIT-104465	Electronic Devices and Circuits	7 CR
M-ETIT-106407	Fundamentals of Digital Technology	4 CR
M-MACH-106535	Basics of Manufacturing Technology	3 CR
M-MATH-102859	Advanced Mathematics	21 CR
M-ETIT-106336	Information and Automation Technology	7 CR
M-ETIT-106417	Linear Electric Circuits	8 CR
M-MACH-106527	Mechanical Design A	7 CR
M-MACH-106493	Mechatronical Systems and Products	7 CR
M-ETIT-106339	Measurement and Control Technology	6 CR
M-ETIT-106372	Signals and Systems	8 CR
M-ETIT-106415	Systems Modeling	2 CR
M-MACH-106374	Engineering Mechanics	21 CR

8.5 Specialization in Mechatronics

Credits
35

Election notes
The Specialization in Mechatronics allows the mapping of a preference in the direction of "Electrical Engineering and Information Technology" or "Mechanical Engineering" and to a lesser extent in the direction of " Informatics " or "Economics and Management".

In elective block 1 "Electrical Engineering and Information Technology", two modules must be selected, but three modules can also be selected.

In the elective block 2 "Mechanical Engineering" one module has to be chosen, but two modules can also be chosen.

It is strongly recommended to choose the desired modules first in elective block 1 and 2 and if needed to fill up the open credit points in elective block 3.

In elective block 3 "Electrical Engineering and Information Technology, Mechanical Engineering, Informatics, Economics and Management" as many modules are choosen until a total of 35 LP has been achieved in the Specialization of Mechatronics.

Compulsary Elective Modules: Part 1: Electrical Engineering and Information Technology (Election: between 2 and 3 items)		
M-ETIT-106471	Electromagnetic Waves	3 CR
M-ETIT-106338	Fundamentals of Data Transmission	6 CR
M-ETIT-100514	Hybrid and Electric Vehicles	4 CR
M-ETIT-104823	Laboratory for Applied Machine Learning Algorithms	6 CR
M-ETIT-105356	Seminar: Fundamentals of Embedded Systems	4 CR
M-ETIT-106474	Systems Engineering and AI-Methods	6 CR
M-ETIT-102104	Theory of Probability	5 CR
Compulsary Elective Modules: Part 2: Mechanical Engineering (Election: between 1 and 2 items)		
M-MACH-106528	Mechanical Design B-C	12 CR
M-MACH-106378	Fluid Mechanics	7 CR
M-MACH-102386	Technical Thermodynamics and Heat Transfer I	8 CR
M-MACH-102567	Material Science and Engineering	9 CR
Compulsary Elective Modules: Part 3: Electrical Engineering and Information Technology, Mechanical Engineering, Informatics, Economics and Management (Election: between 0 and 21 credits)		
M-WIWI-101418	Introduction to Operations Research	9 CR
M-ETIT-106471	Electromagnetic Waves	3 CR
M-ETIT-106338	Fundamentals of Data Transmission	6 CR
M-ETIT-100514	Hybrid and Electric Vehicles	4 CR
M-ETIT-104823	Laboratory for Applied Machine Learning Algorithms	6 CR
M-MACH-106528	Mechanical Design B-C	12 CR
M-INFO-100757	Mechano-Informatics and Robotics	4 CR
M-INFO-101174	Programming	5 CR
M-INFO-100893	Robotics I - Introduction to Robotics	6 CR
M-ETIT-105356	Seminar: Fundamentals of Embedded Systems	4 CR
M-MACH-106378	Fluid Mechanics	7 CR
M-ETIT-106474	Systems Engineering and AI-Methods	6 CR
M-MACH-102386	Technical Thermodynamics and Heat Transfer I	8 CR
M-ETIT-102104	Theory of Probability	5 CR
M-MACH-102567	Material Science and Engineering	9 CR

8.6 Interdisciplinary Qualifications

Credits
4

Mandatory		
M-MACH-106583	Key Competences	4 CR

8.7 Additional Examinations

Additional Examinations (Election: at most 30 credits)		
M-MACH-106439	Further Examinations	30 CR
M-ZAK-106099	Supplementary Studies on Sustainable Development	19 CR
M-ZAK-106235	Supplementary Studies on Culture and Society	22 CR

8.8 Master's 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-MACH-102698	Actuators and Sensors in Nanotechnology	4 CR
M-MACH-102714	Microenergy Technologies	4 CR

Modelled Conditions
The following conditions have to be fulfilled:

1. You need to have earned at least 120 credits in the following fields:
    - Bachelor's Thesis
    - Internship
    - Engineering Fundamentals
    - Interdisciplinary Qualifications
    - Specialization in Mechatronics

9 Modules

M 9.1 Module: Actuators and Sensors in Nanotechnology [M-MACH-102698]

Responsible: Prof. Dr. Manfred Kohl
Organisation: KIT Department of Mechanical Engineering

Part of: Master's Transfer Account

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

Mandatory			
T-MACH-105238	Actuators and Sensors in Nanotechnology	4 CR	Kohl

Competence Certificate
oral exam: 45 min

Prerequisites
keine

Competence Goal
The students can:

- describe the principles of actuation and sensing and exemplify them
- describe important nano fabrication technologies and assess the influence of process parameters
- illustrate the layout and function of nano actuators and sensors and determine their characteristic properties (time constants, sensitivities, forces, etc.)
- evaluate their suitability for specific applications

Content
- Physical principles of actuation and sensing
- Scaling and size effects
- Fabrication technologies
- Selected developments
- Applications

The lecture includes amongst others the following topics:

- Nano technologies
- Nano electro mechanical systems (NEMS)
- Nano magneto mechanical and multiferroic systems
- Polymer-based nano actuators
- Nano motors, molecular systems
- Adaptive nano optical systems
- Nanosensors: concepts, materials, fabrication
- Examples on different categories of materials and applications:

- C-based, MeOx-based nano sensors
- Physical, chemical, biological nano sensors

- Multivariant data analysis / interpretation

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

Workload

Time of attendance:	15 * 1,5 h = 22,5 h
Preparation and follow up:	15 * 5,5 h = 82,5 h
Exam Preaparation and Exam:	15 h

Total: 120 h = 4 LP

Recommendation
The lecture addresses students in the fields of mechanical engineering, mechatronics and information technology, materials science and engineering, physics, electrical engineering and economic sciences. A comprehensive introduction is given in the basics and current developments on the nanoscopic length scale.

Literature
- Lecture notes

- 2. Balzani, V., Credi, A., & Venturi, M., Molecular devices and machines: concepts and perspectives for the nanoworld, 2008

- „Nanowires and Nanobelts, - Materials, Properties and Devices -, Volume 2: Nanowires and Nanobelts of Functional Materials“, Edited by Zhong Lin Wang, Springer, 2003, ISBN 10 0-387-28706-X

- „Sensors Based on Nanostructured Materials“, Edited by Francisco J. Arregui, Springer, 2009, ISBN: 978-0-387-77752-8

- “Multivariate Datenanalyse – Methodik und Anwendungen in der Chemie”, R. Henrion, G. Henrion, Springer 1994, ISBN 3-540-58188-X

M 9.2 Module: Advanced Mathematics [M-MATH-102859]

Responsible: Prof. Dr. Roland Griesmaier
Organisation: KIT Department of Mathematics
Part of: Engineering Fundamentals

Credits	Grading scale	Duration	Language	Level	Version
21	Grade to a tenth	3 terms	German	1	1

Mandatory			
T-MATH-100525	Tutorial Advanced Mathematics I	0 CR	Arens, Griesmaier, Hettlich
T-MATH-100526	Tutorial Advanced Mathematics II	0 CR	Arens, Griesmaier, Hettlich
T-MATH-100527	Tutorial Advanced Mathematics III	0 CR	Arens, Griesmaier, Hettlich
T-MATH-100275	Advanced Mathematics I	7 CR	Arens, Griesmaier, Hettlich
T-MATH-100276	Advanced Mathematics II	7 CR	Arens, Griesmaier, Hettlich
T-MATH-100277	Advanced Mathematics III	7 CR	Arens, Griesmaier, Hettlich

Competence Certificate
Learning assessment is carried by three written examinations of length 120 minutes each and by three sets of homework assignments (pre-requesites). A "pass" result on a pre-requesites in Advanced Mathematics I, II and III, respectively, 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.

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.

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
Fundamentals, sequences and convergence, functions and continuity, series, differential calculus of one real variable, integral calculus, vector spaces, linear maps, eigenvalues, Fourier series, differential equations, Laplace transform, multidimensional calculus, domain integrals, vector calculus, partial differential equations, stochastics

Workload
In class: 270 hours

- lectures, tutorials and examinations

Independent study: 360 hours

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

Learning type
Lecture, problem classes, tutorials

M 9.3 Module: Bachelor's Thesis [M-MACH-106579]

Responsible: Prof. Dr.-Ing. Marcus Geimer
Organisation: KIT Department of Electrical Engineering and Information Technology
KIT Department of Mechanical Engineering
Part of: Bachelor's Thesis

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

Mandatory			
T-MACH-113253	Bachelor's Thesis	12 CR	Geimer
T-MACH-113254	Presentation	3 CR	Geimer

Competence Certificate
The module Bachelor Thesis consists of a written elaboration (Bachelor Thesis) and an oral presentation of a self-chosen or given scientific topic. The students should show that they are able to work on a problem from their field of study independently and in a limited time according to scientific methods.

The date of the issue of the topic of the Bachelor's Thesis is to be recorded by the supervisor and the student and made a record of it at the Examination Board. The topic can only be returned once and only within the first month of the processing period. The Examination Board determines the languages in which the Bachelor's Thesis can be written.

The scope of the module Bachelor Thesis corresponds to 15 credit points (written elaboration 12 LP, oral presentation 3 LP). The topic and task must be adapted to the planned workload. For example, if the student works 30 hours per week, the thesis should be ready for submission after 12 weeks.

The maximum processing time is 6 months. The presentation must take place within the maximum processing time, but no later than six weeks after submission of the Bachelor Thesis. Upon justified application by the student, the Examination Board may extend the processing time by a maximum of one month. If the Bachelor's Thesis is not handed in on time, it is considered to be graded as "failed" (5.0), unless the student is not responsible for this failure.

The Bachelor Thesis is evaluated by at least one professor at KIT or a habilitated member of the KIT Department of Electrical Engineering and Information Technology or a habilitated member of the KIT Department of Mechanical Engineering and one further examiner. As a rule, one of the examiners is the person who assigned the thesis. In case of disagreement between these two persons, the Examination Board determines the grade of the Bachelor Thesis within the framework of the evaluation of these two persons; it may also appoint another examiner. The assessment must be made within six weeks after submission of the Bachelor Thesis.

Prerequisites
The requirement for admission to the bachelor’s thesis module are 120 ECTS. As to exceptions, the examination board decides on a request of the student.

Modeled Conditions
The following conditions have to be fulfilled:

1. You need to have earned at least 120 credits in the following fields:
   - Internship
   - Engineering Fundamentals
   - Interdisciplinary Qualifications
   - Specialization in Mechatronics

Competence Goal
The student is able to work independently on a defined, subject-relevant theme based on scientific criteria within a given period of time. The student is able to do research, to analyze information, to abstract as well as collect and recognize basic principles and regularities on the basis of less structured information. He/she overviews a question, is able to choose scientific methods and techniques, and use them to solve the question or to identify other potentials. In general, this will be carried out in consideration of social and/or ethical aspects.

The student can interpret, evaluate, and if needed plot the results obtained. He/she is able to clearly structure a scientific work and (a) to communicate it in written form using technical terminology as well as (b) to present it in oral form and discuss it with experts.

Content
The student shall be allowed to make suggestions for the topic of his/her bachelor thesis.

Workload
450 hours

Learning type
Bachelor Thesis and presentation

M 9.4 Module: Basics of Manufacturing Technology [M-MACH-106535]

Responsible: Prof. Dr.-Ing. Volker Schulze
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Fundamentals

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

Mandatory			
T-MACH-112928	Basics of Manufacturing Technology	3 CR	Schulze

Competence Certificate
written exam (duration: 60 min)

Prerequisites
none

Competence Goal
The students ...

- are able to classify the manufacturing processes by their general functionality according to the specific main groups (DIN 8580).
- have the ability to declare and explain the function of the significant manufacturing processes of the main groups (DIN 8580).
- are enabled to describe the characteristic process features (geometry, materials, accuracy, tools, machines) of the significant manufacturing processes of the main groups (DIN 8580).
- have the ability to derive the relevant process specific technical advantages and disadvantages of the characteristic process features.
- are enabled to perform a selection of suitable manufacturing processes for given components.
- are enabled to classify the required manufacturing processes in the expiry of a process chain for the production of given sample products.

Content
The objective of the moduleis to classify the manufacturing technology within the wider context of production engineering, to provide an overview of the different manufacturing processes and to establish basic process knowledge of the common processes. The module conveys the basic principles of manufacturing technology and deals with the manufacturing processes based on example components according to their classification into main groups regarding technical and economic aspects. Regard is paid to classic manufacturing processes as well as new developments like additive manufacturing processes.

The following topics will be covered:

- Primary processing (casting, plastics engineering, sintering, additive manufacturing processes)
- Forming (sheet-metal forming, massive forming)
- Cutting (machining with geometrically defined and geometrically undefined cutting edges, separating, abrading)
- Joining
- Coating
- Heat treatment and surface treatment

Workload
regular attendance: 30 hours
self-study: 60 hours

Learning type
Lecture, exercise

M 9.5 Module: Electric Energy Systems [M-ETIT-106337]

Responsible: Prof. Dr.-Ing. Marc Hiller
Prof. Dr.-Ing. Thomas Leibfried
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: Engineering Fundamentals

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

Mandatory			
T-ETIT-112850	Electric Energy Systems	6 CR	Hiller, Leibfried

Prerequisites
none

M 9.6 Module: Electromagnetic Fields [M-ETIT-106419]

Responsible: Prof. Dr. Martin Doppelbauer
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: Engineering Fundamentals

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

Mandatory			
T-ETIT-113004	Electromagnetic Fields	4 CR	Doppelbauer

Competence Goal
The aim is to convey the theoretical basics of electric, magnetic and electromagnetic fields based on the Max-well equations. The students can calculate electromagnetic fields of simple arrangements of charges and current-carrying conductors analytically using Maxwell's equations, sketch field images and derive the forces and powers that occur from them. You can take into account the influence of dielectrics and ferromagnetic materials.

Content
Introduction to the electromagnetic field theory based on Maxwell's equations. Electrostatic fields, electric flow fields, magnetic fields and fields that change slowly over time are treated: • Mathematical foundations of field theory • Fundamentals of electromagnetic fields • Electrostatic fields • Electric flow fields • Magnetic fields • Quasi-stationary (slowly changing over time) fields

Accompanying the lecture, exercises on the lecture material are provided. These are discussed in a large hall exercise and the associated solutions are presented in detail. In addition, tutorials are offered in small groups. The documents for the course (script and collection of formulas) can be found in the ILIAS system. You can register for the course without a password.

Annotation
This module lasts only until the end of December/beginning of January.

For the rest of the semester it is followed by the module "Electromagnetic Waves", which can be chosen by BSc MIT students in the specialization subject.

Workload
The workload is divided as follows:

- Attendance time in lectures (1.5 h per 15 dates) and tutorials (1.5 h per 9 dates) = 36 h
- Attendance time in tutorials = 7 weeks each 2.5 h = 17.5 h
- Preparation and wrap-up of the material = 7 weeks each 3 h = 21 h
- Exam preparation and presence in the exam: 2 weeks each 23 h = 46 h

Total effort approx. 120 hours = 4 ECTS

Recommendation
General physical and mathematical basics from the basic courses of the first semester.

M 9.7 Module: Electromagnetic Waves [M-ETIT-106471]

Responsible: Prof. Dr.-Ing. Sebastian Randel
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: Specialization in Mechatronics (Compulsary Elective Modules: Part 1: Electrical Engineering and Information Technology)
Specialization in Mechatronics (Compulsary Elective Modules: Part 3: Electrical Engineering and Information Technology, Mechanical Engineering, Informatics, Economics and Management)

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

Mandatory			
T-ETIT-113084	Electromagnetic Waves	3 CR	Randel

Competence Certificate
The success controll takes place the form of a written exam lasting 60 minutes.

Prerequisites
One of the modules:

- "M-ETIT-106419 - Elektromagnetische Felder" or
- "M-ETIT-104428 - Elektromagnetische Felder"

must have been started.

Modeled Conditions
You have to fulfill one of 2 conditions:

1. The module M-ETIT-106419 - Electromagnetic Fields must have been started.
2. The module M-ETIT-104428 - Electromagnetic Fields must have been started.

Competence Goal
Qualifications in the field of electromagnetic waves are acquired. The students are able to carry out calculations of electromagnetic wave phenomena and to use the necessary tools for this in a methodically appropriate manner. The students have gained an understanding of the physical relationships and can develop solution approaches for fundamental tasks. With the help of the methodology they have learned, they are able to understand the content of lectures with technical applications.

Content
Introduction to the theory of electromagnetic waves based on Maxwell's equations. The following topics are covered:

- Displacement current density
- The wave equation
- Plane waves in a non-conducting medium
- Reflection and refraction of plane waves
- Reflection at a conductor surface; the skin effect
- Harmonic waves
- Linear and circular polarized waves
- Solution methods for potential problems
- Separation of the scalar wave equation
- Waveguide (waveguide, optical fiber)
- The Hertzian dipole

Accompanying the lecture, exercises will be given on the lecture material. These will be discussed in a large hall exercise and the associated solutions presented in detail.

Additionally, tutorials in small groups are offered.

The course material (script and formulary) can be found in the ILIAS system. Registration for the course can be done without a password.

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

Annotation
This module does not start until late December/early January.

Before that, the module "Electromagnetic Fields" is offered, which is mandatory for students of the BSc MIT.

Workload
The workload is divided as follows:

- Attendance time in lectures (1.5 h per 7 dates) and tutorials (1.5 h per 6 dates) = 19.5 h
- Attendance time in tutorials = 6 weeks each 2.5 h = 15 h
- Preparation and wrap-up of the material = 6 weeks each 3 h = 18 h
- Exam preparation and presence in the exam: 2 weeks each 18 h = 36 h

Total effort approx. 90 hours = 3 ECTS

Recommendation
General physical and mathematical basics from the basic courses of the first semester.

M 9.8 Module: Electronic Devices and Circuits [M-ETIT-104465]

Responsible: Prof. Dr.-Ing. Ahmet Cagri Ulusoy
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: Engineering Fundamentals

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

Mandatory			
T-ETIT-109318	Electronic Devices and Circuits	6 CR	Ulusoy
T-ETIT-109138	Electronic Devices and Circuits - Workshop	1 CR	Zwick

Prerequisites
None

M 9.9 Module: Engineering Mechanics [M-MACH-106374]

Responsible: Prof. Dr.-Ing. Thomas Böhlke
Prof. Dr.-Ing. Carsten Proppe

Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Fundamentals

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

Mandatory			
T-MACH-112904	Engineering Mechanics I	6 CR	Böhlke, Langhoff
T-MACH-112907	Tutorial Engineering Mechanics I *This item will not influence the grade calculation of this parent.*	1 CR	Böhlke, Langhoff
T-MACH-112905	Engineering Mechanics II	6 CR	Böhlke, Langhoff
T-MACH-112908	Tutorial Engineering Mechanics II *This item will not influence the grade calculation of this parent.*	1 CR	Böhlke, Langhoff
T-MACH-112906	Engineering Mechanics III	6 CR	Proppe
T-MACH-112909	Tutorial Engineering Mechanics III *This item will not influence the grade calculation of this parent.*	1 CR	Proppe

Competence Certificate
Engineering Mechanics I (T-MACH-112904): written exam, 90 minutes, graded. Additives as announced

Engineering Mechanics II (T-MACH-112905): written exam, 90 minutes, graded. Additives as announced

Engineering Mechanics III (T-MACH-112906): written exam, 180 minutes, graded. Additives as announced

Coursework in *Tutorial Engineering Mechanics I* (T-MACH-112907) must be passed for admission to the exam Engineering Mechanics I.

Coursework in *Tutorial Engineering Mechanics II* (T-MACH-112908) must be passed for admission to the exam Engineering Mechanics II.

Coursework in *Tutorial Engineering Mechanics III* (T-MACH-112909) must be passed for admission to the exam Engineering Mechanics III.

Prerequisites
none

Competence Goal
After completion of this module the students can

- compute internal forces and moments for linear structures
- compute and evaluate 3D stress and strain states within the framework of linear elasticity and thermoelasticity
- apply the principle of virtual displacements
- apply energy methods and evaluate approximate solutions
- evaluate the stability of equilibrium positions

The students know some possibilities to describe the position and orientation of a rigid body for an arbitrary 3D motion. They realize that the rotational velocity is a vector which may change both magnitude and orientation. They can apply the principle of linear momentum and the principle of moment of momentum to a spatial motion of a rigid body and notice that this is much more complicated compared to a plain motion. The students can calculate the coordinates of the inertia tensor. They see that many effects which may be seen with gyroscopes can be explained by the principle of moment of momentum. For systems with many particles or bodies but only few degrees of freedom the students know that the application of analytical methods like the principle of D'Alembert in Lagrangian form or the Lagrange equations may be advantageous. They can apply these principles to simple problems. For vibration problems the students can interpret the most important expressions like eigenfrequency, resonance or eigenvalue problem. Forced vibration of systems with one degree of freedom can be investigated by the students.

Content
Contents of "Engineering Mechanics I"

- basics of vector calculus; force systems
- statics of rigid bodies
- internal forces and moments in bars and beam
- friction
- center of gravity, center of mass
- work, energy, principle of virtual work
- statics of undeformable ropes
- elastostatics of tension-compression-bars

Contents of "Engineering Mechanics II"

- bending
- shear
- torsion
- stress and strain state in 3D
- Hooke's law in 3D
- elasticity theory in 3D
- energy methods in elastostatics
- approximation methods
- stability

Contents of "Engineering Mechanics III"

- Kinematics of mass points
- Kinematics of continua
- Guided motion
- Mass kinematic quantities
- Dynamic quantities
- Dynamic axioms and theorems
- Analytical methods
- Impacts
- Vibrations
- Gyroscopes

Module grade calculation
The module grade is calculated from the CP-weighted average of the graded partial exams.

Workload
155 hours regular attendance, 475 hours self-study

Learning type
Lectures, Tutorials, Lab course groups, attestation of solved work sheets, consultation hours

M 9.10 Module: Fluid Mechanics [M-MACH-106378]

Responsible: Prof. Dr.-Ing. Bettina Frohnapfel
Organisation: KIT Department of Mechanical Engineering

Part of: Specialization in Mechatronics (Compulsary Elective Modules: Part 2: Mechanical Engineering)
Specialization in Mechatronics (Compulsary Elective Modules: Part 3: Electrical Engineering and Information Technology, Mechanical Engineering, Informatics, Economics and Management)

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

Mandatory			
T-MACH-112933	Fluid Mechanics	7 CR	Frohnapfel

Competence Certificate
Written exam

Prerequisites
none

Competence Goal
After having completed this module the student is capable of deriving the mathematical equations that describe the motion of fluids and can determine flow quantities for generic problems. He/she can name characteristic properties of fluids and distinguish different flow states. The student is capable of determining fluid quantities in fundamental applications. This includes the calculation of

- static and dynamic forces acting from the fluid onto the solid
- two-dimensional viscous flows
- one-dimensional incompressible and compressible flows without losses
- lossy flows through pipes

Content
properties of fluids, surface tension, hydro- and aerostatics, kinematics, stream tube theory (compressible and incompressible), losses in pipeline systems, dimensional analysis, dimensionless numbers

tensor notation, fluid elements in continuum, Reynolds transport theorem, conservation of mass and momentum, continuity equation, constitutive law for Newtonian fluids, Navier-Stokes equations, angular momentum and energy conservation, integral form of the conservation equations, forces between fluids and solids, analytical solutions of the Navier-Stokes equations

Module grade calculation
result of exam

Workload
In presence: 90 hours
Self study time: 120 hours

Recommendation
none

Learning type
Lectures + tutorials

Literature
Zierep J., Bühler, K.: Grundzüge der Strömungslehre, Grundlagen, Statik und Dynamik der Fluide, Springer Vieweg

Spurk, J.H.: Strömungslehre, Einführung in die Theorieder Strömungen, Springer-Verlag

M 9.11 Module: Fundamentals of Data Transmission [M-ETIT-106338]

Responsible: Prof. Dr.-Ing. Laurent Schmalen
Prof. Dr.-Ing. Thomas Zwick

Organisation: KIT Department of Electrical Engineering and Information Technology

Part of: Specialization in Mechatronics (Compulsary Elective Modules: Part 1: Electrical Engineering and Information Technology)
Specialization in Mechatronics (Compulsary Elective Modules: Part 3: Electrical Engineering and Information Technology, Mechanical Engineering, Informatics, Economics and Management)

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

Mandatory			
T-ETIT-112851	Fundamentals of Data Transmission	6 CR	Schmalen, Zwick

Competence Certificate
The success control takes place in the form of a written examination of 120 minutes.

Prerequisites
none

Competence Goal
The students can describe and analyze fundamental problems in the fields of high-frequency technology and communications engineering. By applying the methods they have learned, students can record and assess the processes in modern data transmission systems and compare the algorithms and techniques used with regard to their performance. This includes in particular the relationships between the physical signals in the analog part of the system and the resulting properties of the digital data transmission.

Content
This module aims to provide students with the basic theoretical and practical aspects of modern data transmission systems. Mainly the topics

- Channel capacity concept
- Line theory, reflection factor and power transmission
- Components (modulator/detector, mixer, amplifier, antenna) and systems
- Signal description in the bandpass range and in the equivalent lowpass range
- Modulation, demodulation and detection
- Calculation of error probabilities
- Higher quality modulation methods
- Basics of message coding

treated. The module thus provides an overview of different data transmission systems and how they work, from the physical signals to the performance (e.g. error rate) of the transmission

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

Workload
Each credit point corresponds to approx. 30 hours of work (for students). This is based on average students who achieve an average performance. The workload includes (e.g. 4 SWS):

1. Presence time in lectures, exercises: 15*4 h = 60 h

2. Preparation/post-processing of the same: 25*4 h = 100 h

3. Exam preparation and presence in the same: 20 h

Total: 180 LP = 6 LP

Recommendation
Knowledge of physics, higher mathematics, probability theory, basics of electromagnetic waves, circuit technology, as well as signals and systems are helpful.

M 9.12 Module: Fundamentals of Digital Technology [M-ETIT-106407]

Responsible: Prof. Dr.-Ing. Jürgen Becker
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: Engineering Fundamentals

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

Mandatory			
T-ETIT-112872	Fundamentals of Digital Technology	4 CR	Becker

Competence Certificate
Success is checked in the form of a written exam lasting 80 minutes and by evaluating challenges. The challenges can be worked on independently by the students during the semester and submitted for evaluation.

Prerequisites
none

Competence Goal
The students:

- can name and assign the basic processes of digital technology and digital information processing with a focus on digital circuits.
- learn different coding and number representations including their arithmetic as a methodical basis of information processing systems.
- know the mathematical basics and can understand and apply graphic and algebraic processes for the design, analysis and optimization of digital circuits
- can convert a verbal task into a formal form and implement this in a technically optimized manner in the form of a switching network.
- get to know and correctly specify automata as a modeling tool for state and event-driven components.
- can mathematically correctly describe general data processing systems from vending machine specifications and implement them digitally in a suitable manner.

Content
Lecture (16 lecture units until end of Dezember/begin of January)

This lecture represents an introduction to important theoretical basics of digital technology, which is intended for students in the 1st semester. Since it cannot be based on knowledge of circuit technology, the focus is on abstract modeling of behavior and structures. In addition, the lecture should also convey the basics that are required in other lectures.

The focus of the lecture is the formal, methodical and mathematical basics for the design of digital systems. Building on this, the technical realization of digital systems is discussed.

At the beginning, the terms message and signal are specified, with binary signals being of particular importance. Various number representations and their arithmetic are presented as the basis of information processing systems. Some mathematical basics for set theory and for working with relations are conveyed in a compact manner. The formal basis of an algebraic treatment of digital technology is outlined in the form of switching algebra, which is presented extensively. As a technical realization of the switching algebra, building blocks of digital technology and in particular switching networks are considered, with their design, analysis and optimization being the main focus. Automata are introduced as a basis for modeling state and event-controlled digital systems

Exercise

Accompanying the lecture, exercises on the lecture material are given. These are discussed in a large hall exercise and the associated solutions are presented in detail. In addition, further exercises are provided in the form of dedicated tutorials in small groups, which are worked on independently with the support of a student tutor. The solution of practice-related problems related to digital technology is offered in the form of a blended learning concept interlocked with the lecture content.

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

Annotation
This module lasts only until the end of December/beginning of January.

For the rest of the semester it is followed by the module "Systems Modeling", which is recommended for BSc MIT students in their 1st or 3rd semester.

Workload

1. attendance time in 16 lectures and 4 exercises: 20 * 1,5 h = 30 h
2. preparation and follow-up of the same: 60 h (approx. 2h per unit)
3. exam preparation and presence in the exam: = 20h + 1h

Total: 111 h = 4 LP

M 9.13 Module: Further Examinations [M-MACH-106439]

Organisation: KIT Department of Mechanical Engineering
Part of: Additional Examinations

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

Further Examinations (Election: at most 30 credits)			
T-MACH-106638	Wildcard Additional Examinations 1	3 CR	
T-MACH-106639	Wildcard Additional Examinations 2	3 CR	
T-MACH-106640	Wildcard Additional Examinations 3	3 CR	
T-MACH-106641	Wildcard Additional Examinations 4	3 CR	
T-MACH-106643	Wildcard Additional Examinations 5	3 CR	
T-MACH-106646	Wildcard Additional Examinations 6	3 CR	
T-MACH-106647	Wildcard Additional Examinations 7	3 CR	
T-MACH-106648	Wildcard Additional Examinations 8	3 CR	
T-MACH-106649	Wildcard Additional Examinations 9	3 CR	
T-MACH-106650	Wildcard Additional Examinations 10	3 CR	

Prerequisites
None

M 9.14 Module: Hybrid and Electric Vehicles [M-ETIT-100514]

Responsible: Prof. Dr. Martin Doppelbauer
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: Specialization in Mechatronics (Compulsary Elective Modules: Part 1: Electrical Engineering and Information Technology)
Specialization in Mechatronics (Compulsary Elective Modules: Part 3: Electrical Engineering and Information Technology, Mechanical Engineering, Informatics, Economics and Management)

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

Mandatory			
T-ETIT-100784	Hybrid and Electric Vehicles	4 CR	Doppelbauer

Prerequisites
none

M 9.15 Module: Information and Automation Technology [M-ETIT-106336]

Responsible: Prof. Dr.-Ing. Mike Barth
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: Engineering Fundamentals

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

Mandatory			
T-ETIT-112878	Information and Automation Technology	5 CR	Barth
T-ETIT-112879	Information and Automation Technology - Lab Course	2 CR	Sax

Competence Certificate

1. The assessment of success takes the form of a written examination lasting 120 minutes. The module grade is the grade of the written exam.
2. A success check in the form of a coursework consisting of project documentation and checking the source code as part of the internship course

Prerequisites
None

Competence Goal
Lecture part "Information Technology" (Sax - 2 SWS corresponds to approx. 14 VL units of 90 minutes each)

The students get to know the structure and functionality of information technology systems and their use.

The students can

- distinguish the characteristics of embedded systems.
- Name different programming languages and paradigms and compare their differences.
- list the components necessary to create an executable program and describe their interaction.
- describe general computer architectures, compare their advantages and disadvantages, and explain ways to increase performance.
- name and evaluate different ways of storing and organizing data in a structured way. describe the tasks of an operating system and reflect the basic functions of processes and threads.
- explain the phases and processes of project management and outline the planning of small projects.
- describe the characteristics and procedure for the analysis of large databases.
- name and delimit the characteristics and properties of self-learning systems.
- Classify, describe and evaluate methods of machine learning.

By participating in the information technology internship, the students can break down complex programming problems into simple and clear modules and develop suitable algorithms and data structures, as well as convert them into an executable program using a programming language.

Lecture part "Automation Technology" (Barth - 1 SWS corresponds to approx. 7 VL units of 90 minutes each)

The students

- gain a basic understanding of current challenges in the engineering of (distributed) automation systems.
- know the clusters of industrial systems and processes.
- can analyse, structure and formally describe problems in the field of automation of industrial plants, machines and systems.
- can understand, apply and further develop the language of control technology.
- are able to develop the architecture of an automation system with regard to communication, level and data flows.
- are able to understand how an automation system works and can select the necessary components.
- know basic information models of automation technology.

Content
Lecture part "Information Technology" (Sax, 14 VL)

- Programming languages, program creation and program structures incl. object orientation
- Computer architectures and embedded systems
- Data structures
- Project Management
- Big Data
- Machine Learning

Exercise – share IT (7 exercises)

- Accompanying the lecture, the basics of the C++ programming language are taught in the exercise. For this purpose, exercises related to the lecture material are provided, and the solutions to them are explained in detail. The focus is on the structure and analysis of programs and their creation.

Lecture part "Automation Technology" (Barth, 7 VL)

- Theoretical and practical aspects of industrial automation technology.
- IEC61131-3 languages and program structure units
- Object-oriented aspects of control technology
- Live demos for control program design
- Deterministic systems for control engineering
- Communication architectures and models
- AT architectures including modularization

Exercise – proportion AT (3 exercises)

- Accompanying the lecture, the basics of the IEC 61131-3 control implementation are taught in the exercise. For this purpose, practical tasks are set and their solutions are discussed together. The focus is on the structure of control programs and their implementation and validation in real systems.

Internship information technology (6 dates):

- Writing complex C/C++ code sections and dealing with an integrated development environment is practiced during implementation in a structured and executable source code, in compliance with specified quality criteria. The implementation takes place on a microcontroller board, which is already known from other courses. The project is processed in small teams, which break down the overall project into individual tasks and work on them independently. Contents from lectures and exercises are taken up again and applied to concrete problems. At the end of the internship, each project team should demonstrate the successful completion of their work on the "Magni Silver platform".

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

Annotation
Attention:
The partial performances assigned to this module are part of the orientation examination of the following study programs:

- Bachelor Elektrotechnik und Informationstechnik (SPO 2023, §8).

The examination is to be taken at the end of the 2nd semester. A repeat examination must be taken by the end of the 3rd semester.

Workload

1. Attendance time in lectures and exercises: 31 * 1.5 h = 46.5 h
2. Preparation/post-processing of the same: 60 h
3. Internship 6 appointments = 9 h
4. Preparation/follow-up of the internship = 55 h
5. Exam preparation and presence in the same: = 50 h

Total: 220 h = 7 CP

Recommendation

- Knowledge of the basics of programming is recommended (attendance of the MINT course C++).
- The contents of the Digital Technology module are helpful.

M 9.16 Module: Internship [M-MACH-106582]

Responsible: Prof. Dr. Martin Doppelbauer
Prof. Dr.-Ing. Marcus Geimer
Organisation: KIT Department of Mechanical Engineering
Part of: Internship

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

Mandatory			
T-MACH-113256	Internship	15 CR	Doppelbauer, Geimer

Competence Certificate
During the bachelor's program, students are required to complete an internship of at least 13 weeks, which is suitable for giving students an insight into practical work in the field of mechatronics and information technology. 15 credit points are assigned to the professional internship.

For the recognition of the professional internship, a proof of activity (internship certificate) of the company with the type and duration of the internship and an internship report are submitted to the responsible internship office. Both documents must be confirmed by the company by signature. Company here stands synonymously for firms, companies, etc., which include a recognized training facility (but not, for example, a GbR).

The nature of the individual activities must be evident from the proof. In case of ambiguity, the trainee's certificate, the traineeship contract, or further evidence can also be requested in the original.

Prerequisites
None

Competence Goal
The bachelor's degree program in Mechatronics and Information Technology includes an internship as part of the curriculum.

Its aim is to introduce the student to the special work of an engineer by working on concrete, technical tasks. Subject-related knowledge from practice is to be acquired and further impressions of the later professional environment as well as the position and responsibility within the company are to be gathered. As far as possible, the internship should also provide an insight into the company's organization and management.

After their work placement, students will be able to

- describe the principles of organizational structure (e.g. organizational structures) and process organization (e.g. work planning and work control) in a company,
- perform complex technical tasks under realistic conditions
- apply key qualifications such as initiative, teamwork and communication skills in addition to their technical practical experience and abilities,
- describe the technical and interdisciplinary requirements in the individual's intended future field of activity and take this into account for future study planning.

Content
The activities in the internship must correspond in content to those of an engineer. The activities can be chosen from the following areas:

- Industrial research and development,
- Design and work preparation,
- Assembly and commissioning,
- Production planning and control,
- maintenance, repair and servicing,
- Calculation, modeling and simulation,
- test planning, execution and evaluation,
- project and planning tasks,
- engineering services,
- other discipline-related complex activities (projects) according to the chosen specialization.

At least two different areas from these fields should be demonstrated. Activities from the field of a skilled worker are not recognized as a specialized internship.

Professional internships in higher education institutions are excluded.

Annotation
Further information are provided by the internship guidlines for the bachelor's degree program in Mechatronics and Information Technology.

Workload
450 hours

Learning type
Internship

M 9.17 Module: Introduction to Operations Research (WW1OR) [M-WIWI-101418]

Responsible: Prof. Dr. Stefan Nickel
Prof. Dr. Steffen Rebennack
Prof. Dr. Oliver Stein

Organisation: KIT Department of Economics and Management

Part of: Specialization in Mechatronics (Compulsary Elective Modules: Part 3: Electrical Engineering and Information Technology, Mechanical Engineering, Informatics, Economics and Management)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each summer term	2 terms	German	2	2

Mandatory			
T-WIWI-102758	Introduction to Operations Research I and II	9 CR	Nickel, Rebennack, Stein

Competence Certificate
The assessment of the module is carried out by a written examination (120 minutes).
In each term (usually in March and August), one examination is held for both courses.

Prerequisites
None

Competence Goal
The student

- names and describes basic notions of the essential topics in Operations Research (Linear programming, graphs and networks, integer and combinatorial optimization, nonlinear programming, dynamic programming and stochastic models),
- knows the indispensable methods and models for quantitative analysis,
- models and classifies optimization problems and chooses the appropriate solution methods to solve optimization problems independently,
- validates, illustrates and interprets the obtained solutions.

Content
This module treats the following topics: linear programming, network models, integer programming, nonlinear programming, dynamic programming, queuing theory, heuristic models.

This module forms the basis of a series of advanced lectures with a focus on both theoretical and practical aspects of Operations Research.

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

Workload
The total workload for this module is approx. 270 hours (attendance time: 85 hours, other time for preparation and follow-up as well as exam preparation: 185 hours, 9 credit points). The total number of hours per course results from the time spent attending the lectures and exercises, as well as the examination times and the time required for an average student to achieve the learning objectives of the module.

M 9.18 Module: Key Competences [M-MACH-106583]

Responsible: Prof. Dr.-Ing. Marcus Geimer
Organisation: KIT Department of Mechanical Engineering
Part of: Interdisciplinary Qualifications

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

Election notes
In the module Key Competences, one course each is taken in the elective block "Technology Ethics" and in the elective block "Key Competences".

Engineering Ethics (Election: 1 item)			
T-ETIT-111923	Ethics of Technology - ARs ReflecTIonis	2 CR	Kühler
T-GEISTSOZ-111509	Philosophy of Technology Assessment - Proseminar	3 CR	
T-GEISTSOZ-111511	Normative Aspects of Technology Assessment - Limits and Possibilities of a (Prospective) Technology Assessment - Advanced Seminar	3 CR	Hillerbrand
Key Competence (Election: 1 item)			
T-MACH-111684	Self-Booking-BSc-HOC-SPZ-ZAK-Non-Graded	2 CR	Heilmaier
T-MACH-111685	Self-Booking-BSc-HOC-SPZ-ZAK-Graded	2 CR	Heilmaier

Competence Certificate
Depending on the selected offer

Prerequisites
None

Content
Depending on the selected offer

Module grade calculation
ungraded

Workload
Depending on the selected offer

M 9.19 Module: Laboratory for Applied Machine Learning Algorithms [M-ETIT-104823]

Responsible: Prof. Dr.-Ing. Jürgen Becker
Prof. Dr.-Ing. Eric Sax
Prof. Dr. Wilhelm Stork

Organisation: KIT Department of Electrical Engineering and Information Technology

Part of: Specialization in Mechatronics (Compulsary Elective Modules: Part 1: Electrical Engineering and Information Technology)
Specialization in Mechatronics (Compulsary Elective Modules: Part 3: Electrical Engineering and Information Technology, Mechanical Engineering, Informatics, Economics and Management)

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

Mandatory			
T-ETIT-109839	Laboratory for Applied Machine Learning Algorithms	6 CR	Becker, Sax, Stork

Competence Certificate
Type of examination: alternative exam assessment
The examination consists of written reports, assement of team work, an oral presentation, and an oral exam at the end of the lecture period. The overall impression is rated.

M 9.20 Module: Linear Electric Circuits [M-ETIT-106417]

Responsible: Prof. Dr.-Ing. John Jelonnek
Prof. Dr. Sebastian Kempf
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: Engineering Fundamentals

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

Mandatory			
T-ETIT-113001	Linear Electronic Networks	6 CR	Jelonnek, Kempf
T-ETIT-109317	Linear Electronic Networks - Workshop A	1 CR	Leibfried, Lemmer
T-ETIT-109811	Linear Electronic Networks - Workshop B	1 CR	Nahm

M 9.21 Module: Material Science and Engineering (CIW-MACH-01) [M-MACH-102567]

Responsible: Dr.-Ing. Johannes Schneider
Organisation: KIT Department of Mechanical Engineering

Part of: Specialization in Mechatronics (Compulsary Elective Modules: Part 2: Mechanical Engineering)
Specialization in Mechatronics (Compulsary Elective Modules: Part 3: Electrical Engineering and Information Technology, Mechanical Engineering, Informatics, Economics and Management)

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

Mandatory			
T-MACH-105148	Examination Material Science I & II	9 CR	Schneider

Competence Certificate
oral exam

Prerequisites
None

Competence Goal
The students are able to describe the relationship between atomic structure, microscopical observations, and properties of solid materials.

The students can describe the typical property profiles and can name applications for the most important engineering materials.

The students are able to describe standard materials characterization methods and can explain the evaluation of these methods. They can judge materials on base of the data obtained by these methods.

The students are able to describe the basic mechanisms of hardening for ferrous and non-ferrous materials and reflect these mechanisms using phase and TTT diagrams.

The students can interpret given phase, TTT or other diagrams relevant for materials science, gather information from them and can correlate them regarding the microstructure evolution.

The students can describe the phenomena correlated with materials science in polymers, metals and ceramics and depict differences.

The students know about standard materials characterization methods and are able to asses materials on base of the data obtained by these methods.

Content
Atomic structure and atomic bonds

Structures of crystalline and amorphous solids

Defects in crystalline solids

Alloys

Transport and transformation phenomena in the solid state

Corrosion

Wear

Mechanical properties

Testing of materials

Ferrous materials

Non-ferrous metals and alloys

Polymers

Engineering ceramics

Composites

Module grade calculation
grade of the oral exam

Workload
regular attendance: 90 hours
self-study: 180 hours

Learning type
lectures and exercices

Literature
W. Bergmann: Werkstofftechnik I + II, Hanser Verlag, München, 2008/9
M. Merkel: Taschenbuch der Werkstoffe, Hanser Verlag, München, 2008
R. Schwab: Werkstoffkunde und Werkstoffprüfung für Dummies, Wiley VCH, Weinheim, 2011
J.F. Shackelford; Werkstofftechnologie für Ingenieure, Pearson Studium, München, 2008 (E-Book)
J.F. Shackelford,: Introduction to Materials Science for Engineers. Prentice Hall, 2008
lecture notes and lab script

M 9.22 Module: Measurement and Control Technology [M-ETIT-106339]

Responsible: Prof. Dr.-Ing. Michael Heizmann
Prof. Dr.-Ing. Sören Hohmann
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: Engineering Fundamentals

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

Mandatory			
T-ETIT-112852	Measurement and Control Technology	6 CR	Heizmann, Hohmann

Competence Certificate
The success control takes place in the form of a written examination of 120 minutes.

Prerequisites
none

Competence Goal

- Students have a sound knowledge of the theoretical fundamentals of measurement technology, including scaling of measured quantities, the SI system of units, model building for measurement systems, description and treatment of systematic and stochastic measurement deviations, obtaining and linearizing measurement characteristics and propagation of measurement uncertainties.
- Students master the procedure for the basic design of measurement systems, taking into account the above knowledge.
- Students are able to analyze tasks in measurement technology, synthesize possible solutions for measurement systems and assess the properties of the solution obtained.
- The aim is to teach the basics of control engineering, therefore students are able to recognize and work on basic control engineering problems. They know the relevant technical terms.
- Students are able to formally describe real processes and to derive requirements for control structures in the time and image domain for fixed value and sequential control systems.
- Students are able to analyze the dynamics of systems using graphical and algebraic methods.
- Students will be able to name controller design methods for single-loop, single-variable systems. They will be able to design perfect closed-loop and open-loop control systems.
- They can perform design steps using the Nyquist criterion and the Wurzelortz curve.
- Students can name structures for disturbance compensation, of multi-loop control loops and two degrees of freedom structures and perform design steps for them.
- Students can digitize closed-loop and open-loop controls designed in the image domain using fast sampling design.
- Students are familiar with computer-aided design procedures and can carry out substeps in them.

Content

- Description of measured quantities
  - Metric quantities and their properties
  - SI system of units
- Structure of measuring systems
- Measurement deviations
  - Systematic and stochastic deviations
- Curve fitting
  - Interpolation
  - Approximation
- Characteristic curves and their errors
  - Linearization of characteristic curves
  - Treatment of disturbance variables
- Uncertainty propagation
  - Error propagation
  - Guide to the Expression of Uncertainty in Measurement (GUM)
- Basic concepts of control engineering
  - Control loops
  - Control structures
  - Embedding in automation structures
- Description of systems in time and image domain
  - State space representation
  - Derivation of an I/O representation
  - Signal flow diagrams and control loop elements
  - Realization of controllers (analog and digital)
- Analysis of control loops in time and image domain
  - Stationary accuracy
  - Stability
  - Dynamics (bandwidth)
  - Robustness
- Design of single loop control loops
  - Perfect control
  - Design with the Nyquist criterion
  - Root locus curve
  - Heuristics
- Design of extended control loop structures
  - disturbance compensation
  - Meshing
  - Two degrees of freedom structure

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

Workload
Total approx. 180h, of which

Attendance time in lectures and exercises: 60h

Preparation and follow-up of the lectures and exercises: 60 hours

Exam preparation and presence in the same: 60h

Total: 180 LP = 6 LP

Recommendation
Knowledge of "Signale und Systeme" is helpfull

M 9.23 Module: Mechanical Design A [M-MACH-106527]

Responsible: Prof. Dr.-Ing. Tobias Düser
Prof. Dr.-Ing. Sven Matthiesen

Organisation: KIT Department of Electrical Engineering and Information Technology
KIT Department of Mechanical Engineering

Part of: Engineering Fundamentals

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

Mandatory			
T-MACH-112984	Mechanical Design A	6 CR	Matthiesen
T-MACH-112981	Mechanical Design A, Workshop	1 CR	Matthiesen

Competence Certificate
See individual courses

Prerequisites
None

Competence Goal
In mechanical design, students acquire skills in analysis and synthesis using examples. These include both individual machine elements such as bearings or springs and more complicated systems such as gears or couplings. After completing the machine design theory, the students are able to apply the contents learned to other technical systems - even those not known from the lecture - by transferring the principles of action and basic functions learned from examples to other contexts. This enables students to independently analyze unknown technical systems and synthesize suitable systems for given problems.

Content
MD A

- Springs
- Technical Systems
- Bearings
- Sealings
- Component Joints
- Gears

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

Annotation
None

Workload
MKL A: Total workload: 210 h, thereof attendance 75 h, divided into lecture + exercise: 4 SWS -> 60 h as well as workshop: 1 SWS -> 15 h; self-study 135 h

Recommendation
None

Learning type
Lectures, exercises and semester-long workshops as well as project work

Literature
Grundlagen der Berechnung und Gestaltung von Maschinenelementen; Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X oder Volltextzugriff über Uni-Katalog der Universitätsbibliothek

Grundlagen von Maschinenelementen für Antriebsaufgaben; Steinhilper, Sauer, Springer Verlag, ISBN 3-540-29629-8

Base for
None

M 9.24 Module: Mechanical Design B-C [M-MACH-106528]

Responsible: Prof. Dr.-Ing. Tobias Düser
Prof. Dr.-Ing. Sven Matthiesen

Organisation: KIT Department of Electrical Engineering and Information Technology
KIT Department of Mechanical Engineering

Part of: Specialization in Mechatronics (Compulsary Elective Modules: Part 2: Mechanical Engineering)
Specialization in Mechatronics (Compulsary Elective Modules: Part 3: Electrical Engineering and Information Technology, Mechanical Engineering, Informatics, Economics and Management)

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

Mandatory			
T-MACH-112985	Mechanical Design B and C	6 CR	Matthiesen
T-MACH-112982	Mechanical Design B, Workshop	3 CR	Matthiesen
T-MACH-112983	Mechanical Design C, Workshop	3 CR	Matthiesen

Competence Certificate
See individual courses

Prerequisites
None

Competence Goal
In mechanical design, students acquire skills in analysis and synthesis using examples. These include both individual machine elements such as bearings or springs and more complicated systems such as gears or couplings. After completing the machine design theory, the students are able to apply the contents learned to other technical systems - even those not known from the lecture - by transferring the principles of action and basic functions learned from examples to other contexts. This enables students to independently analyze unknown technical systems and synthesize suitable systems for given problems.

Content
MD B

- Design
- Tolerances & Fittings
- Gear Transmission
- Clutches

MD C

- Bolt connections
- Dimensioning
- Electric Motors + Hydraulics

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

Annotation
None

Workload
MKL B: Total workload: 180 h, thereof attendance: 67.5 h, divided into lecture + tutorial: 3 SWS -> 45 h and workshop: 1.5 SWS -> 22.5; self-study 112.5 h

MKL C: Total workload: 180 h, of which attendance: 67.5 h, divided into lecture + exercise: 3 SWS -> 45 h as well as workshop: 1.5 SWS -> 22.5; self-study 112.5 h

Recommendation
None

Learning type
Lectures, exercises and semester-long workshops as well as project work

Literature
Grundlagen der Berechnung und Gestaltung von Maschinenelementen; Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X oder Volltextzugriff über Uni-Katalog der Universitätsbibliothek

Grundlagen von Maschinenelementen für Antriebsaufgaben; Steinhilper, Sauer, Springer Verlag, ISBN 3-540-29629-8

Base for
None

M 9.25 Module: Mechano-Informatics and Robotics [M-INFO-100757]

Responsible: Prof. Dr.-Ing. Tamim Asfour
Organisation: KIT Department of Informatics
Part of: Specialization in Mechatronics (Compulsary Elective Modules: Part 3: Electrical Engineering and Information Technology, Mechanical Engineering, Informatics, Economics and Management)

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

Mandatory			
T-INFO-101294	Mechano-Informatics and Robotics	4 CR	Asfour

Competence Goal
Students understand the basics of the synergistic integration of methods from mechatronics, computer science and artificial intelligence using the example of humanoid robotics. They are acquainted with the basic concepts and methods of machine learning, the description of robot movements and actions as well as artificial neural networks and their application in robotics.

In particular, they are able to apply basic methods to problems and know relevant tools. Using research-oriented examples from humanoid robotics, students have learned – in an interactive way – to think analytically and to proceed in a structured and goal-oriented way when analyzing, formalizing and solving tasks.

Content
The lecture addresses topics at the interface between robotics and artificial intelligence, which are illustrated and explained based on examples from current research in the area of humanoid robotics. The lecture introduces fundamental algorithms in robotics and machine learning as well as methods for describing dynamical systems and representing robot motions and actions. This includes an introduction to artificial neural networks, the description of dynamical systems in state space as well as the learning of movement primitives. The topics and content are illustrated by practical examples from humanoid robotics.

Recommendation
Der Besuch des *Basispraktikums Mobile Roboter* wird empfohlen.

M 9.26 Module: Mechatronical Systems and Products [M-MACH-106493]

Responsible: Prof. Dr.-Ing. Sören Hohmann
Prof. Dr.-Ing. Sven Matthiesen

Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Fundamentals

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

Mandatory			
T-MACH-112988	Mechatronical Systems and Products	3 CR	Hohmann, Matthiesen
T-MACH-108680	Workshop Mechatronical Systems and Products	4 CR	Hohmann, Matthiesen

Competence Certificate
The control of success takes place in the context of a written examination (60 minutes) and an examination achievement of other kind

Prerequisites
None

Competence Goal
The students
- can describe the difficulties of interdisciplinary project work
- can coordinate processes, structures, areas of responsibility and interfaces within a project
- know different mechanical/electrical options for action to solve problems
- know the elements of the product development processes (PEP) covered and can explain the different views of a PEP
- know the basic principles of virtualized design and can apply the methods for virtual system design
- can recognize differences between virtuality and reality
- can explain the advantages of early validation
- can understand and apply description forms of the bond graph and ESB
- can set up and analyze multidomain models
- can apply methods for identification of model parameters

Translated with www.DeepL.com/Translator (free version)

Content
The students will learn theoretical basics in the lecture, which they will apply and deepen in a development task. The development task will be worked on in small groups in which the students organize themselves and divide the tasks independently. In the project work - the workshop Mechatronic Systems and Products - they work on a development task in teams. In the process, they go through various development phases, from the formulation of technical solution concepts to the development and validation of virtual prototypes and physical functional prototypes.

Module grade calculation
The module grade is composed of equal parts of the grades of the partial performances of the module.

Annotation
All relevant contents (script, exercise sheets, etc.) for the course can be obtained via the eLearning platform ILIAS. To participate in the course, please complete the survey registration and group assignment in ILIAS already before the start of the semester.

Workload
The total workload for this unit is approximately 210 hours (7.0 credits).

Recommendation
It is recommended that this module not be taken concurrently with other time-consuming workshops.

Learning type
Lecture, exercise and project work

Literature

Janschek, Klaus (2010): Systementwurf mechatronischer Systeme. Methoden - Modelle - Konzepte. Berlin, Heidelberg: Springer

Matthiesen, Sven (2021): Gestaltung – Prozess und Methoden. In: Beate Bender und Kilian Gericke (Hg.): Pahl/Beitz Konstruktionslehre. Berlin, Heidelberg: Springer Berlin Heidelberg, S. 397–465.

Base for

None

M 9.27 Module: Microenergy Technologies [M-MACH-102714]

Responsible: Prof. Dr. Manfred Kohl
Organisation: KIT Department of Mechanical Engineering

Part of: Master's Transfer Account

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

Mandatory			
T-MACH-105557	Microenergy Technologies	4 CR	Kohl

Competence Certificate
Oral exam: 45 min

Prerequisites
none

Competence Goal
The students can:

- describe the energy conversion principles and exemplify them
- explain the underlying concepts of thermodynamics and materials science
- illustrate the layout, fabrication and function of the treated devices
- calculate important properties (time constants, power output, efficiency, etc.)
- develop a layout based on specifications

Content
- Basic physical principles of energy conversion - Layout and design optimization - Technologies - Selected devices - Applications

The lecture includes amongst others the following topics:

- Micro energy harvesting of vibrations using different conversion principles (piezo, electrostatic, electromagnetic, etc.)
- Thermoelectric energy generation
- Novel thermal energy conversion principles (thermomagnetic, pyroelectric)
- Miniature scale solar devices
- RF energy harvesting
- Miniature scale heat pumping
- Solid-state cooling technologies (magneto-, electro-, mechanocalorics)
- Power management
- Energy storage technologies (microbatteries, supercapacito4rs, fuel cells)

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

Workload

Time of attendance:	15 * 1,5 h = 22,5 h
Preparation and follow up:	15 * 5,5 h = 82,5 h
Exam Preaparation and Exam:	15 h

Total: 120 h = 4 LP

Literature
- Lecture notes (overhead transparencies) „Micro Energy Technologies“
- Stephen Beeby, Neil White, Energy Harvesting for Autonomous Systems, Artech House, 2010
- Shashank Priya, Daniel J. Inman, Energy Harvesting Technologies, Springer, 2009

M 9.28 Module: Orientation Exam [M-MACH-106549]

Organisation: University
Part of: Orientation Exam

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

Mandatory			
T-MACH-112904	Engineering Mechanics I	6 CR	Böhlke, Langhoff
T-ETIT-113001	Linear Electronic Networks	6 CR	Jelonnek, Kempf
T-ETIT-109317	Linear Electronic Networks - Workshop A	1 CR	Leibfried, Lemmer
T-ETIT-109811	Linear Electronic Networks - Workshop B	1 CR	Nahm

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

Prerequisites
None

M 9.29 Module: Programming (IN1INPROG) [M-INFO-101174]

Responsible: Prof. Dr.-Ing. Anne Koziolek
Prof. Dr. Ralf Reussner

Organisation: KIT Department of Informatics

Part of: Specialization in Mechatronics (Compulsary Elective Modules: Part 3: Electrical Engineering and Information Technology, Mechanical Engineering, Informatics, Economics and Management)

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

Mandatory			
T-INFO-101967	Programming Pass	0 CR	Koziolek, Reussner
T-INFO-101531	Programming	5 CR	Koziolek, Reussner

Competence Goal
Students should learn

- basic structures of the programming language Java and how to apply them; in particular control and simple data structures, object orientation and implementation of basic algorithms
- basics of programming methodology and the ability to autonomously write executable small to medium sized Java programs

Content

- objects and classes
- types, values and variables
- methods
- control structures
- recursion
- references, lists
- inheritance
- input and output
- exceptions
- programming methodology
- implementation of basic algorithms in Java (such as sorting algorithms)

M 9.30 Module: Robotics I - Introduction to Robotics [M-INFO-100893]

Responsible: Prof. Dr.-Ing. Tamim Asfour
Organisation: KIT Department of Informatics
Part of: Specialization in Mechatronics (Compulsary Elective Modules: Part 3: Electrical Engineering and Information Technology, Mechanical Engineering, Informatics, Economics and Management)

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

Mandatory			
T-INFO-108014	Robotics I - Introduction to Robotics	6 CR	Asfour

Competence Certificate
See partial achivements (Teilleistung)

Prerequisites
See partial achivements (Teilleistung)

Competence Goal
The student is able to apply the presented concepts to simple and realistic tasks from robotics. This includes mastering and deriving the mathematical concepts relevant for robot modeling. Furthermore, the student masters the kinematic and dynamic modeling of robot systems, as well as the modeling and design of simple controllers. The student knows the algorithmic basics of motion and grasp planning and can apply these algorithms to problems in robotics. He/she knows algorithms from the field of image processing and is able to apply them to problems in robotics. He/she is able to model and solve tasks as a symbolic planning problem. The student has knowledge about intuitive programming procedures for robots and knows procedures for programming and learning by demonstration.

Content
The lecture provides an overview of the fundamentals of robotics using the examples of industrial robots, service robots and autonomous humanoid robots. An insight into all relevant topics is given. This includes methods and algorithms for robot modeling, control and motion planning, image processing and robot programming. First, mathematical basics and methods for kinematic and dynamic robot modeling, trajectory planning and control as well as algorithms for collision-free motion planning and grasp planning are covered. Subsequently, basics of image processing, intuitive robot programming especially by human demonstration and symbolic planning are presented.

In the exercise, the theoretical contents of the lecture are further illustrated with examples. Students deepen their knowledge of the methods and algorithms by independently working on problems and discussing them in the exercise. In particular, students can gain practical programming experience with tools and software libraries commonly used in robotics.

Workload
Lecture with 3 SWS + 1 SWS Tutorial, 6 LP
6 LP corresponds to 180 hours, including
15 * 3 = 45 hours attendance time (lecture)
15 * 1 = 15 hours attendance time (tutorial)
15 * 6 = 90 hours self-study and exercise sheets
30 hours preparation for the exam

M 9.31 Module: Seminar: Fundamentals of Embedded Systems [M-ETIT-105356]

Responsible: Prof. Dr.-Ing. Jürgen Becker
Prof. Dr.-Ing. Eric Sax
Prof. Dr. Wilhelm Stork

Organisation: KIT Department of Electrical Engineering and Information Technology

Part of: Specialization in Mechatronics (Compulsary Elective Modules: Part 1: Electrical Engineering and Information Technology)
Specialization in Mechatronics (Compulsary Elective Modules: Part 3: Electrical Engineering and Information Technology, Mechanical Engineering, Informatics, Economics and Management)

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

Mandatory			
T-ETIT-110832	Seminar: Fundamentals of Embedded Systems	4 CR	Becker, Sax, Stork

Competence Certificate
The success control takes the form of a written paper and a presentation. The overall impression is rated.

Prerequisites
none

Competence Goal
The participants of the seminar are able to familiarize themselves with a given technical topic, to identify all relevant aspects and to summarize the results. You can present the results of a work concisely in the form of a short text (4-page short paper) and an approximately 20-minute presentation in words and pictures (slides).

Content
In the seminar "Fundamentals of Embedded Systems", the students work on a given topic through literature and internet research under the guidance of the scientific staff and then in a short text (a 4-page short paper) and a roughly 20-minute lecture in words and Image (slides) shown to fellow students.

For this purpose, workshops on literature research, scientific writing and presentation techniques will take place as part of the seminar. The knowledge imparted can then be applied directly to the selected research topics.

Module grade calculation
The modul grade results from the paper and the presentation.

Workload
the workload includes:

1. independent work with a topic: 60h
2. writing a scientific article: 40h
3. preparation and giving of a presentation: 20h

Total: 120h = 4 LP

M 9.32 Module: Signals and Systems [M-ETIT-106372]

Responsible: Dr.-Ing. Mathias Kluwe
Prof. Dr.-Ing. Sander Wahls
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: Engineering Fundamentals

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

Mandatory			
T-ETIT-112860	Signals and Systems	7 CR	Kluwe, Wahls
T-ETIT-112861	Signals and Systems - Workshop	1 CR	Kluwe, Wahls

Competence Certificate
The assessment of success takes place in the form of a written examination lasting 120 minutes. In addition, the completion of the written work in the workshop is a prerequisite for passing the module.

Prerequisites
none

Competence Goal
The students master the basics, properties and calculation rules of the Laplace transformation and can apply these to solve linear differential equations.

• The students are able to use the Laplace transformation to describe time-continuous dynamic systems.

• The students know some basics of complex analysis in the context of integral transformations such as Laurent expansion and theorem of residuals.

• The students know the complex inverse formula of the La-place transformation and can use it for complicated image functions.

• The students know the two-sided Laplace transformation and master the basics, properties and calculation rules of the Fourier transformation.

• Students can use the Fourier transformation to describe time-continuous signals in the frequency domain.

• Students are familiar with the sampling theorem for converting time-continuous into time-discrete signals and can use the discrete Fourier transform to describe time-discrete signals in the frequency domain.

• The students are familiar with the basics, properties and calculation rules of the z-transformation.

• Students can use the z-transformation to describe time-discrete systems.

Content

- Laplace transform
  - Motivation and Definition
  - Properties and Examples
- Laplace transform of ordinary differential equations
  - Ordinary and generalized differentiation rule
  - Laplace transform of general linear differential equations with constant coefficients
  - Back transformation via the partial fraction decomposition of rational functions
  - Calculation rules of the Laplace transform (1): Integration rule and damping rule
  - Back transformation over the convolution rule of the Laplace transformation
  - Calculation rules of the Laplace transform (2): Displacement rules and limit theorems
- Characterization of the transfer behavior of dynamic systems with transfer and weight function
- Function theory: Laurent expansion, residual and residual theorem
- Complex inversion formula of the Laplace transformation
  - Derivation of the complex inverse formula
  - Calculation of the complex inverse integral
- Two-sided Laplace Transform and Fourier Transform
  - Two-sided Laplace Transform
  - Definition and properties of the Fourier transform
  - Calculation rules and correspondences of the Fourier transform
- z-Transform
  - Definition, properties and calculation rules of the z-transform
  - Use for the solution of difference equations
- Mathematical basics: Spaces
- Time-continuous signals
  - Fourier series
  - Fourier transform
  - Test signals
  - General signal properties
- Continuous-time systems
  - Properties
  - System description by differential equations
  - Laplace transform
  - System function
  - Frequency selective filters
- Discrete-Time Signals
  - Fourier transform of discrete-time signals
  - Sampling theorem
  - Discrete Fourier Transform
- Discrete-Time Systems
  - Properties
  - System description by difference equations
  - The z-transformation
  - System function
  - Discrete-time representation of continuous systems
  - Frequency selective filters

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

Workload
Total approx. 240h, of which

Attendance time in lectures and exercises: 75h

Preparation/follow-up of the lectures and exercises: 115h

3. Exam preparation and presence in the same: 25h

Preparation time for the workshop: 5h

Presence time in the workshop: 15h

Preparation of the protocol for the workshop: 5h

Total: 240 LP = 8 LP

Recommendation
Knowledge of HM3 is helpful.

M 9.33 Module: Supplementary Studies on Culture and Society [M-ZAK-106235]

Responsible: Dr. Christine Mielke
Christine Myglas

Organisation:

Part of: Additional Examinations

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

Election notes
With the exception of the final oral exam and the practice module, students have to self-record the achievements obtained in the Supplementary Studies on Culture and Society in their study plan. 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 ZAK homepage at https://www.zak.kit.edu/begleitstudium-bak.php. The title of the examination and the amount of credits override the modules placeholders.

If you want to use ZAK achievements **both for your interdisciplinary qualifications and for the supplementary studies**, please record them in the interdisciplinary qualifications first. You can then get in contact with the ZAK study services (stg@zak.kit.edu) to also record them in your supplementary studies.

In the in-depth module, achievements have to be obtained in three different areas. The areas are as follows:

- Technology & Responsibility
- Doing Culture
- Media & Aesthetics
- Spheres of Life
- Global Cultures

You have to obtain two achievements with 3 credits each and one achievement with 5 credits. To self-record achievements in the in-depth module, you first have to elect the matching partial achievement.

Note: If you registered for the Supplementary Studies on Sustainable Development before April 1st, 2023, self-recording an achievement in this module counts as a request in the sense of §20 (2) of the regulations for the Supplementary Studies on Culture and Society. Your overall grade for the supplementary studies will thus be calculated as the average of the examantion grades, not as the average of the module grades.

Mandatory			
T-ZAK-112653	Basics Module - Self Assignment BAK	3 CR	Mielke, Myglas
In-depth Module (Election: 3 items)			
T-ZAK-112654	In-depth Module - Technology & Responsibility - Self Assignment BAK	3 CR	Mielke, Myglas
T-ZAK-112655	In-depth Module - Doing Culture - Self Assignment BAK	3 CR	Mielke, Myglas
T-ZAK-112656	In-depth Module - Media & Aesthetics - Self Assignment BAK	3 CR	Mielke, Myglas
T-ZAK-112657	In-depth Module - Spheres of Life - Self Assignment BAK	3 CR	Mielke, Myglas
T-ZAK-112658	In-depth Module - Global Cultures - Self Assignment BAK	3 CR	Mielke, Myglas
Mandatory			
T-ZAK-112660	Practice Module	4 CR	Mielke, Myglas
T-ZAK-112659	Oral Exam - Supplementary Studies on Culture and Society	4 CR	Mielke, Myglas

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

They are composed of:

- minutes
- presentations
- a seminar paper
- an internship report
- an oral examination

After successful completion of the supplementary studies, the graduates receive a graded certificate and a KIT certificate.

Prerequisites
The offer is study-accompanying and does not have to be completed within a defined period of time. Enrolment or acceptance for graduation must be present when registering for the final examination.

KIT students register for the supplementary studies by selecting this module in the student portal and self-checking a performance. In addition, registration for the individual courses is necessary, which is possible shortly before the beginning of each semester.

The course catalogue, statutes (study regulations), registration form for the oral exam, and guides for preparing the various written performance requirements can be found as downloads on the ZAK homepage at www.zak.kit.edu/begleitstudium-bak.

Competence Goal
Graduates of the Supplementary Studies on Culture and Society demonstrate a sound basic knowledge of conditions, procedures and concepts for analysing and shaping fundamental social development tasks in connection with cultural topics. They have gained a well-founded theoretical and practical insight into various cultural studies and interdisciplinary topics in the field of tension between culture, technology and society in the sense of an expanded concept of culture.

They are able to place the contents selected from the specialization module in the basic context as well as to analyse and evaluate the contents of the selected courses independently and exemplarily and to communicate about them scientifically in written and oral form. Graduates are able to analyse social topics and problem areas and critically reflect on them in a socially responsible and sustainable perspective.

Content
The Supplementary Studies on Culture and Society can be started from the 1st semester and is not limited in time. It comprises at least 3 semesters. The supplementary studies are divided into 3 modules (basics, in-depth studies, practice). A total of 22 credit points (ECTS) are earned.

The thematic elective areas of the supplementary studies are divided into the following 5 modules and their sub-topics:

Block 1Technology & Responsibility

Value change / ethics of responsibility, technology development / history of technology, general ecology, sustainability

Block 2Doing Culture

Cultural studies, cultural management, creative industries, cultural institutions, cultural policy

Block 3Media & Aesthetics

Media communication, cultural aesthetics

Block 4Spheres of Life

Cultural sociology, cultural heritage, architecture and urban planning, industrial science

Block 5Global Cultures

Multiculturalism / interculturalism / transculturalism, science and culture

Module grade calculation
The overall grade of the supplementary studies is calculated as an average of the grades of the examination performances weighted with credit points.

In-depth Module

- presentation 1 (3 ECTS)
- presentation 2 (3 ECTS)
- seminar paper incl. presentation (5 ECTS)
- oral examination (4 ECTS)

Annotation
With the Supplementary Studies on Culture and Society, KIT provides a multidisciplinary study offer as an additional qualification, with which the respective specialized study program is supplemented by interdisciplinary basic knowledge and interdisciplinary orientation knowledge in the field of cultural studies, which is becoming increasingly important for all professions.

Within the framework of the supplementary studies, students acquire in-depth knowledge of various cultural studies and interdisciplinary subject areas in the field of tension between culture, technology and society. In addition to high culture in the classical sense, other cultural practices, common values and norms as well as historical perspectives of cultural developments and influences are considered.

In the courses, conditions, procedures and concepts for the analysis and design of fundamental social development tasks are acquired on the basis of an expanded concept of culture. This includes everything created by humans - also opinions, ideas, religious or other beliefs. The aim is to develop a modern concept of cultural diversity. This includes the cultural dimension of education, science and communication as well as the preservation of cultural heritage. (UNESCO, 1982)

According to § 16 of the statutes, a reference and a certificate are issued by the ZAK for the supplementary studies. The achievements are also shown in the transcript of records of the degree program and, upon request, in the certificate. They can also be recognized in the interdisciplinary qualifications (see elective information).

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

- basic module approx. 90 h
- in-depth module approx. 340 h
- practical module approx. 120 h

total: approx. 550 h

Learning type

- lectures
- seminars
- workshops
- practical course

Literature
Recommended reading of primary and specialized literature will be determined individually by each instructor.

M 9.34 Module: Supplementary Studies on Sustainable Development [M-ZAK-106099]

Responsible: Dr. Christine Mielke
Christine Myglas

Organisation:

Part of: Additional Examinations

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

Election notes
With the exception of the final oral exam, students have to self-record the achievements obtained in the Supplementary Studies on Sustainable Development in their study plan. 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 ZAK homepage at https://www.zak.kit.edu/begleitstudium-bene. The title of the examination and the amount of credits override the modules placeholders.

If you want to use ZAK achievements **both for your interdisciplinary qualifications and for the supplementary studies**, please record them in the interdisciplinary qualifications first. You can then get in contact with the ZAK study services (stg@zak.kit.edu) to also record them in your supplementary studies.

In the elective module, you need to obtain 6 credits worth of achievements in two of the four areas:

- Sustainable Cities & Neighbourhoods
- Sustainable Assessment of Technology
- Subject, Body, Individual: The Other Side of Sustainability
- Sustainability in Culture, Economy & Society

Usually, two achievements with 3 credits each have to be obtained. To self-record achievements in the elective module, you first have to elect the matching partial achievement.

Note: If you registered for the Supplementary Studies on Sustainable Development before April 1st, 2023, self-recording an achievement in this module counts as a request in the sense of §19 (2) of the regulations for the Supplementary Studies on Sustainable Development. Your overall grade for the supplementary studies will thus be calculated as the average of the examantion grades, not as the average of the module grades.

Mandatory			
T-ZAK-112345	Basics Module - Self Assignment BeNe	3 CR	Myglas
Elective Module (Election: at least 6 credits)			
T-ZAK-112347	Elective Module - Sustainable Cities and Neighbourhoods - Self Assignment BeNe	3 CR	
T-ZAK-112348	Elective Module - Sustainability Assessment of Technology - Self Assignment BeNe	3 CR	
T-ZAK-112349	Elective Module - Subject, Body, Individual: the Other Side of Sustainability - Self Assignment BeNe	3 CR	
T-ZAK-112350	Elective Module - Sustainability in Culture, Economy and Society - Self Assignment BeNe	3 CR	
Mandatory			
T-ZAK-112346	Specialisation Module - Self Assignment BeNe	6 CR	Myglas
T-ZAK-112351	Oral Exam - Supplementary Studies on Sustainable Development	4 CR	

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

They are composed of:

- protocols
- a reflection report
- presentations
- presentations
- the elaboration of a project work
- an individual term paper

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

Prerequisites
The course is offered during the course of study and does not have to be completed within a defined period of time. Enrolment is required for all performance assessments of the modules of 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 self-booking a performance. Registration for courses, performance assessments and examinations is regulated by § 6 of the Statutes and is usually possible shortly before the beginning of the semester.

The course catalogue, statutes (study regulations), registration form for the oral exam and guidelines for preparing the various written performance requirements can be found as downloads on the ZAK homepage at http://www.zak.kit.edu/begleitstudium-bene.

Competence Goal
Graduates of the supplementary studies in sustainable development acquire additional practical and professional competencies. Thus, the supplementary study program enables the acquisition of basics and initial experience in project management, trains teamwork skills, presentation skills and self-reflection, and also creates a fundamental understanding of sustainability that is relevant for all professional fields.

Graduates are able to analyse social topics and problem areas and critically reflect on them in a socially responsible and sustainable perspective. They are able to place the contents selected from the modules "Elective" and "Advanced" in the basic context as well as to independently and exemplarily analyse and evaluate the contents of the selected courses and to scientifically communicate about them in written and oral form.

Content
The supplementary study program Sustainable Development can be started from the 1st semester and is not limited in time. The wide range of courses offered by ZAK makes it possible to complete the program usually within three semesters. The supplementary studies comprise 19 credit points (LP). It consists of three modules: Basic Module, Elective Module and Advanced Module.

The thematic elective areas of the supplementary studies are divided into the following 4 modules and their subtopics in Module 2 (elective module):

Block 1 **Sustainable Cities and Neighbourhoods**

The courses provide an overview of the interaction of social, ecological, and economic dynamics in the microcosm of the city.

Block 2 **Sustainability Assessment of Technology**

Mostly based on ongoing research activities, methods and approaches of technology assessment are elaborated.

Block 3 **Subject, Body, Individual: The other Side of Sustainability**

Different approaches are presented to the individual perception, experience, shaping and responsibility of relationships to the environment and to oneself.

Block 4 **Sustainability in Culture, Economy & Society**

Courses usually have an interdisciplinary approach, but may also focus on one of the areas of culture, economics or society, both in application and in theory.

The core of the supplementary studies is a case study in the specialization area. In this project seminar, students conduct sustainability research with practical relevance themselves. The case study is supplemented by an oral examination with two topics from module 2 (elective module) and module 3 (in-depth module).

Module grade calculation
The overall grade of the supplementary studies is calculated as an average of the grades of the examination performances weighted with credit points.

Elective module

- Presentation 1 (3 ECTS)
- Presentation 2 (3 ECTS)

Advanced module

- individual term paper (6 ECTS)
- oral examination (4 ECTS)

Annotation
The Supplementary Studies on Sustainable Development at KIT is based on the conviction that a long-term socially and ecologically compatible coexistence in the global world is only possible if knowledge about necessary changes in science, economy and society is acquired and applied.

The interdisciplinary and transdisciplinary Studies on Sustainable Development enables diverse access to transformation knowledge as well as basic principles and application areas of sustainable development. According to the statutes § 16, a certificate is issued by the ZAK for the complementary studies.

The achievements are also shown in the transcript of records of the degree program and, upon request, in the certificate. They can also be recognized in the interdisciplinary qualifications (see elective information).
In the specialised studies, modules and partial achievements can be recognised within the framework of the additional achievements or e.g. the interdisciplinary qualifications. This must be regulated via the respective subject study programme.

The focus is on experience- and application-oriented knowledge and competences, but theories and methods are also learned. The aim is to be able to represent one's own actions as a student, researcher and later decision-maker as well as an individual and part of society under the aspect of sustainability.

Sustainability is understood as a guiding principle to which economic, scientific, social and individual actions should be oriented. According to this, the long-term and socially just use of natural resources and the material environment for a positive development of global society can only be addressed by means of integrative concepts. Therefore, "education for sustainable development" in the sense of the United Nations programme plays just as central a role as the goal of promoting "cultures of sustainability". For this purpose, practice-centred and research-based learning of sustainability is made possible and the broad concept of culture established at ZAK is used, which understands culture as habitual behaviour, lifestyle and changing context for social actions.

The supplementary study programme conveys the basics of project management, trains teamwork skills, presentation skills and self-reflection. Complementary to the specialised studies at KIT, it creates a fundamental understanding of sustainability, which is important for all professional fields. Integrative concepts and methods are essential: in order to use natural resources in the long term and to shape the global future in a socially just way, not only different disciplines, but also citizens, practitioners and institutions must work together.

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

- Basic module approx. 180 h
- Elective module approx. 150 h
- Consolidation module approx. 180 h

Total: approx. 510 h

Learning type

- lectures
- seminars
- workshops

Literature
Recommended reading of primary and specialist literature is determined individually by the respective lecturer.

M 9.35 Module: Systems Engineering and AI-Methods [M-ETIT-106474]

Responsible: Prof. Dr.-Ing. Eric Sax
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: Specialization in Mechatronics (Compulsary Elective Modules: Part 1: Electrical Engineering and Information Technology)
Specialization in Mechatronics (Compulsary Elective Modules: Part 3: Electrical Engineering and Information Technology, Mechanical Engineering, Informatics, Economics and Management)

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

Mandatory			
T-ETIT-113087	Introduction to Systems Engineering and AI-Methods	4 CR	Sax
T-ETIT-113146	Laboratory Systems Engineering and AI-Methods	2 CR	Sax

Prerequisites
none

M 9.36 Module: Systems Modeling [M-ETIT-106415]

Responsible: Prof. Dr.-Ing. Mike Barth
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: Engineering Fundamentals

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

Mandatory			
T-ETIT-112989	Systems Modeling	2 CR	Barth

Competence Certificate
Success is checked in the form of a written exam lasting 60 minutes.

Prerequisites
none

Competence Goal
The students:

- can apply the automaton design learned in Digital Technology in depth and transfer it to other event-discrete systems.
- know Petri nets and their design and switching logic with regard to automation-technical systems.
- can structure technical systems into different layers and hierarchies and know well-known system models.
- know basic mechatronic systems and their principles for exchanging information.
- can distinguish networked system architectures and assign technical terms of information technology.
- understand the depiction of systems in modeling hierarchies as well as their respective abstraction and goals
- understand the differences in modeling systems with distributed and with lumped parameters.
- know computer-based tools for modeling and simulating systems with concentrated parameters.

Content
Lecture (7 lecture units starting in early January)

- Systems modeling with spatially concentrated parameters.
- In-depth automata theory with a focus on automated systems.
- Petri nets in extension of the parallelizing possibilities of automata.
- Formal analysis of Petri nets regarding reachability.
- Basics for modeling simple continuous systems.
- System models and hierarchies of mechatronics and automation technology.
- Basic system concepts of mechatronic systems related to system architectures (OSI, cloud, edge, centralized, decentralized, orchestration, choreography, service architectures, virtualization).
- Description of systems with the help of signals (effects) between subsystems, block diagram.

Exercise

Accompanying the lecture, the basics of systems modeling with spatially concentrated parameters are deepened in the exercise. For this purpose, exercises are modeled and calculated together and the solution methods are discussed.

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

Annotation
This module starts at the beginning of January.

It is recommended to be taken by BSc MIT students in their 1st or 3rd semester.

Workload
Attendance time in 7 lectures and 3 exercisestwo: 10 * 1.5 h = 45 h

2. Preparation/follow-up of the same: 30 hours (approx. 2 hours per unit)

3. Exam preparation and presence in the same: = 10h + 1h

Total: 56 h = 2 CP

M 9.37 Module: Technical Thermodynamics and Heat Transfer I [M-MACH-102386]

Responsible: Prof. Dr. Ulrich Maas
Organisation: KIT Department of Mechanical Engineering

Part of: Specialization in Mechatronics (Compulsary Elective Modules: Part 2: Mechanical Engineering)
Specialization in Mechatronics (Compulsary Elective Modules: Part 3: Electrical Engineering and Information Technology, Mechanical Engineering, Informatics, Economics and Management)

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

Mandatory			
T-MACH-104747	Technical Thermodynamics and Heat Transfer I	8 CR	Maas
T-MACH-105204	Excercises in Technical Thermodynamics and Heat Transfer I *This item will not influence the grade calculation of this parent.*	0 CR	Maas

Competence Certificate
See individual courses

Competence Goal
The students acquire the competency to master the fundamentals of thermodynamics and the ability to apply this knowledge to problem-solving in various branches of mechanical engineering and especially in the energy technology sector.

An integral part of the module is that students can define the fundamental laws of thermodynamics and their applications. The students are competent in describing and comparing the main processes in energy conversion that are important in mechanical engineering. Using tools also applied in industry, they are capable of analyzing and rating the efficiency of processes. The students are capable of discussing the thermodynamic correlation of ideal gas mixtures, real gases, and humid air, as well as explaining the properties on a molecular basis and analyzing them with the help of the laws of thermodynamics.

Content

- System, properties of state
- Absolute temperature, model systems
- 1st law of thermodynamics for resting and moving systems
- Entropy and 2nd law of thermodynamics
- Behavior of real substances described by tables, diagrams and equations of state
- Machine processes
- Mixtures of ideal and real compounds

Module grade calculation
Grade of the written exam

Annotation
This module, including all brick details, exams and courses, is offered in German language.

For the Bachelor’s program Mechanical Engineering (International) the module (including all brick details, exams and courses) is offered in English.

Workload
Lectures and exercises: 75 h

Homework and preparation of examination: 165 h

Learning type
Lecture
Exercise course
Tutorial

Literature
Script

Additional literature will be provided in the lecture.

M 9.38 Module: Theory of Probability [M-ETIT-102104]

Responsible: Dr.-Ing. Holger Jäkel
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: Specialization in Mechatronics (Compulsary Elective Modules: Part 1: Electrical Engineering and Information Technology)
Specialization in Mechatronics (Compulsary Elective Modules: Part 3: Electrical Engineering and Information Technology, Mechanical Engineering, Informatics, Economics and Management)

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

Mandatory			
T-ETIT-101952	Theory of Probability	5 CR	Jäkel

Competence Certificate
Type of examination: written exam. Duration of examination: approx. 120 minutes.

Prerequisites
Contents of higher mathematics are necessary (e.g. M-MATH-101731 and M-MATH-101732).

Recommendation
Contents of digital technologies are recommanded (e.g. M-ETIT-102102).

10 Courses

T 10.1 Course: Philosophy of Technology Assessment - Proseminar [T-GEISTSOZ-111509]

Organisation: KIT Department of Humanities and Social Sciences
Part of: M-MACH-106583 - Key Competences

Type	Credits	Grading scale	Version
Examination of another type	3	Grade to a third	2

Events					
WT 23/24	5000046	Technikphilosophische Grundlagen der TA	2 SWS	Seminar / 🗣	Hillerbrand, Frigo, Milchram
Exams					
WT 23/24	7400565	Philosophy of Technology Assessment - Proseminar			Hillerbrand

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

Annotation
Seminar Language in English

This seminar will be held in English language. The impact of technology on (human) nature and society is undeniably. Environmental disasters, advance in medical technology as well as advances in algorithms and increase computational power change the world we live in, changes human nature, and also the way we think about ourselves. Technologies raise particular philosophical questions and may put longstanding philosophical disputes in a different light. This course aims to highlight some recent developments in philosophy of technology, thereby focusing on ethical and epistemic aspects.

The course thereby addresses students with and without philosophical education so far and aims to provide the philosophical literacy as needed for technology assessment. The seminar expects participants for 2 credit points to read the papers provided (in English language), participate in the discussion in class, and hand in the course assignments (questions on the texts to be answered in written form). For more credit points, a written course assignment is required.

T 10.2 Course: Actuators and Sensors in Nanotechnology [T-MACH-105238]

Responsible: Prof. Dr. Manfred Kohl
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102698 - Actuators and Sensors in Nanotechnology

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1

Events					
WT 23/24	2141866	Actuators and sensors in nanotechnology	2 SWS	Lecture /	Kohl, Sommer
Exams					
WT 23/24	76-T-MACH-105238	Actuators and Sensors in Nanotechnology			Kohl, Sommer

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

Competence Certificate
oral exam

Prerequisites
none

Below you will find excerpts from events related to this course:

V Actuators and sensors in nanotechnology

2141866, WS 23/24, 2 SWS, Language: German, Open in study portal

Lecture (V)
Blended (On-Site/Online)

T 10.3 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-MATH-102859 - Advanced Mathematics

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

Events					
WT 23/24	0131000	Höhere Mathematik I für die Fachrichtung Maschinenbau, Geodäsie, Materialwissenschaft und Werkstofftechnik	4 SWS	Lecture	Hettlich
WT 23/24	0131200	Höhere Mathematik I für die Fachrichtungen Chemieingenieurwesen, Verfahrenstechnik, Bioingenieurwesen und MIT	4 SWS	Lecture	Hettlich
Exams					
ST 2023	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 10.4 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-102859 - Advanced Mathematics

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

Events					
ST 2023	0180800	Höhere Mathematik II für die Fachrichtungen Maschinenbau, Geodäsie, Materialwissenschaft und Werkstofftechnik	4 SWS	Lecture	Hettlich
ST 2023	0181000	Höhere Mathematik II für die Fachrichtungen Chemieingenieurwesen, Verfahrenstechnik, Bioingenieurwesen und MIT	4 SWS	Lecture	Hettlich
Exams					
ST 2023	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 10.5 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-102859 - Advanced Mathematics

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

Events					
WT 23/24	0131400	Höhere Mathematik III für die Fachrichtungen Maschinenbau, Chemieingenieurwesen, Verfahrenstechnik, Bioingenieurwesen und das Lehramt Maschinenbau	4 SWS	Lecture	Arens
Exams					
ST 2023	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 10.6 Course: Bachelor's Thesis [T-MACH-113253]

Responsible: Prof. Dr.-Ing. Marcus Geimer
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-106579 - Bachelor's Thesis

Type	Credits	Grading scale	Recurrence	Version
Final Thesis	12	Grade to a third	Each term	1

Competence Certificate
The module Bachelor Thesis consists of a written elaboration (Bachelor Thesis) and an oral presentation of a self-chosen or given scientific topic. The students should show that they are able to work on a problem from their field of study independently and in a limited time according to scientific methods.

The date of the issue of the topic of the Bachelor's Thesis is to be recorded by the supervisor and the student and made a record of it at the Examination Board. The topic can only be returned once and only within the first month of the processing period. The Examination Board determines the languages in which the Bachelor's Thesis can be written.

The scope of the module Bachelor Thesis corresponds to 15 credit points (written elaboration 12 LP, oral presentation 3 LP). The topic and task must be adapted to the planned workload. For example, if the student works 30 hours per week, the thesis should be ready for submission after 12 weeks.

The maximum processing time is 6 months. The presentation must take place within the maximum processing time, but no later than six weeks after submission of the Bachelor Thesis. Upon justified application by the student, the Examination Board may extend the processing time by a maximum of one month. If the Bachelor's Thesis is not handed in on time, it is considered to be graded as "failed" (5.0), unless the student is not responsible for this failure.

The Bachelor Thesis is evaluated by at least one professor at KIT or a habilitated member of the KIT Department of Electrical Engineering and Information Technology or a habilitated member of the KIT Department of Mechanical Engineering and one further examiner. As a rule, one of the examiners is the person who assigned the thesis. In case of disagreement between these two persons, the Examination Board determines the grade of the Bachelor Thesis within the framework of the evaluation of these two persons; it may also appoint another examiner. The assessment must be made within six weeks after submission of the Bachelor Thesis.

Prerequisites
The requirement for admission to the Bachelor’s Thesis module are 120 ECTS. As to exceptions, the Examination Board decides on a request of the student.

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

Submission deadline	6 months
Maximum extension period	1 months
Correction period	6 weeks

This thesis requires confirmation by the examination office.

T 10.7 Course: Basics Module - Self Assignment BAK [T-ZAK-112653]

Responsible: Dr. Christine Mielke
Christine Myglas

Organisation:

Part of: M-ZAK-106235 - Supplementary Studies on Culture and Society

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

Competence Certificate
The monitoring in this module includes a course credit according to § 5 section 4 in the form of minutes of which two are to be handed in freely chosen topics of the lecture series " Introduction to Applied Studies on Culture and Society ". Length: approx. 6,000 characters each (incl. spaces).

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

- Zentrum für Angewandte Kulturwissenschaft und Studium Generale
- ZAK Begleitstudium

Recommendation
Fjordevik, Anneli und Jörg Roche: Angewandte Kulturwissenschaften. Vol. 10. Narr Francke Attempto Verlag, 2019.

Annotation
The Basic Module consists of the lecture “Introduction to Supplementary Studies on Culture and Society”, which is offered only in the winter semester. It is therefore recommended that students start their studies in the winter semester and complete them before module 2.

T 10.8 Course: Basics Module - Self Assignment BeNe [T-ZAK-112345]

Responsible: Christine Myglas
Organisation:
Part of: M-ZAK-106099 - Supplementary Studies on Sustainable Development

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

Competence Certificate
The monitoring in this module includes a course credit according to § 5 section 4:

Introduction to Sustainable Development in the form of minutes of which two are to be handed in freely chosen topics of the lecture series "Introduction to Sustainable Development". Length: approx. 6,000 characters each (incl. spaces).

or

Sustainability Spring Days at KIT in the form of a reflection report on all components of the project days "Sustainability Spring Days at KIT". Length approx. 12,000 characters (incl. spaces).

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:

- Zentrum für Angewandte Kulturwissenschaft und Studium Generale
- ZAK Begleitstudium

Recommendation
Kropp, Ariane: Grundlagen der Nachhaltigen Entwicklung: Handlungsmöglichkeiten und Strategien zur Umsetzung. Springer-Verlag, 2018.

Pufé, Iris: Nachhaltigkeit. 3. überarb. Edition, UTB, 2017.

Roorda, Niko, et al.: Grundlagen der nachhaltigen Entwicklung. Springer-Verlag, 2021.

Annotation
Module Basics consists of the lecture " Introduction to Sustainable Development ", which is only offered in the summer semester or alternatively of the project days " Sustainability Spring Days at KIT ", which is only offered in the winter semester. It is recommended to complete the course before Elective Module an Specialisation Module.

In exceptional cases, Elective Module or Specialisation Module can also be completed simultaneously with Basics Module. However, the prior completion of the advanced modules Elective and Specialisation should be avoided.

T 10.9 Course: Basics of Manufacturing Technology [T-MACH-112928]

Responsible: Prof. Dr.-Ing. Volker Schulze
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-106535 - Basics of Manufacturing Technology

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

Events					
WT 23/24	2149658	Basics of Manufacturing Technology	2 SWS	Lecture / Practice /	Schulze
Exams					
WT 23/24	76-T-MACH-112928	Basics of Manufacturing Technology			Schulze

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

Competence Certificate
written exam (duration: 60 min)

Prerequisites
none

Below you will find excerpts from events related to this course:

V Basics of Manufacturing Technology

2149658, WS 23/24, 2 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
Blended (On-Site/Online)

Content
The objective of the lecture is to classify the manufacturing technology within the wider context of production engineering, to provide an overview of the different manufacturing processes and to establish basic process knowledge of the common processes. The lecture conveys the basic principles of manufacturing technology and deals with the manufacturing processes based on example components according to their classification into main groups regarding technical and economic aspects. Regard is paid to classic manufacturing processes as well as new developments like additive manufacturing processes.

The following topics will be covered:

- Primary processing (casting, plastics engineering, sintering, additive manufacturing processes)
- Forming (sheet-metal forming, massive forming)
- Cutting (machining with geometrically defined and geometrically undefined cutting edges, separating, abrading)
- Joining
- Coating
- Heat treatment and surface treatment

Learning Outcomes:

The students ...

- are able to classify the manufacturing processes by their general functionality according to the specific main groups (DIN 8580).
- have the ability to declare and explain the function of the significant manufacturing processes of the main groups (DIN 8580).
- are enabled to describe the characteristic process features (geometry, materials, accuracy, tools, machines) of the significant manufacturing processes of the main groups (DIN 8580).
- have the ability to derive the relevant process specific technical advantages and disadvantages of the characteristic process features.
- are enabled to perform a selection of suitable manufacturing processes for given components.
- are enabled to classify the required manufacturing processes in the expiry of a process chain for the production of given sample products.

Workload:

regular attendance: 30 hours
self-study: 60 hours

Literature
Medien:
Skript zur Veranstaltung wird über ilias (https://ilias.studium.kit.edu/)
bereitgestellt.

Media:
Lecture notes will be provided in ilias (https://ilias.studium.kit.edu/).

T 10.10 Course: Elective Module - Subject, Body, Individual: the Other Side of Sustainability - Self Assignment BeNe [T-ZAK-112349]

Organisation:

Part of: M-ZAK-106099 - Supplementary Studies on Sustainable Development

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

Competence Certificate
Examination of another kind according to § 7 section 7 in the form of a presentation in the selected course.

Prerequisites
Prerequisite for the 'Oral Examination' is the successful completion of Modules 1 and 3 and the required elective sections in Module 2.

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

- Zentrum für Angewandte Kulturwissenschaft und Studium Generale
- ZAK Begleitstudium

Recommendation
The content of the Basics Module is helpful.

T 10.11 Course: Elective Module - Sustainability Assessment of Technology - Self Assignment BeNe [T-ZAK-112348]

Organisation:

Part of: M-ZAK-106099 - Supplementary Studies on Sustainable Development

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

Competence Certificate
Examination of another kind according to § 7 section 7 in the form of a presentation in the selected course.

Prerequisites
Prerequisite for the 'Oral Examination' is the successful completion of Modules 1 and 3 and the required elective sections in Module 2.

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

- Zentrum für Angewandte Kulturwissenschaft und Studium Generale
- ZAK Begleitstudium

Recommendation
The content of the Basics Module is helpful.

T 10.12 Course: Elective Module - Sustainability in Culture, Economy and Society - Self Assignment BeNe [T-ZAK-112350]

Organisation:

Part of: M-ZAK-106099 - Supplementary Studies on Sustainable Development

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

Competence Certificate
Examination of another kind according to § 7 section 7 in the form of a presentation in the selected course.

Prerequisites
Prerequisite for the 'Oral Examination' is the successful completion of Modules 1 and 3 and the required elective sections in Module 2.

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

- Zentrum für Angewandte Kulturwissenschaft und Studium Generale
- ZAK Begleitstudium

Recommendation
The content of the Basics Module is helpful.

T 10.13 Course: Elective Module - Sustainable Cities and Neighbourhoods - Self Assignment BeNe [T-ZAK-112347]

Organisation: University

Part of: M-ZAK-106099 - Supplementary Studies on Sustainable Development

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

Competence Certificate
Examination of another kind according to § 7 section 7 in the form of a presentation in the selected course.

Prerequisites
Prerequisite for the 'Oral Examination' is the successful completion of Modules 1 and 3 and the required elective sections in Module 2.

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

- Zentrum für Angewandte Kulturwissenschaft und Studium Generale
- ZAK Begleitstudium

Recommendation
The content of the Basics Module is helpful.

T 10.14 Course: Electric Energy Systems [T-ETIT-112850]

Responsible: Prof. Dr.-Ing. Marc Hiller
Prof. Dr.-Ing. Thomas Leibfried

Organisation: KIT Department of Electrical Engineering and Information Technology

Part of: M-ETIT-106337 - Electric Energy Systems

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

Prerequisites
none

T 10.15 Course: Electromagnetic Fields [T-ETIT-113004]

Responsible: Prof. Dr. Martin Doppelbauer
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-ETIT-106419 - Electromagnetic Fields

Type	Credits	Grading scale	Recurrence	Version
Written examination	4	Grade to a third	Each winter term	1

Prerequisites
none

T 10.16 Course: Electromagnetic Waves [T-ETIT-113084]

Responsible: Prof. Dr.-Ing. Sebastian Randel
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-ETIT-106471 - Electromagnetic Waves

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

Prerequisites
none

T 10.17 Course: Electronic Devices and Circuits [T-ETIT-109318]

Responsible: Prof. Dr.-Ing. Ahmet Cagri Ulusoy
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-ETIT-104465 - Electronic Devices and Circuits

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	6	Grade to a third	Each summer term	1 terms	2

Events					
ST 2023	2308655	Electronic Devices and Circuits	3 SWS	Lecture / 🗣	Ulusoy
ST 2023	2308657	Übungen zu 2312655 Elektronische Schaltungen	1 SWS	Practice / 🗣	Ulusoy
ST 2023	2308658	Tutorien zu 2312655 Elektronische Schaltungen		/ 🗣	Ulusoy
Exams					
ST 2023	7308655	Electronic Devices and Circuits			Ulusoy
WT 23/24	7308655	Electronic Devices and Circuits			Ulusoy

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

T 10.18 Course: Electronic Devices and Circuits - Workshop [T-ETIT-109138]

Responsible: Prof. Dr.-Ing. Thomas Zwick
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-ETIT-104465 - Electronic Devices and Circuits

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

Events					
ST 2023	2308450	Elektronische Schaltungen - Workshop	1 SWS	Practical course / 🗣	Zwick
Exams					
ST 2023	7308450-1	Electronic Devices an Circuits - Workshop			Zwick, Ulusoy

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

T 10.19 Course: Engineering Mechanics I [T-MACH-112904]

Responsible: Prof. Dr.-Ing. Thomas Böhlke
Dr.-Ing. Tom-Alexander Langhoff

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-106374 - Engineering Mechanics
M-MACH-106549 - Orientation Exam

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

Events					
WT 23/24	2161245	Engineering Mechanics I	3 SWS	Lecture / 🗣	Böhlke
Exams					
WT 23/24	76-T-MACH-100282	Engineering Mechanics I			Böhlke, Langhoff

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

Competence Certificate
written exam, 90 minutes, graded. Additives as announced

Prerequisites
Coursework in *Tutorial Engineering Mechanics I* (T-MACH-112907) must be passed

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-112907 - Tutorial Engineering Mechanics I must have been passed.

Below you will find excerpts from events related to this course:

V Engineering Mechanics I

2161245, WS 23/24, 3 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

- Basics of vector calculus
- Force systems
- Statics of rigid bodies
- Internal forces and moments in bars and beams
- Friction
- Centre of gravity, centre of mass
- Work, energy, principle of virtual work
- Statics of inextensible ropes
- Elastostatics of tension-compression- bars

Literature

- Vorlesungsskript
- Hibbeler, R.C: Technische Mechanik 1 - Statik. Prentice Hall. Pearson Studium 2005
- Gross, D. et al.: Technische Mechanik 1 - Statik. Springer 2006
- Gummert, P.; Reckling, K.-A.: Mechanik. Vieweg 1994
- Parkus, H.: Mechanik der festen Körper. Springer 1988

T 10.20 Course: Engineering Mechanics II [T-MACH-112905]

Responsible: Prof. Dr.-Ing. Thomas Böhlke
Dr.-Ing. Tom-Alexander Langhoff
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-106374 - Engineering Mechanics

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

Events					
ST 2023	2162250	Engineering Mechanics II	3 SWS	Lecture / 🗣	Böhlke, Langhoff
Exams					
ST 2023	76-T-MACH-100283	Engineering Mechanics II			Böhlke, Langhoff

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

Competence Certificate
written exam, 90 minutes, graded. Additives as announced

Prerequisites
Coursework in *Tutorial Engineering Mechanics II* (T-MACH-112908) must be passed

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-112908 - Tutorial Engineering Mechanics II must have been passed.

Below you will find excerpts from events related to this course:

V Engineering Mechanics II

2162250, SS 2023, 3 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

- bending
- shear
- torsion
- stress and strain state in 3D
- Hooke's law in 3D
- elasticity theors in 3D
- energy methods in elastostatics
- approximation methods
- stability of elastic bars

Literature
Vorlesungsskript
Hibbeler, R.C: Technische Mechanik 2 - Festigkeitslehre. Prentice Hall. Pearson Studium 2005.
Gross, D. et al.: Technische Mechanik 2 - Elastostatik. Springer 2006.
Gummert, P.; Reckling, K.-A.: Mechanik. Vieweg 1994.
Parkus, H.: Mechanik der festen Körper. Springer 1988.

T 10.21 Course: Engineering Mechanics III [T-MACH-112906]

Responsible: Prof. Dr.-Ing. Carsten Proppe
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-106374 - Engineering Mechanics

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

Competence Certificate
Written exam, duration: 180 minutes

Prerequisites
Coursework in *Tutorial Engineering Mechanics III* (T-MACH-112909) must have been passed

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-112909 - Tutorial Engineering Mechanics III must have been passed.

T 10.22 Course: Ethics of Technology - ARs ReflecTIonis [T-ETIT-111923]

Responsible: Dr. phil. Michael Kühler
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-MACH-106583 - Key Competences

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

Events					
ST 2023	9003013	ARS REFLECTIONIS. Thinking and Acting Responsibly in Engineering, Science, and Innovation		Block /	Kühler, Does
WT 23/24	9003013	ARS REFLECTIONIS. Thinking and Acting Responsibly in Engineering, Science, and Innovation		Block /	Kühler, Does
Exams					
ST 2023	9900002	ARS REFLECTIONIS. Thinking and Acting Responsibly in Engineering, Science, and Innovation			
WT 23/24	9900017	ARS REFLECTIONIS. Thinking and Acting Responsibly in Engineering, Science, and Innovation			

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

Prerequisites
none

Below you will find excerpts from events related to this course:

V ARS REFLECTIONIS. Thinking and Acting Responsibly in Engineering, Science, and Innovation

Block (B) Online

9003013, SS 2023, SWS, Language: German, Open in study portal

Content
ARs ReflecTIonis is an online modular self-study course. Its aim is to enable students to reflect critically on ethical challenges of their disciplines and their later professional work. The course allows for combining general components on ethics and normative argumentation with components on concrete questions about responsible decision-making, tailor-made for specific areas of study at the KIT. Each component consists of a video micro-lecture, which can be viewed on ILIAS, and further material for self-study. Optionally, Q&A sessions and workshops are offered to give students the opportunity to ask questions individually and discuss the topics directly and more in-depth with teachers. The course is completed via a multiple-choice test.

The course is offered – and continually developed further – by the Academy for Responsible Research, Teaching, and Innovation (ARRTI) in cooperation with the House of Competence (HoC).

No maximum number of participants. Registration possible at any time.

Additional information and links can be found here:

https://www.arrti.kit.edu/736.php

Link to ILIAS course:

https://ilias.studium.kit.edu/goto.php?target=crs_2060880&client_id=produktiv

Work Expenditure:

2 ECTS: Multiple Choice Test

Lecturers:

Michael Kühler and Elisabeth Does are research associates at the Academy for Responsible Research, Teaching, and Innovation (ARRTI) at KIT. In the "Teaching" team, they are responsible for developing and offering innovative event offerings around questions of ethics and responsibility. Together they support students in developing their ability for critical ethical reflection.

Michael Kühler has a broad philosophical as well as special expertise in technology ethics and can support students especially in these areas.

Elisabeth Does has expertise in philosophy as well as social and economic sciences and can support students especially in interdisciplinary issues.

Organizational issues
Onlinekurs im Selbststudium: Zur Teilnahme bitte auf studium.hoc.kit.edu und auf Ilias anmelden.

Keine Teilnahmebeschränkung, Anmeldung fortlaufend möglich.

V ARS REFLECTIONIS. Thinking and Acting Responsibly in Engineering, Science, and Innovation

Block (B) Online

9003013, WS 23/24, SWS, Language: German, Open in study portal

Content
ARs ReflecTIonis is an online modular self-study course. Its aim is to enable students to reflect critically on ethical challenges of their disciplines and their later professional work. The course allows for combining general components on ethics and normative argumentation with components on concrete questions about responsible decision-making, tailor-made for specific areas of study at the KIT. Each component consists of a video micro-lecture, which can be viewed on ILIAS, and further material for self-study. Optionally, Q&A sessions and workshops are offered to give students the opportunity to ask questions individually and discuss the topics directly and more in-depth with teachers. The course is completed via a multiple-choice test.

The course is offered—and continually developed further—by the Academy for Responsible Research, Teaching, and Innovation (ARRTI) in cooperation with the

House of Competence (HoC).

Workload:

2 ECTS: Multiple Choice Test

Weitere Infos und Links:

https://www.arrti.kit.edu/736.php

Organizational issues
Onlinekurs im Selbststudium: Zur Teilnahme bitte auf studium@hoc.kit.edu und auf Ilias anmelden. Anmeldung jederzeit möglich

T 10.23 Course: Examination Material Science I & II [T-MACH-105148]

Responsible: Dr.-Ing. Johannes Schneider
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102567 - Material Science and Engineering

Type	Credits	Grading scale	Recurrence	Version
Oral examination	9	Grade to a third	Each winter term	1

Events					
ST 2023	2182562	Materials Science and Engineering II for ciw, vt, mit	4 SWS	Lecture / Practice / 🗣	Schneider
WT 23/24	2181555	Materials Science and Engineering I for ciw, vt, MIT	4 SWS	Lecture / Practice / 🗣	Schneider
Exams					
ST 2023	76-T-MACH-105148	Examination Material Science I & II			Schneider

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

Competence Certificate
oral; 30 to 40 minutes

No tools and reference tools are allowed!

Prerequisites
none

Below you will find excerpts from events related to this course:

V Materials Science and Engineering II for ciw, vt, mit

2182562, SS 2023, 4 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Content
Ferrous materials

Non-ferrous metals and alloys

Polymers

Engineering ceramics

Composites

The students are able to describe the relationship between atomic structure, microscopical observations, and properties of solid materials.

The students can name representative materials for different material classes and can describe the differences.

The students are able to describe the basic mechanisms of hardening for ferrous and non-ferrous materials and reflect these mechanisms using phase and TTT diagrams.

The students can interpret given phase, TTT or other diagrams relevant for materials science, gather information from them and can correlate them regarding the microstructure evolution.

The students can describe the phenomena correlated with materials science in polymers, metals and ceramics and depict differences.

The students know about standard materials characterization methods and are able to asses materials on base of the data obtained by these methods.

regular attendance: 45 hours
self-study: 105 hours

Combined oral exam with Materials Science and Engineering I; 30 to 40 minutes

No tools and reference tools are allowed!

Literature
Vorlesungsskript

Übungsaufgabenblätter

W. Bergmann: Werkstofftechnik I + II, Hanser Verlag, München, 2008/9

M. Merkel: Taschenbuch der Werkstoffe, Hanser Verlag, München, 2008

R. Schwab: Werkstoffkunde und Werkstoffprüfung für Dummies, Wiley VCH, Weinheim, 2011

J.F. Shackelford; Werkstofftechnologie für Ingenieure, Pearson Studium, München, 2008 (E-Book)

V

Materials Science and Engineering I for ciw, vt, MIT

2181555, WS 23/24, 4 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Content
Atomic structure and atomic bonds

Structures of crystalline and amorphous solids

Defects in crystalline solids

Alloys

Transport and transformation phenomena in the solid state

Corrosion

Wear

Mechanical properties

Testing of materials

The students are able to describe the relationship between atomic structure, microscopical observations, and properties of solid materials.

The students can describe the typical property profiles and can name applications for the most important engineering materials.

The students are able to describe standard materials characterization methods and can explain the evaluation of these methods. They can judge materials on base of the data obtained by these methods.

regular attendance: 45 hours
self-study: 75 hours

Oral exam in combination with Materials Science and Engineering II; oral; 30 to 40 minutes

No tools and reference tools are allowed!

Literature
Vorlesungsskript

Aufgabenblätter

W. Bergmann: Werkstofftechnik I + II, Hanser Verlag, München, 2008/9

M. Merkel: Taschenbuch der Werkstoffe, Hanser Verlag, München, 2008

R. Schwab: Werkstoffkunde und Werkstoffprüfung für Dummies, Wiley VCH, Weinheim, 2019

J.F. Shackelford; Werkstofftechnologie für Ingenieure, Pearson Studium, München, 2007

J.F. Shackelford: Introduction to Materials Science for Engineers. Pearson, 2014

W. D. Callister: Materials Science and Engineering. John Wiley & Sons, 2020

M. Ashby: Materials. Elsevier, 2018

M. Ashby: Materials Selection in Mechanical Design. Elsevier, 2016

T 10.24 Course: Excercises in Technical Thermodynamics and Heat Transfer I [T-MACH-105204]

Responsible: Prof. Dr. Ulrich Maas
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102386 - Technical Thermodynamics and Heat Transfer I

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

Events					
WT 23/24	2165502	Exercise course Technical Thermodynamics and Heat Transfer I	2 SWS	Practice / 🗣	Maas
WT 23/24	3165015	Technical Thermodynamics and Heat Transfer I (Tutorial)	2 SWS	Tutorial / 🗣	Schießl, Maas
Exams					
ST 2023	76-T-MACH-105204	Excercises in Technical Thermodynamics and Heat Transfer I			Maas, Schießl
WT 23/24	76-T-MACH-105204	Excercises in Technical Thermodynamics and Heat Transfer I			Maas, Schießl

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

Competence Certificate
Successful completion of written preliminary tests.

Prerequisites
none

T 10.25 Course: Fluid Mechanics [T-MACH-112933]

Responsible: Prof. Dr.-Ing. Bettina Frohnapfel
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-106378 - Fluid Mechanics

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

Competence Certificate
Written exam 2h

Prerequisites
none

T 10.26 Course: Fundamentals of Data Transmission [T-ETIT-112851]

Responsible: Prof. Dr.-Ing. Laurent Schmalen
Prof. Dr.-Ing. Thomas Zwick

Organisation: KIT Department of Electrical Engineering and Information Technology

Part of: M-ETIT-106338 - Fundamentals of Data Transmission

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

Competence Certificate
The assessment of success takes place in the form of a written examination lasting 120 minutes. The module grade is the grade of the written examination.

Prerequisites
none

T 10.27 Course: Fundamentals of Digital Technology [T-ETIT-112872]

Responsible: Prof. Dr.-Ing. Jürgen Becker
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-ETIT-106407 - Fundamentals of Digital Technology

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	4	Grade to a third	Each winter term	1 terms	1

Events					
WT 23/24	2311613	Accompanying group tutorial for 2311615 Digital Technology / Fundamentals of Digital Technology		Tutorial / 🗣	Höfer
WT 23/24	2311615	Digital Technology / Fundamentals of Digital Technology	3 SWS	Lecture / 🧩	Becker
WT 23/24	2311617	Tutorial for 2311615 Digital Technology / Fundamentals of Digital Technology	1 SWS	Practice / 🧩	Höfer
Exams					
WT 23/24	73116152	Fundamentals of Digital Technology			Becker

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

Prerequisites
none

T 10.28 Course: Hybrid and Electric Vehicles [T-ETIT-100784]

Responsible: Prof. Dr. Martin Doppelbauer
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-ETIT-100514 - Hybrid and Electric Vehicles

Type	Credits	Grading scale	Recurrence	Version
Written examination	4	Grade to a third	Each winter term	1

Events					
WT 23/24	2306321	Hybrid and Electric Vehicles	2 SWS	Lecture /	Doppelbauer
WT 23/24	2306323	Tutorial for 2306323 Hybrid and Electric Vehicles	1 SWS	Practice /	Doppelbauer
Exams					
ST 2023	7306321	Hybrid and Electric Vehicles			Doppelbauer
WT 23/24	7306321	Hybrid and Electric Vehicles			Doppelbauer

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

Prerequisites
none

T 10.29 Course: In-depth Module - Doing Culture - Self Assignment BAK [T-ZAK-112655]

Responsible: Dr. Christine Mielke
Christine Myglas

Organisation:

Part of: M-ZAK-106235 - Supplementary Studies on Culture and Society

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

Competence Certificate
At least two presentations must be given: An examination of another kind according to § 5 section 3 (3) in the form of a presentation in one of the chosen courses (3 ECT).
In a third seminar, either (a) a presentation is held (preliminary study achievement) which remains not graded and a topic-related term paper is submitted or (b) a written exam is taken.
The three courses can be selected individually from the 5 thematic blocks or – in exceptional cases and according to the agreement with the responsible lecturer – all three courses can be selected from one block in the sense of a specialization.
In addition, an oral examination is taken, which relates to the content of two of the chosen three courses.

Prerequisites
Prerequisite for the 'Oral Examination' is the successful completion of Modules 1 and 3 and the required elective sections in Module 2.

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

- Zentrum für Angewandte Kulturwissenschaft und Studium Generale
- ZAK Begleitstudium

Annotation
The content of the Basic Modul is helpful.

T 10.30 Course: In-depth Module - Global Cultures - Self Assignment BAK [T-ZAK-112658]

Responsible: Dr. Christine Mielke
Christine Myglas

Organisation:

Part of: M-ZAK-106235 - Supplementary Studies on Culture and Society

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

Competence Certificate
At least two presentations must be given: An examination of another kind according to § 5 section 3 (3) in the form of a presentation in one of the chosen courses (3 ECT).
In a third seminar, either (a) a presentation is held (preliminary study achievement) which remains not graded and a topic-related term paper is submitted or (b) a written exam is taken.
The three courses can be selected individually from the 5 thematic blocks or – in exceptional cases and according to the agreement with the responsible lecturer – all three courses can be selected from one block in the sense of a specialization.
In addition, an oral examination is taken, which relates to the content of two of the chosen three courses.

Prerequisites
Prerequisite for the 'Oral Examination' is the successful completion of Modules 1 and 3 and the required elective sections in Module 2.

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

- Zentrum für Angewandte Kulturwissenschaft und Studium Generale
- ZAK Begleitstudium

Annotation
The content of the Basic Modul is helpful.

T 10.31 Course: In-depth Module - Media & Aesthetics - Self Assignment BAK [T-ZAK-112656]

Responsible: Dr. Christine Mielke
Christine Myglas

Organisation:

Part of: M-ZAK-106235 - Supplementary Studies on Culture and Society

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

Competence Certificate
At least two presentations must be given: An examination of another kind according to § 5 section 3 (3) in the form of a presentation in one of the chosen courses (3 ECT).
In a third seminar, either (a) a presentation is held (preliminary study achievement) which remains not graded and a topic-related term paper is submitted or (b) a written exam is taken.
The three courses can be selected individually from the 5 thematic blocks or – in exceptional cases and according to the agreement with the responsible lecturer – all three courses can be selected from one block in the sense of a specialization.
In addition, an oral examination is taken, which relates to the content of two of the chosen three courses.

Prerequisites
Prerequisite for the 'Oral Examination' is the successful completion of Modules 1 and 3 and the required elective sections in Module 2.

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

- Zentrum für Angewandte Kulturwissenschaft und Studium Generale
- ZAK Begleitstudium

Annotation
The content of the Basic Modul is helpful.

T 10.32 Course: In-depth Module - Spheres of Life - Self Assignment BAK [T-ZAK-112657]

Responsible: Dr. Christine Mielke
Christine Myglas

Organisation:

Part of: M-ZAK-106235 - Supplementary Studies on Culture and Society

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

Competence Certificate
At least two presentations must be given: An examination of another kind according to § 5 section 3 (3) in the form of a presentation in one of the chosen courses (3 ECT).
In a third seminar, either (a) a presentation is held (preliminary study achievement) which remains not graded and a topic-related term paper is submitted or (b) a written exam is taken.
The three courses can be selected individually from the 5 thematic blocks or – in exceptional cases and according to the agreement with the responsible lecturer – all three courses can be selected from one block in the sense of a specialization.
In addition, an oral examination is taken, which relates to the content of two of the chosen three courses.

Prerequisites
Prerequisite for the 'Oral Examination' is the successful completion of Modules 1 and 3 and the required elective sections in Module 2.

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

- Zentrum für Angewandte Kulturwissenschaft und Studium Generale
- ZAK Begleitstudium

Annotation
The content of the Basic Modul is helpful.

T 10.33 Course: In-depth Module - Technology & Responsibility - Self Assignment BAK [T-ZAK-112654]

Responsible: Dr. Christine Mielke
Christine Myglas

Organisation:

Part of: M-ZAK-106235 - Supplementary Studies on Culture and Society

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

Competence Certificate
At least two presentations must be given: An examination of another kind according to § 5 section 3 (3) in the form of a presentation in one of the chosen courses (3 ECT).
In a third seminar, either (a) a presentation is held (preliminary study achievement) which remains not graded and a topic-related term paper is submitted or (b) a written exam is taken.
The three courses can be selected individually from the 5 thematic blocks or – in exceptional cases and according to the agreement with the responsible lecturer – all three courses can be selected from one block in the sense of a specialization.
In addition, an oral examination is taken, which relates to the content of two of the chosen three courses.

Prerequisites
Prerequisite for the 'Oral Examination' is the successful completion of Modules 1 and 3 and the required elective sections in Module 2.

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

- Zentrum für Angewandte Kulturwissenschaft und Studium Generale
- ZAK Begleitstudium

Annotation
The content of the Basic Modul is helpful.

T 10.34 Course: Information and Automation Technology [T-ETIT-112878]

Responsible: Prof. Dr.-Ing. Mike Barth
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-ETIT-106336 - Information and Automation Technology

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

Competence Certificate
The success check takes the form of a written exam lasting 120 minutes.

Prerequisites
none

T 10.35 Course: Information and Automation Technology - Lab Course [T-ETIT-112879]

Responsible: Prof. Dr.-Ing. Eric Sax
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-ETIT-106336 - Information and Automation Technology

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

Competence Certificate
A performance check in the form of a coursework consisting of project documentation and checking the source code as part of the internship course

Prerequisites
none

T 10.36 Course: Internship [T-MACH-113256]

Responsible: Prof. Dr. Martin Doppelbauer
Prof. Dr.-Ing. Marcus Geimer
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-106582 - Internship

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	15	pass/fail	Each term	1

Competence Certificate
During the bachelor's program, students are required to complete an internship of at least 13 weeks, which is suitable for giving students an insight into practical work in the field of mechatronics and information technology. 15 credit points are assigned to the professional internship.

For the recognition of the professional internship, **a proof of activity (internship certificate)** of the company with the type and duration of the internship **and an internship report are required.**

Both documents must be confirmed by the company by signature. Company here stands synonymously for firms, companies, etc., which include a recognized training facility (but not, for example, a GbR). The nature of the individual activities must be evident from the proof. In case of ambiguity, the trainee's certificate, the traineeship contract, or further evidence can also be requested in the original.

Prerequisites
None

Recommendation
If the professional internship was performed during periods in which the student was not enrolled, the application for recognition must be submitted within the first semester after enrollment in accordance with § 19 paragraph 2 of the Bachelor Study and Examination Regulations.

Annotation
Further information are provided by the internship guidlines for the BSc-course in Mechatronics and Information Technology.

T 10.37 Course: Introduction to Operations Research I and II [T-WIWI-102758]

Responsible: Prof. Dr. Stefan Nickel
Prof. Dr. Steffen Rebennack
Prof. Dr. Oliver Stein

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101418 - Introduction to Operations Research

Type	Credits	Grading scale	Recurrence	Version
Written examination	9	Grade to a third	see Annotations	2

Events					
ST 2023	2500008	Computer Exercises on Introduction to Operations Research I	1 SWS	Tutorial / 🖳	Dunke
ST 2023	2550040	Introduction to Operations Research I	2 SWS	Lecture / 🧩	Rebennack
ST 2023	2550043	Tutorials on Introduction to Operations Research I	2 SWS	Tutorial / 🗣	Dunke
WT 23/24	2500030	Computer Exercises on Introduction to Operations Research II	1 SWS	Tutorial / 🖳	Dunke
WT 23/24	2530043	Introduction to Operations Reseasrch II	2 SWS	Lecture / 🧩	Rebennack
WT 23/24	2530044			Tutorial / 🗣	Dunke
Exams					
ST 2023	7900038	Introduction to Operations Research I and II			Stein
WT 23/24	7900011	Introduction to Operations Research I and II			Rebennack
WT 23/24	7900209	Introduction to Operations Research I			Rebennack

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

Competence Certificate
The assessment of the module is carried out by a written examination (120 minutes) according to Section 4(2), 1 of the examination regulation.
In each term (usually in March and August), one examination is held for both courses.
The overall grade of the module is the grade of the written examination.

Prerequisites
None

Recommendation
Knowledge of Mathematics I and II is recommended, as well as programming knowledge for the software laboratory.
It is strongly recommended to attend the course Introduction to Operations Research I
[2550040] before attending the courseIntroduction to Operations Research II
[2530043].

Below you will find excerpts from events related to this course:

V Introduction to Operations Research I

2550040, SS 2023, 2 SWS, Language: German, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Content
Examples for typical OR problems.

Linear Programming: Basic notions, simplex method, duality, special versions of the simplex method (dual simplex method, three phase method), sensitivity analysis, parametric optimization, game theory.

Graphs and Networks: Basic notions of graph theory, shortest paths in networks, project scheduling, maximal and minimal cost flows in networks.

Learning objectives:

The student

- names and describes basic notions of linear programming as well as graphs and networks,
- knows the indispensable methods and models for quantitative analysis,
- models and classifies optimization problems and chooses the appropriate solution methods to solve optimization problems independently,
- validates, illustrates and interprets the obtained solutions.

Literature

- Nickel, Rebennack, Stein, Waldmann: Operations Research, 3. Auflage, Springer, 2022
- Hillier, Lieberman: Introduction to Operations Research, 8th edition. McGraw-Hill, 2005
- Murty: Operations Research. Prentice-Hall, 1995
- Neumann, Morlock: Operations Research, 2. Auflage. Hanser, 2006
- Winston: Operations Research - Applications and Algorithms, 4th edition. PWS-Kent, 2004

V Introduction to Operations Reseasrch II

2530043, WS 23/24, 2 SWS, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Content
Integer and combinatorial optimization: basic concepts, cutting plane methods, branch-and-bound methods, branch-and-cut methods, heuristic methods.

Nonlinear optimization: basic concepts, optimality conditions, solution methods for convex and nonconvex optimization problems.

Dynamic and stochastic models and methods: Dynamic optimization, Bellman methods, lot-sizing models and dynamic and stochastic models of inventory, queues.

Learning Objectives:

The student

- knows and describes the basic concepts of integer and combinatorial optimization, nonlinear optimization and dynamic optimization,
- knows the methods and models indispensable for a quantitative analysis,
- models and classifies optimization problems and selects appropriate solution procedures to solve simple optimization problems independently,
- validates, illustrates and interprets obtained solutions.

Literature

- Nickel, Stein, Waldmann: Operations Research, 2. Auflage, Springer, 2014
- Hillier, Lieberman: Introduction to Operations Research, 8th edition. McGraw-Hill, 2005
- Murty: Operations Research. Prentice-Hall, 1995
- Neumann, Morlock: Operations Research, 2. Auflage. Hanser, 2006
- Winston: Operations Research - Applications and Algorithms, 4th edition. PWS-Kent, 2004

T 10.38 Course: Introduction to Systems Engineering and AI-Methods [T-ETIT-113087]

Responsible: Prof. Dr.-Ing. Eric Sax
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-ETIT-106474 - Systems Engineering and AI-Methods

Type	Credits	Grading scale	Recurrence	Version
Written examination	4	Grade to a third	Each summer term	1

Prerequisites
none

T 10.39 Course: Laboratory for Applied Machine Learning Algorithms [T-ETIT-109839]

Responsible: Prof. Dr.-Ing. Jürgen Becker
Prof. Dr.-Ing. Eric Sax
Prof. Dr. Wilhelm Stork

Organisation: KIT Department of Electrical Engineering and Information Technology

Part of: M-ETIT-104823 - Laboratory for Applied Machine Learning Algorithms

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

Events					
WT 23/24	2311650	Laboratory for Applied Machine Learning Algorithms	4 SWS	Practical course / 🗣	Sax, Stork, Becker

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

Prerequisites
none

T 10.40 Course: Laboratory Systems Engineering and AI-Methods [T-ETIT-113146]

Responsible: Prof. Dr.-Ing. Eric Sax
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-ETIT-106474 - Systems Engineering and AI-Methods

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

Prerequisites
none

T 10.41 Course: Linear Electronic Networks [T-ETIT-113001]

Responsible: Prof. Dr.-Ing. John Jelonnek
Prof. Dr. Sebastian Kempf

Organisation: KIT Department of Electrical Engineering and Information Technology

Part of: M-ETIT-106417 - Linear Electric Circuits
M-MACH-106549 - Orientation Exam

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

Events					
WT 23/24	2305256	Linear Electric Circuits	4 SWS	Lecture / 🗣	Kempf, Jelonnek
Exams					
WT 23/24	7305256	Linear Electronic Networks			Kempf, Jelonnek

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

Prerequisites
none

T 10.42 Course: Linear Electronic Networks - Workshop A [T-ETIT-109317]

Responsible: Prof. Dr.-Ing. Thomas Leibfried
Prof. Dr. Ulrich Lemmer

Organisation: KIT Department of Electrical Engineering and Information Technology

Part of: M-ETIT-106417 - Linear Electric Circuits
M-MACH-106549 - Orientation Exam

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

Events					
WT 23/24	2313732	Linear Electric Circuits - Workshop A	1 SWS	Practical course / 🗣	Lemmer
Exams					
WT 23/24	7313732	Linear Electronic Networks - Workshop A			Lemmer

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

Prerequisites
none

T 10.43 Course: Linear Electronic Networks - Workshop B [T-ETIT-109811]

Responsible: Prof. Dr. Werner Nahm
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-ETIT-106417 - Linear Electric Circuits
M-MACH-106549 - Orientation Exam

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

Events					
WT 23/24	2307306	Linear Electronic Networks Workshop B	1 SWS	Practical course / 🗣	Leibfried
WT 23/24	2307400	Linear Electronic Networks - Workshop B	1 SWS	Practical course / 🗣	Leibfried
Exams					
WT 23/24	7307400	Linear Electronic Networks - Workshop B			Leibfried

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

T 10.44 Course: Measurement and Control Technology [T-ETIT-112852]

Responsible: Prof. Dr.-Ing. Michael Heizmann
Prof. Dr.-Ing. Sören Hohmann

Organisation: KIT Department of Electrical Engineering and Information Technology

Part of: M-ETIT-106339 - Measurement and Control Technology

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

Competence Certificate
The assessment of success takes place in the form of a written examination lasting 120 minutes. The module grade is the grade of the written examination.

Prerequisites
none

T 10.45 Course: Mechanical Design A [T-MACH-112984]

Responsible: Prof. Dr.-Ing. Sven Matthiesen
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-106527 - Mechanical Design A

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	6	Grade to a third	Each winter term	1 terms	2

Events					
WT 23/24	2145170	Mechanical Design A	3 SWS	Lecture / Practice	Matthiesen, Düser
Exams					
WT 23/24	76T-MACH-112984	Mechanical Design A			Matthiesen, Düser

Competence Certificate
Written exam with a duration of 90 Minutes

Prerequisites
Admission to the exam only with succesful completion of Workshop Mechanical Design A (T-MACH-112981)

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-112981 - Mechanical Design A, Workshop must have been passed.

Recommendation
None

Annotation
Students are familiar with the basic machine elements of technical systems and are able to analyze them in a system context

Below you will find excerpts from events related to this course:

V Mechanical Design A

2145170, WS 23/24, 3 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)

Content
Students are introduced to fundamental topics in Mechanical Design A. The focus is on the analysis of existing systems and the development of knowledge for fundamental elements and functionality of technical systems. The course is divided into the following topics:

- Springs
- Technical systems
- Bearings
- Seals
- Component connection
- Gearbox

Literature

- Grundlagen der Berechnung und Gestaltung von Maschinenelementen; Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X oder Volltextzugriff über Uni-Katalog der Universitätsbibliothek
- Grundlagen von Maschinenelementen für Antriebsaufgaben; Steinhilper, Sauer, Springer Verlag, ISBN 3-540-29629-8

T 10.46 Course: Mechanical Design A, Workshop [T-MACH-112981]

Responsible: Prof. Dr.-Ing. Sven Matthiesen
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-106527 - Mechanical Design A

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

Events					
WT 23/24	2145171	Mechanical Design A - Workshop	1 SWS	Practical course / 🗣	Düser, Matthiesen

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

Competence Certificate
Concomitant to the lecture, a workshop with 3 workshop sessions takes place over the semester. During the workshop the students are divided into groups and their mechanical design knowledge will be tested during a colloquium at the beginning of every single workshop session. The attendance is mandatory and will be controlled.

The pass of the colloquia and the process of the workshop task are required for the successful participation.

Prerequisites
None

Recommendation
None

Annotation
None

Below you will find excerpts from events related to this course:

V Mechanical Design A - Workshop

2145171, WS 23/24, 1 SWS, Language: German, Open in study portal

Practical course (P)
On-Site

Content
In addition to the MD A lecture, the students are familiarized with the design process in a series of three workshops. The focus here is on application-oriented learning and understanding. For example, the students independently disassemble and assemble small demonstrator systems and thus gain a better understanding of the relevant problems in the field of mechanical design.

Literature

- Grundlagen der Berechnung und Gestaltung von Maschinenelementen; Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X oder Volltextzugriff über Uni-Katalog der Universitätsbibliothek
- Grundlagen von Maschinenelementen für Antriebsaufgaben; Steinhilper, Sauer, Springer Verlag, ISBN 3-540-29629-8

T 10.47 Course: Mechanical Design B and C [T-MACH-112985]

Responsible: Prof. Dr.-Ing. Sven Matthiesen
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-106528 - Mechanical Design B-C

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	6	Grade to a third	Each summer term	2 terms	1

Competence Certificate
Written exam consisting of a written & design part (total 240 minutes)

Prerequisites
Admission to the exam only with succesful completion of Workshop Mechanical Design B (T-MACH-112982) AND Workshop Mechanical Design C (T-MACH-112983)

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-112983 - Mechanical Design C, Workshop must have been passed.
2. The course T-MACH-112982 - Mechanical Design B, Workshop must have been passed.

Recommendation
None

Annotation
None

T 10.48 Course: Mechanical Design B, Workshop [T-MACH-112982]

Responsible: Prof. Dr.-Ing. Sven Matthiesen
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-106528 - Mechanical Design B-C

Type	Credits	Grading scale	Recurrence	Expansion	Version
Completed coursework	3	pass/fail	Each summer term	1 terms	1

Competence Certificate
Concomitant to the lecture, a workshop with 3 workshop sessions takes place over the semester. During the workshop the students are divided into groups and their mechanical design knowledge will be tested during a colloquium at the beginning of every single workshop session. The attendance is mandatory and will be controlled.

A CAD task from the area of mechanical design must be processed. This will be approved within an examination.

The pass of the colloquia and the process of the workshop task are required for the successful participation.

Prerequisites
None

Recommendation
None

Annotation
None

T 10.49 Course: Mechanical Design C, Workshop [T-MACH-112983]

Responsible: Prof. Dr.-Ing. Sven Matthiesen
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-106528 - Mechanical Design B-C

Type	Credits	Grading scale	Recurrence	Expansion	Version
Completed coursework	3	pass/fail	Each winter term	1 terms	1

Competence Certificate
Concomitant to the lecture, a workshop with 3 workshop sessions takes place over the semester. During the workshop the students are divided into groups and their mechanical design knowledge will be tested during a colloquium at the beginning of every single workshop session. The attendance is mandatory and will be controlled.

A CAD task from the area of mechanical design must be processed. This will be approved within an examination.

The pass of the colloquia and the process of the workshop task are required for the successful participation.

Prerequisites
None

Recommendation
None

Annotation
None

T 10.50 Course: Mechano-Informatics and Robotics [T-INFO-101294]

Responsible: Prof. Dr.-Ing. Tamim Asfour
Organisation: KIT Department of Informatics
Part of: M-INFO-100757 - Mechano-Informatics and Robotics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4	Grade to a third	Each winter term	1

Events					
WT 23/24	2400077	Mechano-Informatics and Robotics	2 SWS	Lecture / 🗣	Asfour
Exams					
ST 2023	7500217	Nachprüfung: Mechano-Informatics and Robotics			Asfour
WT 23/24	7500176	Mechano-Informatics and Robotics			Asfour

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

Below you will find excerpts from events related to this course:

V Mechano-Informatics and Robotics

2400077, WS 23/24, 2 SWS, Language: German/English, Open in study portal

Lecture (V)
On-Site

Content
The lecture addresses various engineering and algorithmic aspects and topics in robotics which are illustrated and explained based on examples originating from current research conducted in the field of humanoid robotics. First, this lecture gives an introduction into the mathematical fundamentals which are needed to describe a robotic system as well as the basic algorithms commonly applied in motion planning.
Subsequently, models and methods are introduced with which dynamical systems can be formalized and which can be used to encode and represent robot actions. To do so, we will discuss linear time-invariant systems in state.

Learning Objectives:

Based on the example of robotics students understand the synergistic effects and interdisciplinarity of mechatronics and informatics, the embedded systems, the control, and the methods and the algorithms. They are acquainted with the basic terminology and the methods which are common in robotics, signal processing, action representation, machine learning and cognitive systems. They are capable of applying fundamental state-of-the-art methods and tools for the development and programming of robots. Based on
examples originating from current research conducted in the fields of humanoid robotics, the students interactively learn how to identify and formalize problems and tasks and how to develop solutions in an analytical and goal-directed way.

Organizational issues
Zugehörige Veranstaltungen: Empfehlung - Basispraktikum Mobile Roboter

Die Erfolgskontrolle erfolgt in Form einer schriftlichen Prüfung in englischer Sprache im Umfang von i.d.R. 60 Minuten nach § 4 Abs. 2 Nr. 1 SPO.

Arbeitsaufwand:

2h Präsenz

+ 2*2h = 4h Vor/Nachbereitung

+ 30h Prüfungsvorbereitung

120h

T 10.51 Course: Mechatronical Systems and Products [T-MACH-112988]

Responsible: Prof. Dr.-Ing. Sören Hohmann
Prof. Dr.-Ing. Sven Matthiesen

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-106493 - Mechatronical Systems and Products

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	3	Grade to a third	Each summer term	1 terms	2

Competence Certificate
written exam (duration 60 minutes)

Prerequisites
none

Recommendation
Mechanical Design should be completed

Annotation
All relevant contents (script, exercise sheets, etc.) for the course can be obtained via the eLearning platform ILIAS. To participate in the course, please complete the survey registration and group assignment in ILIAS already before the start of the semester.

T 10.52 Course: Microenergy Technologies [T-MACH-105557]

Responsible: Prof. Dr. Manfred Kohl
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102714 - Microenergy Technologies

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	1

Events					
ST 2023	2142897	Microenergy Technologies	2 SWS	Lecture / 🗣	Kohl
Exams					
ST 2023	76-T-MACH-105557	Microenergy Technologies			Kohl
WT 23/24	76-T-MACH-105557	Microenergy Technologies			Kohl

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

Competence Certificate
Oral examination (30 Min.)

Prerequisites
none

Below you will find excerpts from events related to this course:

V Microenergy Technologies

2142897, SS 2023, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content
- Basic physical principles of energy conversion
- Layout and design optimization
- Technologies
- Selected devices
- Applications

The lecture includes amongst others the following topics:

- Micro energy harvesting of vibrations using different conversion principles (piezo, electrostatic, electromagnetic, etc.)
- Thermoelectric energy generation
- Novel thermal energy conversion principles (thermomagnetic, pyroelectric)
- Miniature scale solar devices
- RF energy harvesting
- Miniature scale heat pumping
- Solid-state cooling technologies (magneto-, electro-, mechanocalorics)
- Power management
- Energy storage technologies (microbatteries, supercapacito4rs, fuel cells)

Literature
- Folienskript "Micro Energy Technologies"
- Stephen Beeby, Neil White, Energy Harvesting for Autonomous Systems, Artech House, 2010
- Shashank Priya, Daniel J. Inman, Energy Harvesting Technologies, Springer, 2009

T 10.53 Course: Normative Aspects of Technology Assessment - Limits and Possibilities of a (Prospective) Technology Assessment - Advanced Seminar [T-GEISTSOZ-111511]

Responsible: Prof. Dr. Dr. Rafaela Hillerbrand
Organisation: KIT Department of Humanities and Social Sciences
Part of: M-MACH-106583 - Key Competences

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

Events					
WT 23/24	5000057	Aufbaumodul: Technikfolgenabschätzung und Normativität		Advanced seminar	Hillerbrand

T 10.54 Course: Oral Exam - Supplementary Studies on Culture and Society [T-ZAK-112659]

Responsible: Dr. Christine Mielke
Christine Myglas

Organisation:

Part of: M-ZAK-106235 - Supplementary Studies on Culture and Society

Type	Credits	Grading scale	Version
Oral examination	4	Grade to a third	1

Competence Certificate
An oral examination according to § 7 section 6 of approx. 45 minutes on the contents of two courses from In-depth Module.

Prerequisites
Prerequisite for the 'Oral Examination' is the successful completion of Modules 1 and 3 and the required elective sections in Module 2.

T 10.55 Course: Oral Exam - Supplementary Studies on Sustainable Development [T-ZAK-112351]

Organisation:

Part of: M-ZAK-106099 - Supplementary Studies on Sustainable Development

Type	Credits	Grading scale	Version
Oral examination	4	Grade to a third	1

Competence Certificate
An oral examination according to § 7 section 6 of approx. 45 minutes on the contents of two courses from Elective Module.

Prerequisites
A requirement for the Supplementary Course: Oral examination is the successful completion of the modules Basics Module and Specialisation Module and the required electives of Elective Module.

T 10.56 Course: Practice Module [T-ZAK-112660]

Responsible: Dr. Christine Mielke
Christine Myglas

Organisation:

Part of: M-ZAK-106235 - Supplementary Studies on Culture and Society

Type	Credits	Grading scale	Version
Completed coursework	4	pass/fail	1

Competence Certificate
Internship (3 ECT)
Report within the framework of the practical training (Length approx. 18,000 characters (incl. spaces)
(1 ECT)

Prerequisites
none

Annotation
Knowledge from the Basic Module and the Elective Module is helpful.

T 10.57 Course: Presentation [T-MACH-113254]

Responsible: Prof. Dr.-Ing. Marcus Geimer
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-106579 - Bachelor's Thesis

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

Competence Certificate
The colloquium presentation must be held within the maximum processing time of the modul Bachleor Thesis but latest 6 weeks after the submission of the bachelor thesis.

The presentation should last around 20 minutes followed by a scientific discussion with the present expert audience. The students should show that they are able to independently present and discuss the content of their bachelor thesis according to scientific criteria.

Prerequisites
Bachelor Thesis has been started.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-113253 - Bachelor's Thesis must have been started.

Annotation
No exam registration is required for the presentation. Passing will be registered by Examination Office.

T 10.58 Course: Programming [T-INFO-101531]

Responsible: Prof. Dr.-Ing. Anne Koziolek
Prof. Dr. Ralf Reussner
Organisation: KIT Department of Informatics
Part of: M-INFO-101174 - Programming

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	5	Grade to a third	Each winter term	1

Events					
ST 2023	2400083	Programming Exercise	0 SWS	Practice / 🗣	Koziolek
WT 23/24	24004	Programming	4 SWS	Lecture / Practice	Heinrich
Exams					
ST 2023	7500195	Programming			Reussner, Koziolek
WT 23/24	7500075	Programming			Koziolek, Heinrich

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

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-INFO-101967 - Programming Pass must have been passed.

T 10.59 Course: Programming Pass [T-INFO-101967]

Responsible: Prof. Dr.-Ing. Anne Koziolek
Prof. Dr. Ralf Reussner
Organisation: KIT Department of Informatics
Part of: M-INFO-101174 - Programming

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

Events					
ST 2023	2400083	Programming Exercise	0 SWS	Practice / 🗣	Koziolek
WT 23/24	24004	Programming	4 SWS	Lecture / Practice	Heinrich
Exams					
ST 2023	7500022	Programming Pass			Koziolek, Reussner
WT 23/24	7500074	Programming Pass			Koziolek, Heinrich

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

T 10.60 Course: Robotics I - Introduction to Robotics [T-INFO-108014]

Responsible: Prof. Dr.-Ing. Tamim Asfour
Organisation: KIT Department of Informatics
Part of: M-INFO-100893 - Robotics I - Introduction to Robotics

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

Events					
WT 23/24	2424152	Robotics I - Introduction to Robotics	3/1 SWS	Lecture / 🗣	Asfour
Exams					
ST 2023	7500218	Robotik I - Einführung in die Robotik			Asfour
WT 23/24	7500106	Robotics I - Introduction to Robotics			Asfour

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

Competence Certificate
The assessment is carried out as a written examination (§ 4 Abs. 2 No. 1 SPO) lasting 60 minutes.

Prerequisites
none.

T 10.61 Course: Self-Booking-BSc-HOC-SPZ-ZAK-Graded [T-MACH-111685]

Responsible: Prof. Dr.-Ing. Martin Heilmaier
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-106583 - Key Competences

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	2	Grade to a third	Each term	1

Competence Certificate
Completed coursework

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:

- House of Competence
- Sprachenzentrum
- Zentrum für Angewandte Kulturwissenschaft und Studium Generale

Annotation
Interdisciplinary qualifications (IQ) completed at the House-of-Competence (HoC), at the Zentrum für Angewandte Kulturwissenschaften (ZAK) or at the Sprachenzentrum (SpZ) can be assigned in self-service.

First, select a partial accomplishment named "self-assignment" in your study schedule and second, assign an IQ-achievement via the tab "IQ achievements".

T 10.62 Course: Self-Booking-BSc-HOC-SPZ-ZAK-Non-Graded [T-MACH-111684]

Responsible: Prof. Dr.-Ing. Martin Heilmaier
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-106583 - Key Competences

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

Competence Certificate
Completed coursework

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:

- House of Competence
- Sprachenzentrum
- Zentrum für Angewandte Kulturwissenschaft und Studium Generale

Annotation
Interdisciplinary qualifications (IQ) completed at the House-of-Competence (HoC), at the Zentrum für Angewandte Kulturwissenschaften (ZAK) or at the Sprachenzentrum (SpZ) can be assigned in self-service.

First, select a partial accomplishment named "self-assignment" in your study schedule and second, assign an IQ-achievement via the tab "IQ achievements".

T 10.63 Course: Seminar: Fundamentals of Embedded Systems [T-ETIT-110832]

Responsible: Prof. Dr.-Ing. Jürgen Becker
Prof. Dr.-Ing. Eric Sax
Prof. Dr. Wilhelm Stork

Organisation: KIT Department of Electrical Engineering and Information Technology

Part of: M-ETIT-105356 - Seminar: Fundamentals of Embedded Systems

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	4	Grade to a third	Each term	1 terms	2

Events					
ST 2023	2311628	Seminar Fundamentals of Embedded Systems	2 SWS	Seminar /	Becker, Sax, Stork
WT 23/24	2311628	Seminar: Fundamentals of Embedded Systems	2 SWS	Seminar /	Becker, Sax, Stork
Exams					
ST 2023	7311628	Seminar: Fundamentals of Embedded Systems			Becker, Sax, Stork
WT 23/24	7311628	Seminar: Fundamentals of Embedded Systems			Becker, Sax, Stork

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

Prerequisites
none

T 10.64 Course: Signals and Systems [T-ETIT-112860]

Responsible: Dr.-Ing. Mathias Kluwe
Prof. Dr.-Ing. Sander Wahls

Organisation: KIT Department of Electrical Engineering and Information Technology

Part of: M-ETIT-106372 - Signals and Systems

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

Prerequisites
none

T 10.65 Course: Signals and Systems - Workshop [T-ETIT-112861]

Responsible: Dr.-Ing. Mathias Kluwe
Prof. Dr.-Ing. Sander Wahls

Organisation: KIT Department of Electrical Engineering and Information Technology

Part of: M-ETIT-106372 - Signals and Systems

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

Events					
ST 2023	2302905	Signals and Systems - Workshop	1 SWS	Practical course /	Heizmann

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

Prerequisites
none

T 10.66 Course: Specialisation Module - Self Assignment BeNe [T-ZAK-112346]

Responsible: Christine Myglas
Organisation:
Part of: M-ZAK-106099 - Supplementary Studies on Sustainable Development

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

Competence Certificate
The monitoring occurs in the form of several supplementary courses, which usually comprise a presentation of the (group) project, a written elaboration of the (group) project as well as an individual term paper, if necessary with appendices (examination performances of other kind according to statutes § 5 section 3 No. 3 or § 7 section 7).

The presentation is usually with the accompanying practice partners, as well as the written paper.

Prerequisites
Active participation in all three mandatory components.

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

- Zentrum für Angewandte Kulturwissenschaft und Studium Generale
- ZAK Begleitstudium

Recommendation
Knowledge from 'Basic Module ' and 'Elective Module ' is helpful.

T 10.67 Course: Systems Modeling [T-ETIT-112989]

Responsible: Prof. Dr.-Ing. Mike Barth
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-ETIT-106415 - Systems Modeling

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

Events					
WT 23/24	2311171	Systemmodellierung	1 SWS	Lecture /	Barth
WT 23/24	2311172	Systemmodellierung Übung	1 SWS	Practice /	Dorn, Barth
Exams					
WT 23/24	7300049	Systems Modeling			Barth

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

Prerequisites
none

T 10.68 Course: Technical Thermodynamics and Heat Transfer I [T-MACH-104747]

Responsible: Prof. Dr. Ulrich Maas
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102386 - Technical Thermodynamics and Heat Transfer I

Type	Credits	Grading scale	Recurrence	Version
Written examination	8	Grade to a third	Each winter term	3

Events					
WT 23/24	2165501	Technical Thermodynamics and Heat Transfer I	4 SWS	Lecture / 🗣	Maas
WT 23/24	3165014	Technical Thermodynamics and Heat Transfer I	4 SWS	Lecture / 🗣	Schießl, Maas
Exams					
ST 2023	76-T-MACH-104747	Technical Thermodynamics and Heat Transfer I			Maas, Schießl
ST 2023	76-T-MACH-104747-englisch	Technical Thermodynamics and Heat Transfer I			Maas, Schießl
WT 23/24	76-T-MACH-104747	Technical Thermodynamics and Heat Transfer I			Maas, Schießl
WT 23/24	76-T-MACH-104747-english	Technical Thermodynamics and Heat Transfer I			Maas, Schießl

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

Competence Certificate
Written exam, approx. 3 hours

Prerequisites
Successful participation in the tutorial (T-MACH-105204 - Excercises in Technical Thermodynamics and Heat Transfer I)

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-105204 - Excercises in Technical Thermodynamics and Heat Transfer I must have been passed.

Below you will find excerpts from events related to this course:

V Technical Thermodynamics and Heat Transfer I

2165501, WS 23/24, 4 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

- System, properties of state
- Absolute temperature, model systems
- 1st law of thermodynamics for resting and moving systems
- Entropy and 2nd law of thermodynamics
- Behavior of real substances described by tables, diagrams and equations of state
- Machine processes
- Mixtures of ideal and real compounds

Literature
Vorlesungsskriptum

Elsner, N.; Dittmann, A.: Energielehre und Stoffverhalten (Grundlagen der technischen Thermodynamik Bd. 1 und 2), 8. Aufl., Akademie-Verlag, 680 S. 1993.

Baehr, H.D.: Thermodynamik: eine Einführung in die Grundlagen und ihre technischen Anwendungen, 9. Aufl., Springer-Verlag, 460 S., 1996.

V

Technical Thermodynamics and Heat Transfer I

3165014, WS 23/24, 4 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content

- System, properties of state
- Absolute temperature, model systems
- 1st law of thermodynamics for resting and moving systems
- Entropy and 2nd law of thermodynamics
- Behavior of real substances described by tables, diagrams and equations of state
- Machine processes
- Mixtures of ideal and real compounds

Literature

Vorlesungsskriptum

Elsner, N.; Dittmann, A.: Energielehre und Stoffverhalten (Grundlagen der technischen Thermodynamik Bd. 1 und 2), 8. Aufl., Akademie-Verlag, 680 S. 1993.

Baehr, H.D.: Thermodynamik: eine Einführung in die Grundlagen und ihre technischen Anwendungen, 9. Aufl., Springer-Verlag, 460 S., 1996.

T 10.69 Course: Theory of Probability [T-ETIT-101952]

Responsible: Dr.-Ing. Holger Jäkel
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-ETIT-102104 - Theory of Probability

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

Events					
WT 23/24	2310505	Theory of Probability	2 SWS	Lecture /	Jäkel
WT 23/24	2310507	Tutorial for 2310505 Theory of Probability	1 SWS	Practice /	Jäkel
Exams					
ST 2023	7310505	Theory of Probability			Jäkel
WT 23/24	7310505	Theory of Probability			Jäkel

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

Prerequisites
Contents of higher mathematics are necessary (e.g. M-MATH-101731 und M-MATH-101732).

T 10.70 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-MATH-102859 - Advanced Mathematics

Type	Credits	Grading scale	Recurrence	Version
Completed coursework (written)	0	pass/fail	Each winter term	2

Events					
WT 23/24	0131100	Übungen zu 0131000	2 SWS	Practice	Hettlich
WT 23/24	0131300	Übungen zu 0131200	2 SWS	Practice	Hettlich

Competence Certificate
Learning assessment is carried out by written assigments (pre-requesite). Exact requirements will be communicated in the lectures.

Prerequisites
None.

T 10.71 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-102859 - Advanced Mathematics

Type	Credits	Grading scale	Recurrence	Version
Completed coursework (written)	0	pass/fail	Each summer term	2

Events					
ST 2023	0180900	Übungen zu 0180800	2 SWS	Practice	Hettlich
ST 2023	0181100	Übungen zu 0181000	2 SWS	Practice	Hettlich
Exams					
ST 2023	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 10.72 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-102859 - Advanced Mathematics

Type	Credits	Grading scale	Recurrence	Version
Completed coursework (written)	0	pass/fail	Each winter term	2

Events					
WT 23/24	0131500	Übungen zu 0131400	2 SWS	Practice	Arens

Competence Certificate
Learning assessment is carried out by written assigments (pre-requesite). Exact requirements will be communicated in the lectures.

Prerequisites
None.

T 10.73 Course: Tutorial Engineering Mechanics I [T-MACH-112907]

Responsible: Prof. Dr.-Ing. Thomas Böhlke
Dr.-Ing. Tom-Alexander Langhoff

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-106374 - Engineering Mechanics

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

Events					
WT 23/24	2161246	Tutorial Engineering Mechanics I	2 SWS	Practice / 🗣	Kehrer, Klein, Böhlke
Exams					
WT 23/24	76-T-MACH-100528	Tutorial Engineering Mechanics I			Böhlke, Langhoff

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

Competence Certificate
Successful solution of worksheets. Details are given in the first lecture "Engineering Mechanics I"

Passing this course allows to register to the exam "Engineering Mechanics I" (see T-MACH-112904).

Prerequisites
none

Below you will find excerpts from events related to this course:

V Tutorial Engineering Mechanics I

2161246, WS 23/24, 2 SWS, Language: German, Open in study portal

Practice (Ü)
On-Site

Content
Please refer to the lecture Engineering Mechanics I.

Literature
Siehe Vorlesung Technische Mechanik I

T 10.74 Course: Tutorial Engineering Mechanics II [T-MACH-112908]

Responsible: Prof. Dr.-Ing. Thomas Böhlke
Dr.-Ing. Tom-Alexander Langhoff

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-106374 - Engineering Mechanics

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

Events					
ST 2023	2162251	Tutorial Engineering Mechanics II	2 SWS	Practice / 🗣	Dyck, Sterr, Böhlke
Exams					
WT 23/24	76-T-MACH-100284	Tutorial Engineering Mechanics II			Böhlke, Langhoff

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

Competence Certificate
Successful solution of worksheets. Details are given in the first lecture "Engineering Mechanics II"

Passing this course allows to register to the exam "Engineering Mechanics II" (see T-MACH-112905).

Prerequisites
none

Below you will find excerpts from events related to this course:

V Tutorial Engineering Mechanics II

2162251, SS 2023, 2 SWS, Language: German, Open in study portal

Practice (Ü)
On-Site

Content
see lecture Engineering Mechanics II

Literature
Siehe Vorlesung Technische Mechanik II

T 10.75 Course: Tutorial Engineering Mechanics III [T-MACH-112909]

Responsible: Prof. Dr.-Ing. Carsten Proppe
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-106374 - Engineering Mechanics

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

Competence Certificate
Passing this course allows to register to the exam "Engineering Mechanics III" (see T-MACH-112906).

Prerequisites
none

T 10.76 Course: Wildcard Additional Examinations 1 [T-MACH-106638]

Organisation: University
Part of: M-MACH-106439 - Further Examinations

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

T 10.77 Course: Wildcard Additional Examinations 10 [T-MACH-106650]

Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-106439 - Further Examinations

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

T 10.78 Course: Wildcard Additional Examinations 2 [T-MACH-106639]

Organisation: University
Part of: M-MACH-106439 - Further Examinations

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

T 10.79 Course: Wildcard Additional Examinations 3 [T-MACH-106640]

Organisation: University
Part of: M-MACH-106439 - Further Examinations

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

T 10.80 Course: Wildcard Additional Examinations 4 [T-MACH-106641]

Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-106439 - Further Examinations

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

T 10.81 Course: Wildcard Additional Examinations 5 [T-MACH-106643]

Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-106439 - Further Examinations

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

T 10.82 Course: Wildcard Additional Examinations 6 [T-MACH-106646]

Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-106439 - Further Examinations

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

T 10.83 Course: Wildcard Additional Examinations 7 [T-MACH-106647]

Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-106439 - Further Examinations

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

T 10.84 Course: Wildcard Additional Examinations 8 [T-MACH-106648]

Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-106439 - Further Examinations

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

T 10.85 Course: Wildcard Additional Examinations 9 [T-MACH-106649]

Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-106439 - Further Examinations

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

T 10.86 Course: Workshop Mechatronical Systems and Products [T-MACH-108680]

Responsible: Prof. Dr.-Ing. Sören Hohmann
Prof. Dr.-Ing. Sven Matthiesen

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-106493 - Mechatronical Systems and Products

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

Events					
WT 23/24	2145162	Workshop Mechatronical Systems and Products	2 SWS	Practical course / 🗣	Teltschik, Matthiesen, Hohmann
Exams					
WT 23/24	76-T-MACH-108680	Workshop Mechatronical Systems and Products			Hohmann, Matthiesen

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

Competence Certificate
Alongside the workshop, deliverables will be requested at defined milestones. In these, the application of the knowledge that has been developed within the framework of the module will be examined. These deliverables consist of CAD designs, control software and reflection reports, for example, are defined in a workshop assignment at the beginning of the semester. The milestones are announced in a calendar at the beginning of the semester and are available to students through ILIAS. The demanded deliveries are uploaded to ILIAS.

Prerequisites
none

Annotation
All relevant content (scripts, exercise sheets, etc.) for the course can be obtained via the eLearning platform ILIAS. To participate in the course, please complete the survey " *Anmeldung und Gruppeneinteilung* " in ILIAS before the start of the semester.