Karlsruher Institut für Technologie

Module Handbook
Bachelor's Program Mechanical Engineering International (B.Sc.)

SPO 2017

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KIT DEPARTMENT OF MECHANICAL ENGINEERING

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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 Mechanical Engineering International

By way of research and practical orientation of the six-semester, English-language Bachelor’s degree program for Mechanical Engineering International at KIT, graduates of the program are prepared for lifelong learning and employment in typical professional fields of mechanical engineering either in private industry, services and public administration. They acquire the necessary communicative, organizational, social, and intercultural skills to pursue careers in international companies and organizations. Graduates acquire the academic qualifications to pursue a Master’s degree program in Mechanical Engineering or related disciplines.

Within the fundamental subjects of their studies, graduates acquire sound basic knowledge in mathematics, mechanics and materials science, plus practical skills in design and construction, logistics, management, manufacturing and production planning. This is complemented by basic knowledge in electrical engineering, information technology, and natural sciences. In the field of business management international standards in accounting, company structures and international law receive special attention.

This in-depth knowledge of scientific theories, principles and methods allows graduates to successfully solve specific tasks of mechanical engineering using a unique approach.
Through project work in international teams graduates are well prepared for the technical and practical requirements of the engineering profession in an increasingly globalized economy. Their intercultural skills acquired during the study coursework enable graduates to act responsibly and appropriately in each situation within an international business environment.

In their major subjects, complementary subjects and in their thesis project graduates develop cross-disciplinary research, problem-solving and planning skills for technical systems by using a combination of theoretical and practical approaches. Throughout the program the acquisition of skills is based on international standards. Graduates have the qualification to proficiently assess technical systems in their specific fields and they are able to generalize results and to generate new solutions.

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 Mechanical Engineering (International)

vom 19. Juli 2017

Aufgrund von § 10 Absatz 2 Ziff. 5 und § 20 Absatz 2 Satz 1 des Gesetzes über das Karlsruher Institut für Technologie (KIT-Gesetz - KITG) in der Fassung vom 14. Juli 2009 (GBl. S. 317 f), zuletzt geändert durch Artikel 5 des Dritten Gesetzes zur Änderung hochschulrechtlicher Vorschriften (3. Hochschulrechtsänderungsgesetz – 3. HRÄG) vom 01. April 2014 (GBl. S. 99, 167) und § 32 Absatz 3 Satz 1 des Gesetzes über die Hochschulen in Baden-Württemberg (Landeshochschulgesetz - LHG) in der Fassung vom 1. Januar 2005 (GBl. S. 1 f zuletzt geändert durch Artikel 2 des Gesetzes zur Verwirklichung der Chancengleichheit von Frauen und Männern im öffentlichen Dienst in Baden-Württemberg und zur Änderung des Landeshochschulgesetzes vom 23. Februar 2016 (GBl. S. 108, 118), hat der Senat des KIT am 19. Dezember 2016 die folgende Studien- und Prüfungsordnung für den Bachelorstudiengang Mechanical Engineering (International) beschlossen.

Der Präsident hat seine Zustimmung gemäß § 20 Absatz 2 Satz 1 KITG i.V.m. § 32 Absatz 3 Satz 1 LHG am 19. Juli 2017 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

Diese Bachelorprüfungsordnung regelt Studienablauf, Prüfungen und den Abschluss des Studiums im englischsprachigen Bachelorstudiengang Mechanical Engineering (International) am KIT.

§ 2 Ziel des Studiums, akademischer Grad

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

(2) Aufgrund der bestandenen Bachelorprüfung wird der akademische Grad „Bachelor of Science (B.Sc.)“ für den Bachelorstudiengang Mechanical Engineering (International) verliehen.

§ 3 Regelstudienzeit, Studienaufbau, Leistungspunkte

(1) Die Regelstudienzeit beträgt sechs Semester.

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

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

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

(5) Lehrveranstaltungen werden in englischer Sprache angeboten.

§ 4 Modulprüfungen, Studien- und Prüfungsleistungen

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

Erfolgskontrollen gliedern sich in Studien- oder Prüfungsleistungen.

(2) Prüfungsleistungen sind:

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

(3) Studienleistungen sind schriftliche, mündliche oder praktische Leistungen, die von den Studierenden in der Regel lehrveranstaltungsbegleitend erbracht werden. Die Bachelorprüfung darf nicht mit einer Studienleistung abgeschlossen werden.

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

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

§ 5 Anmeldung und Zulassung zu den Modulprüfungen und Lehrveranstaltungen

(1) Um an den Modulprüfungen teilnehmen zu können, müssen sich die Studierenden online im Studierendenportal zu den jeweiligen Erfolgskontrollen anmelden. In Ausnahmefällen kann eine Anmeldung schriftlich im Studierendenservice oder in einer anderen vom Studierendenservice autorisierten Einrichtung erfolgen. Für die Erfolgskontrollen können durch die Prüfenden Anmeldefristen festgelegt werden. Die Anmeldung der Bachelorarbeit ist im Modulhandbuch geregelt.

(2) 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. Auf Antrag des/der Studierenden an den Prüfungsausschuss kann die Wahl oder die Zuordnung nachträglich geändert werden. Ein begonnenes Prüfungsverfahren ist zu beenden, d. h. eine erstmals nicht bestandene Prüfung ist zu wiederholen. Sofern bereits ein Prüfungsverfahren in einem Modul begonnen wurde, ist die Änderung der Wahl oder der Zuordnung erst nach Beendigung des Prüfungsverfahrens zulässig; dies gilt nur für Prüfungsleistungen.

(3) Zu einer Erfolgskontrolle ist zuzulassen, wer

1. in den Bachelorstudiengang Mechanical Engineering (International) am KIT eingeschrieben ist; die Zulassung beurlaubter Studierender ist auf Prüfungsleistungen 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 Mechanical Engineering (International) den Prüfungsanspruch nicht verloren hat.

(4) Nach Maßgabe von § 30 Abs. 5 LHG kann die Zulassung zu einzelnen Pflichtveranstaltungen beschränkt werden. 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 § 13 Abs. 1 Satz 1 und 2, sofern ein Abbau des Überhangs durch andere oder zusätzliche Veranstaltungen nicht möglich ist. Für den Fall gleichen Studienfortschritts sind durch die KIT-Fakultäten weitere Kriterien festzulegen. Das Ergebnis wird den Studierenden rechtzeitig bekannt gegeben.

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

§ 6 Durchführung von Erfolgskontrollen

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

(2) Die Art der Erfolgskontrolle (§ 4 Abs. 2 Nr. 1 bis 3, Abs. 3) wird von der/dem Prüfenden der betreffenden Lehrveranstaltung in Bezug auf die Lerninhalte der Lehrveranstaltung und die Lernziele des Moduls festgelegt. 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. Im Einvernehmen von Prüfendem und Studierender bzw. Studierendem können die Art der Prüfungsleistung sowie die Prüfungssprache auch nachträglich geändert werden; im ersten Fall ist jedoch § 4 Abs. 5 zu be-

rücksichtigen. Bei der Prüfungsorganisation sind die Belange Studierender mit Behinderung oder chronischer Erkrankung gemäß § 13 Abs. 1 zu berücksichtigen. § 13 Abs. 1 Satz 3 und 4 gelten entsprechend.

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

(4) Erfolgskontrollen werden in englischer Sprache abgenommen.

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

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

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

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. Die Zulassung erstreckt sich nicht auf die Beratung und Bekanntgabe der Prüfungsergebnisse.

(7) Für *Prüfungsleistungen anderer Art* (§ 4 Abs. 2 Nr. 3) sind angemessene Bearbeitungsfristen einzuräumen und Abgabetermine festzulegen. Dabei ist durch die Art der Aufgabenstellung und durch entsprechende Dokumentation sicherzustellen, dass die erbrachte Prüfungsleistung dem/der Studierenden zurechenbar ist. Die wesentlichen Gegenstände und Ergebnisse einer solchen Erfolgskontrolle sind in einem Protokoll festzuhalten.

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

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.“ Trägt die Arbeit diese Erklärung nicht, wird sie nicht angenommen. Die wesentlichen Gegenstände und Ergebnisse der Erfolgskontrolle sind in einem Protokoll festzuhalten.

§ 6 a Erfolgskontrollen im Antwort-Wahl-Verfahren

Das Modulhandbuch regelt, ob und in welchem Umfang Erfolgskontrollen im Wege des *Antwort-Wahl-Verfahrens* abgelegt werden können

§ 6 b Computergestützte Erfolgskontrollen

(1) Erfolgskontrollen können computergestützt durchgeführt werden. Dabei wird die Antwort bzw. Lösung der/des Studierenden elektronisch übermittelt und, sofern möglich, automatisiert ausgewertet. Die Prüfungsinhalte sind von einer/einem Prüfenden zu erstellen.

(2) Vor der computergestützten Erfolgskontrolle hat die/der Prüfende sicherzustellen, dass die elektronischen Daten eindeutig identifiziert und unverwechselbar und dauerhaft den Studierenden zugeordnet werden können. Der störungsfreie Verlauf einer computergestützten Erfolgskontrolle ist durch entsprechende technische und fachliche Betreuung zu gewährleisten. Alle Prüfungsaufgaben müssen während der gesamten Bearbeitungszeit zur Bearbeitung zur Verfügung stehen.

(3) Im Übrigen gelten für die Durchführung von computergestützten Erfolgskontrollen die §§ 6 bzw. 6 a.

§ 7 Bewertung von Studien- und Prüfungsleistungen

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

(2) 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.

Zur differenzierten Bewertung einzelner Prüfungsleistungen sind nur folgende Noten zugelassen:

1,0; 1,3	:	sehr gut (very good)
1,7; 2,0; 2,3	:	gut (good)
2,7; 3,0; 3,3	:	befriedigend (satisfactory)
3,7; 4,0	:	ausreichend (sufficient)
5,0	:	nicht ausreichend (failed)

(3) Studienleistungen werden mit „bestanden (passed)“ oder mit „nicht bestanden (not passed)“ gewertet.

(4) 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) Jedes Modul und jede Erfolgskontrolle darf in demselben Studiengang nur einmal gewertet werden.

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

(7) Die Modulprüfung ist bestanden, wenn alle erforderlichen Erfolgskontrollen bestanden sind. Die Modulprüfung und die Bildung der Modulnote sollen im Modulhandbuch geregelt werden. 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. Die differenzierten Noten (Absatz 2) sind bei der Berechnung der Modulnoten als Ausgangsdaten zu verwenden.

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(8) Die Ergebnisse der Erfolgskontrollen sowie die erworbenen Leistungspunkte werden durch den Studierendenservice des KIT verwaltet.

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

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

		bis	1,5	=	sehr gut (very good)
von	1,6	bis	2,5	=	gut (good)
von	2,6	bis	3,5	=	befriedigend (satisfactory)
von	3,6	bis	4,0	=	ausreichend (sufficient)

§ 8 Orientierungsprüfungen, Verlust des Prüfungsanspruchs

(1) Die Teilmodulprüfungen Advanced Mathematics I, Engineering Mechanics I und Engineering Mechanics II in den Modulen Advanced Mathematics und Engineering Mechanics sind bis zum Ende des Prüfungszeitraums des zweiten Fachsemesters abzulegen (Orientierungsprüfungen).

(2) Wer die Orientierungsprüfungen einschließlich etwaiger Wiederholungen bis zum Ende des Prüfungszeitraums 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. Eine zweite Wiederholung der Orientierungsprüfungen ist ausgeschlossen.

(3) Ist die Bachelorprüfung bis zum Ende des Prüfungszeitraums des neunten Fachsemesters einschließlich etwaiger Wiederholungen nicht vollständig abgelegt, so erlischt der Prüfungsanspruch im Bachelorstudiengang Mechanical Engineering (International), es sei denn, dass die Fristüberschreitung nicht selbst zu vertreten ist. Die Entscheidung über eine Fristverlängerung und über Ausnahmen von der Fristregelung trifft der Prüfungsausschuss unter Beachtung der in § 32 Abs. 6 LHG genannten Tätigkeiten auf Antrag des/der Studierenden. Der Antrag ist schriftlich, in der Regel bis sechs Wochen vor Ablauf der in Satz 1 genannten Studienhöchstdauer, zu stellen.

(4) Der Prüfungsanspruch geht auch verloren, wenn eine nach dieser Studien- und Prüfungsordnung erforderliche Studien- oder Prüfungsleistung endgültig nicht bestanden ist oder eine Wiederholungsprüfung nach § 9 Abs. 6 nicht rechtzeitig erbracht wurde, es sei denn die Fristüberschreitung ist nicht selbst zu vertreten.

§ 9 Wiederholung von Erfolgskontrollen, endgültiges Nichtbestehen

(1) Studierende können eine nicht bestandene schriftliche Prüfung (§ 4 Absatz 2 Nr. 1) einmal wiederholen. Wird eine schriftliche Wiederholungsprüfung mit „nicht ausreichend (failed)“ (5,0) bewertet, so findet eine mündliche Nachprüfung im zeitlichen Zusammenhang mit dem Termin der nicht bestandenen Prüfung statt. In diesem Falle kann die Note dieser Prüfung nicht besser als „ausreichend (sufficient)“ (4,0) sein.

(2) Studierende können eine nicht bestandene mündliche Prüfung (§ 4 Absatz 2 Nr. 2) einmal wiederholen.

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

(4) Prüfungsleistungen anderer Art (§ 4 Absatz 2 Nr. 3) können einmal wiederholt werden.

(5) Studienleistungen können mehrfach wiederholt werden.

(6) Die Wiederholung von Prüfungsleistungen hat spätestens bis zum Ende des Prüfungszeitraums des übernächsten Semesters zu erfolgen.

(7) Die Prüfungsleistung ist endgültig nicht bestanden, wenn die mündliche Nachprüfung im Sinne des Absatzes 1 mit „nicht ausreichend (failed)“ (5,0) bewertet wurde. 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 (not passed)“ bewertet wurde.

(8) Das Modul ist endgültig nicht bestanden, wenn eine für sein Bestehen erforderliche Prüfungsleistung endgültig nicht bestanden ist.

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

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

(10) Die Wiederholung einer bestandenen Prüfungsleistung ist nicht zulässig.

(11) Die Bachelorarbeit kann bei einer Bewertung mit „nicht ausreichend (failed)“ (5,0) einmal wiederholt werden. Eine zweite Wiederholung der Bachelorarbeit ist ausgeschlossen.

§ 10 Abmeldung; Versäumnis, Rücktritt

(1) Studierende können ihre Anmeldung zu *schriftlichen Prüfungen* ohne Angabe von Gründen bis zur Ausgabe der Prüfungsaufgaben widerrufen (Abmeldung). Eine Abmeldung kann online im Studierendenportal bis 24:00 Uhr des Vortages der Prüfung oder in begründeten Ausnahmefällen beim Studierendenservice innerhalb der Geschäftszeiten erfolgen. Erfolgt die Abmeldung gegenüber dem/der Prüfenden, hat diese/r Sorge zu tragen, dass die Abmeldung im Campus Management System verbucht wird.

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

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

(4) Eine Erfolgskontrolle gilt als mit „nicht ausreichend (failed)“ (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. 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) Der für den Rücktritt nach Beginn der Erfolgskontrolle oder das Versäumnis geltend gemachte Grund muss dem Prüfungsausschuss unverzüglich schriftlich angezeigt und glaubhaft gemacht werden. Bei Krankheit des/der Studierenden oder eines allein zu versorgenden Kindes oder pflegebedürftigen Angehörigen kann die Vorlage eines ärztlichen Attestes verlangt werden.

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§ 11 Täuschung, Ordnungsverstoß

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

(2) 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. In diesem Fall gilt die betreffende Erfolgskontrolle als mit „nicht ausreichend (failed)“ (5,0) bewertet. In schwerwiegenden Fällen kann der Prüfungsausschuss diese Studierenden von der Erbringung weiterer Erfolgskontrollen ausschließen.

(3) 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) Auf Antrag sind die Mutterschutzfristen, wie sie im jeweils gültigen Gesetz zum Schutz der erwerbstätigen Mutter (Mutterschutzgesetz - MuSchG) festgelegt sind, entsprechend zu berücksichtigen. Dem Antrag sind die erforderlichen Nachweise beizufügen. Die Mutterschutzfristen unterbrechen jede Frist nach dieser Prüfungsordnung. Die Dauer des Mutterschutzes wird nicht in die Frist eingerechnet.

(2) Gleichfalls sind die Fristen der Elternzeit nach Maßgabe des jeweils gültigen Gesetzes (Bundeselterngeld- und Elternzeitgesetz - BEEG) auf Antrag zu berücksichtigen. Der/die Studierende muss bis spätestens vier Wochen vor dem Zeitpunkt, von dem an die Elternzeit angetreten werden soll, dem Prüfungsausschuss, unter Beifügung der erforderlichen Nachweise schriftlich mitteilen, in welchem Zeitraum die Elternzeit in Anspruch genommen werden soll. Der Prüfungsausschuss hat zu prüfen, ob die gesetzlichen Voraussetzungen vorliegen, die bei einer Arbeitnehmerin bzw. einem Arbeitnehmer den Anspruch auf Elternzeit auslösen würden, und teilt dem/der Studierenden das Ergebnis sowie die neu festgesetzten Prüfungszeiten unverzüglich mit. Die Bearbeitungszeit der Bachelorarbeit kann nicht durch Elternzeit unterbrochen werden. Die gestellte Arbeit gilt als nicht vergeben. Nach Ablauf der Elternzeit erhält der/die Studierende ein neues Thema, das innerhalb der in § 14 festgelegten Bearbeitungszeit zu bearbeiten ist.

(3) Der Prüfungsausschuss entscheidet auf Antrag über die flexible Handhabung von Prüfungsfristen entsprechend den Bestimmungen des Landeshochschulgesetzes, wenn Studierende Familienpflichten wahrzunehmen haben. Absatz 2 Satz 4 bis 6 gelten entsprechend.

§ 13 Studierende mit Behinderung oder chronischer Erkrankung

(1) Bei der Gestaltung und Organisation des Studiums sowie der Prüfungen sind die Belange Studierender mit Behinderung oder chronischer Erkrankung zu berücksichtigen. Insbesondere ist Studierenden mit Behinderung oder chronischer Erkrankung bevorzugter Zugang zu teilnahmebegrenzten Lehrveranstaltungen zu gewähren und die Reihenfolge für das Absolvieren bestimmter Lehrveranstaltungen entsprechend ihrer Bedürfnisse anzupassen. Studierende sind gemäß Bundesgleichstellungsgesetz (BGG) und Sozialgesetzbuch Neuntes Buch (SGB IX) behindert, wenn ihre körperliche Funktion, geistige Fähigkeit oder seelische Gesundheit mit hoher Wahrscheinlichkeit länger als sechs Monate von dem für das Lebensalter typischen Zustand abweichen und daher ihre Teilhabe am Leben in der Gesellschaft beeinträchtigt ist. Der Prüfungsausschuss entscheidet auf Antrag der/des Studierenden über das Vorliegen der Voraussetzungen nach Satz 2 und 3. Die/der Studierende hat die entsprechenden Nachweise vorzulegen.

(2) Weisen Studierende eine Behinderung oder chronische Erkrankung nach und folgt daraus, dass sie nicht in der Lage sind, Erfolgskontrollen ganz oder teilweise in der vorgeschriebenen Zeit oder Form abzulegen, kann der Prüfungsausschuss gestatten, die Erfolgskontrollen in einem anderen Zeitraum oder einer anderen Form zu erbringen. Insbesondere ist behinderten Studierenden zu gestatten, notwendige Hilfsmittel zu benutzen.

(3) Weisen Studierende eine Behinderung oder chronische Erkrankung nach und folgt daraus, dass sie nicht in der Lage sind, die Lehrveranstaltungen regelmäßig zu besuchen oder die gemäß § 20 erforderlichen Studien- und Prüfungsleistungen zu erbringen, kann der Prüfungsausschuss auf Antrag gestatten, dass einzelne Studien- und Prüfungsleistungen nach Ablauf der in dieser Studien- und Prüfungsordnung vorgesehenen Fristen absolviert werden können.

§ 14 Modul Bachelorarbeit

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

(1 a) Dem Modul Bachelorarbeit sind 15 LP zugeordnet. Es besteht aus der Bachelorarbeit und einer Präsentation. Die Präsentation soll spätestens sechs Wochen nach Abgabe der Bachelorarbeit erfolgen.

(2) Die Bachelorarbeit kann von Hochschullehrer/innen, leitenden Wissenschaftlern/Wissenschaftlerinnen gemäß § 14 Abs. 3 Ziff. 1 KITG und habilitierten Mitgliedern der KIT-Fakultät vergeben werden. Darüber hinaus kann der Prüfungsausschuss weitere Prüfende gemäß § 18 Abs. 2 und 3 zur Vergabe des Themas berechtigen. Den Studierenden ist Gelegenheit zu geben, für das Thema Vorschläge zu machen. Soll die Bachelorarbeit außerhalb der KIT-Fakultät für Maschinenbau angefertigt werden, so bedarf dies der Genehmigung durch den Prüfungsausschuss. Die Bachelorarbeit kann auch in Form einer Gruppenarbeit zugelassen werden, wenn der als Prüfungsleistung zu bewertende Beitrag der einzelnen Studierenden aufgrund objektiver Kriterien, die eine eindeutige Abgrenzung ermöglichen, deutlich unterscheidbar ist und die Anforderung nach Absatz 4 erfüllt. 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. Die Ausgabe des Themas erfolgt in diesem Fall über die/den Vorsitzende/n des Prüfungsausschusses.

(3) 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) 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. Der Umfang der Bachelorarbeit entspricht 12 Leistungspunkten. Die maximale Bearbeitungsdauer beträgt drei Monate. Thema und Aufgabenstellung sind an den vorgesehenen Umfang anzupassen. Der Prüfungsausschuss legt fest, in welchen Sprachen die Bachelorarbeit geschrieben werden kann. Auf Antrag des Studierenden kann der/die Prüfende genehmigen, dass die Bachelorarbeit in einer anderen Sprache als Englisch geschrieben wird.

(5) 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. Wenn diese Erklärung nicht enthalten ist, wird die Arbeit nicht angenommen. Die Erklärung kann wie folgt lauten: „Ich versichere wahrheitsgemäß, die Arbeit selbstständig verfasst, alle benutzten 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.“ Bei Abgabe einer unwahren Versicherung wird die Bachelorarbeit mit „nicht ausreichend (failed)“ (5,0) bewertet.

(6) 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. Der Zeitpunkt der Abgabe der Bachelorarbeit ist durch den/die Prüfende/n beim Prüfungsausschuss aktenkundig zu machen. Das Thema kann nur einmal und nur innerhalb des ersten Monats der Bearbeitungszeit zurückgegeben werden. Macht der oder die Studierende

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einen triftigen Grund geltend, kann der Prüfungsausschuss die in Absatz 4 festgelegte Bearbeitungszeit auf Antrag der oder des Studierenden um höchstens einen Monat verlängern. Wird die Bachelorarbeit nicht fristgerecht abgeliefert, gilt sie als mit „nicht ausreichend (failed)“ (5,0) bewertet, es sei denn, dass die Studierenden dieses Versäumnis nicht zu vertreten haben.

(7) Die Bachelorarbeit wird von mindestens einem/einer Hochschullehrer/in, einem/einer leitenden Wissenschaftler/in gemäß § 14 Abs. 3 Ziff. 1 KITG oder einem habilitierten Mitglied der KIT-Fakultät und einem/einer weiteren Prüfenden bewertet. In der Regel ist eine/r der Prüfenden die Person, die die Arbeit gemäß Absatz 2 vergeben hat. 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 einen weiteren Gutachter bestellen. Die Bewertung hat innerhalb von sechs Wochen nach Abgabe der Bachelorarbeit zu erfolgen.

§ 15 Zusatzleistungen

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

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

§ 15 a Mastervorzug

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

§ 16 Überfachliche Qualifikationen

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

§ 17 Prüfungsausschuss

(1) Für den Bachelorstudiengang wird ein Prüfungsausschuss gebildet. Er besteht aus vier stimmberechtigten Mitgliedern: zwei Hochschullehrer/innen / leitenden Wissenschaftler/innen gemäß § 14 Abs. 3 Ziff. 1 KITG / Privatdozentinnen bzw. -dozenten, zwei akademischen Mitarbeiterinnen und Mitarbeitern nach § 52 LHG / wissenschaftlichen Mitarbeiter/innen gemäß § 14 Abs. 3 Ziff. 2 KITG und einer bzw. einem Studierenden mit beratender Stimme. Die Amtszeit der nichtstudentischen Mitglieder beträgt zwei Jahre, die des studentischen Mitglieds ein Jahr.

(2) Die/der Vorsitzende, ihre/sein Stellvertreter/in, die weiteren Mitglieder des Prüfungsausschusses sowie deren Stellvertreter/innen werden von dem KIT-Fakultätsrat bestellt, die akademischen Mitarbeiter/innen nach § 52 LHG, die wissenschaftlichen Mitarbeiter gemäß § 14 Abs. 3 Ziff. 2 KITG und die Studierenden auf Vorschlag der Mitglieder der jeweiligen Gruppe; Wiederbestellung ist möglich. Die/der Vorsitzende und deren/dessen Stellvertreter/in müssen Hoch-

schullehrer/innen oder leitende Wissenschaftler/innen § 14 Abs. 3 Ziff. 1 KITG sein. Die/der Vorsitzende des Prüfungsausschusses nimmt die laufenden Geschäfte wahr und wird durch das jeweilige Prüfungssekretariat unterstützt.

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

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

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

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

§ 18 Prüfende und Beisitzende

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

(2) Prüfende sind Hochschullehrer/innen sowie leitende Wissenschaftler/innen gemäß § 14 Abs. 3 Ziff. 1 KITG, habilitierte Mitglieder und akademische Mitarbeiter/innen gemäß § 52 LHG, welche der KIT-Fakultät angehören und denen die Prüfungsbefugnis übertragen wurde; desgleichen kann wissenschaftlichen Mitarbeitern gemäß § 14 Abs. 3 Ziff. 2 KITG die Prüfungsbefugnis übertragen werden. Bestellt werden darf nur, wer mindestens die dem jeweiligen Prüfungsgegenstand entsprechende fachwissenschaftliche Qualifikation erworben hat.

(3) Soweit Lehrveranstaltungen von anderen als den unter Absatz 2 genannten Personen durchgeführt werden, sollen diese zu Prüfenden bestellt werden, sofern die KIT-Fakultät eine Prüfungsbefugnis erteilt hat und sie die gemäß Absatz 2 Satz 2 vorausgesetzte Qualifikation nachweisen können.

(4) Die Beisitzenden werden durch die Prüfenden benannt. Zu Beisitzenden darf nur bestellt werden, wer einen akademischen Abschluss in einem mathematisch-naturwissenschaftlichen oder ingenieurwissenschaftlichen Studiengang erworben hat.

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§ 19 Anerkennung von Studien- und Prüfungsleistungen, Studienzeiten

(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. Dabei ist kein schematischer Vergleich, sondern eine Gesamtbetrachtung vorzunehmen. Bezüglich des Umfangs einer zur Anerkennung vorgelegten Studienleistung bzw. Prüfungsleistung (Anrechnung) werden die Grundsätze des ECTS herangezogen.

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

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

(4) 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) 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. Die Anrechnung kann in Teilen versagt werden, wenn mehr als 50 Prozent des Hochschulstudiums ersetzt werden soll.

(6) Zuständig für Anerkennung und Anrechnung ist der Prüfungsausschuss. Im Rahmen der Feststellung, ob ein wesentlicher Unterschied im Sinne des Absatz 1 vorliegt, sind die zuständigen Fachvertreter/innen zu hören. Der Prüfungsausschuss entscheidet in Abhängigkeit von Art und Umfang der anzurechnenden Studien- und Prüfungsleistungen über die Einstufung in ein höheres Fachsemester.

II. Bachelorprüfung

§ 20 Umfang und Art der Bachelorprüfung

(1) Die Bachelorprüfung besteht aus den Modulprüfungen nach Absatz 2 sowie dem Modul Bachelorarbeit (§ 14).

(2) Es sind Modulprüfungen in folgenden Pflichtfächern abzulegen:

1. Fundamentals of Engineering: Modul(e) im Umfang von 143 LP,
2. Majors in Mechanical Engineering (International) : Modul(e) im Umfang von 16 LP,
3. International Project Management and Soft Skills im Umfang von 6 LP gemäß § 16.

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

§ 21 Bestehen der Bachelorprüfung, Bildung der Gesamtnote

(1) Die Bachelorprüfung ist bestanden, wenn alle in § 20 genannten Modulprüfungen mindestens mit „ausreichend (sufficient)“ bewertet wurden.

(2) Die Gesamtnote der Bachelorprüfung errechnet sich als ein mit Leistungspunkten gewichteter Notendurchschnitt der Fachnoten sowie des Moduls Bachelorarbeit. Dabei wird die Note des Moduls Bachelorarbeit mit dem doppelten Gewicht gegenüber den Noten der übrigen Fächer berücksichtigt.

(3) 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) Über die Bachelorprüfung werden nach Bewertung der letzten Prüfungsleistung eine Bachelorurkunde und ein Zeugnis erstellt. Die Ausfertigung von Bachelorurkunde und Zeugnis soll nicht später als drei Monate nach Ablegen der letzten Prüfungsleistung erfolgen. Bachelorurkunde und Bachelorzeugnis werden in deutscher und englischer Sprache ausgestellt. Bachelorurkunde und Zeugnis tragen das Datum der erfolgreichen Erbringung der letzten Prüfungsleistung. Diese Dokumente werden den Studierenden zusammen ausgehändigt. In der Bachelorurkunde wird die Verleihung des akademischen Bachelorgrades beurkundet. Die Bachelorurkunde wird von dem Präsidenten und der KIT-Dekanin/ dem KIT-Dekan der KIT-Fakultät unterzeichnet und mit dem Siegel des KIT versehen.

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

(3) 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) Das Transcript of Records enthält in strukturierter Form alle erbrachten Studien- und Prüfungsleistungen. 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. Absatz 2 Satz 2 gilt entsprechend. Aus dem Transcript of Records soll die Zugehörigkeit von Lehrveranstaltungen zu den einzelnen Modulen deutlich erkennbar sein. Angerechnete Studien- und Prüfungsleistungen sind im Transcript of Records aufzunehmen. Alle Zusatzleistungen werden im Transcript of Records aufgeführt.

(5) 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

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. Dasselbe gilt, wenn der Prüfungsanspruch erloschen ist.

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§ 24 Aberkennung des Bachelorgrades

(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. Gegebenenfalls kann die Modulprüfung für „nicht ausreichend (failed)“ (5,0) und die Bachelorprüfung für „nicht bestanden (not passed)“ erklärt werden.

(2) 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. Hat die/der Studierende die Zulassung vorsätzlich zu Unrecht erwirkt, so kann die Modulprüfung für „nicht ausreichend (failed)“ (5,0) und die Bachelorprüfung für „nicht bestanden (not passed)“ erklärt werden.

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

(4) Das unrichtige Zeugnis ist zu entziehen und gegebenenfalls ein neues zu erteilen. Mit dem unrichtigen Zeugnis ist auch die Bachelorurkunde einzuziehen, wenn die Bachelorprüfung aufgrund einer Täuschung für „nicht bestanden (not passed)“ erklärt wurde.

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

(6) Die Aberkennung des akademischen Grades richtet sich nach § 36 Abs. 7 LHG.

§ 25 Einsicht in die Prüfungsakten

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

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

(4) Prüfungsunterlagen sind mindestens fünf Jahre aufzubewahren.

§ 26 Inkrafttreten, Übergangsvorschriften

(1) Diese Studien- und Prüfungsordnung tritt am 01. Oktober 2017 in Kraft.

Karlsruhe, den 19. Juli 2017

Professor Dr.-Ing. Holger Hanselka
(Präsident)

Karlsruher Institut für Technologie

Die Forschungsuniversität in der Helmholtz-Gemeinschaft

Amtliche Bekanntmachung

2018 **Ausgegeben Karlsruhe, den 28. November 2018** **Nr. 71**

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Satzung zur Änderung der Studien- und Prüfungsordnung des Karlsruher Instituts für Technologie (KIT) für den Bachelorstudiengang Mechanical Engineering (International)

vom 28. November 2018

Aufgrund von § 10 Absatz 2 Ziff. 5 und § 20 Absatz 2 Satz 1 des Gesetzes über das Karlsruher Institut für Technologie (KIT-Gesetz - KITG) in der Fassung vom 14. Juli 2009 (GBl. S. 317 f), zuletzt geändert durch Artikel 2 des Gesetzes zur Weiterentwicklung des Hochschulrechts (HRWeitEG) vom 13. März 2018 (GBl S. 85, 94), und § 32 Absatz 3 Satz 1 des Gesetzes über die Hochschulen in Baden-Württemberg (Landeshochschulgesetz - LHG) in der Fassung vom 1. Januar 2005 (GBl. S. 1 f), zuletzt geändert durch Artikel 1 des Gesetzes zur Weiterentwicklung des Hochschulrechts (HRWeitEG) vom 13. März 2018 (GBl. S. 85) hat der KIT-Senat am 19. November 2018 die folgende Satzung zur Änderung der Studien- und Prüfungsordnung für den Bachelorstudiengang Mechanical Engineering (International) vom 19. Juli 2017 (Amtliche Bekanntmachung des Karlsruher Instituts für Technologie (KIT) Nr. 51 vom 21. Juli 2017) beschlossen.

Der Präsident hat seine Zustimmung gemäß § 20 Absatz 2 Satz 1 KITG i.V.m. § 32 Absatz 3 Satz 1 LHG am 28. November 2018 erteilt.

Artikel 1 – Änderung der Studien- und Prüfungsordnung

1. § 9 Absatz 11 werden folgende Sätze 3 und 4 angefügt:

„Die Präsentation nach § 14 Absatz 1 a ist eine Studienleistung und kann bei einer Bewertung mit „nicht bestanden (not passed)“ (im Gegensatz zu anderen Studienleistungen) nur einmal wiederholt werden. Die Präsentation ist endgültig nicht bestanden, wenn sie zweimal mit „nicht bestanden“ (not passed) bewertet wurde.“

2. § 12 Absatz 1 wird wie folgt geändert:

a) Satz 1 wird wie folgt gefasst:

„Es gelten die Vorschriften des Gesetzes zum Schutz von Müttern bei der Arbeit, in der Ausbildung und im Studium (Mutterschutzgesetz – MuSchG) in seiner jeweils geltenden Fassung.“

b) Satz 2 wird aufgehoben.

c) Die bisherigen Sätze 3 und 4 werden die Sätze 2 und 3

3. § 14 Absatz 1a wird wie folgt geändert:

In Satz 2 wird nach dem Wort „Bachelorarbeit“ die Angabe „mit 12 LP“ und nach dem Wort „Präsentation“ die Angabe „mit 3 LP“ eingefügt.

4. § 17 Absatz 7 wird wie folgt geändert:

In Satz 4 werden nach dem Wort „Entscheidung“ die Wörter „schriftlich oder zur Niederschrift“ gestrichen.

5. § 18 Absatz 3 wird wie folgt geändert:

Nach dem Wort „sofern“ werden die Wörter „die KIT-Fakultät eine Prüfungsbefugnis erteilt hat und“ gestrichen.

Artikel 2 – Inkrafttreten

Diese Satzung tritt am Tage nach ihrer Bekanntmachung in den Amtlichen Bekanntmachungen des KIT in Kraft.

Karlsruhe, den 28. November 2018

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

Karlsruher Institut für Technologie

Die Forschungsuniversität in der Helmholtz-Gemeinschaft

Amtliche Bekanntmachung

2018 **Ausgegeben Karlsruhe, den 28. November 2018** **Nr. 73**

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Satzung zur Änderung der Studien- und Prüfungsordnung des Karlsruher Instituts für Technologie (KIT) für den Bachelorstudiengang Mechanical Engineering (International)

vom 28. November 2018

Aufgrund von § 10 Absatz 2 Ziff. 5 und § 20 Absatz 2 Satz 1 des Gesetzes über das Karlsruher Institut für Technologie (KIT-Gesetz - KITG) in der Fassung vom 14. Juli 2009 (GBl. S. 317 f), zuletzt geändert durch Artikel 2 des Gesetzes zur Weiterentwicklung des Hochschulrechts (HRWeitEG) vom 13. März 2018 (GBl S. 85, 94), und § 32 Absatz 3 Satz 1 des Gesetzes über die Hochschulen in Baden-Württemberg (Landeshochschulgesetz - LHG) in der Fassung vom 1. Januar 2005 (GBl. S. 1 f), zuletzt geändert durch Artikel 1 des Gesetzes zur Weiterentwicklung des Hochschulrechts (HRWeitEG) vom 13. März 2018 (GBl. S. 85) hat der KIT-Senat am 19. November 2018 die folgende Satzung zur Änderung der Studien- und Prüfungsordnung für den Bachelorstudiengang Mechanical Engineering (International) vom 19. Juli 2017 (Amtliche Bekanntmachung des Karlsruher Instituts für Technologie (KIT) Nr. 51 vom 21. Juli 2017) beschlossen.

Der Präsident hat seine Zustimmung gemäß § 20 Absatz 2 Satz 1 KITG i.V.m. § 32 Absatz 3 Satz 1 LHG am 28. November 2018 erteilt.

Artikel 1 – Änderung der Studien- und Prüfungsordnung

1. § 9 Absatz 11 werden folgende Sätze 3 und 4 angefügt:

„Die Präsentation nach § 14 Absatz 1 a ist eine Studienleistung und kann bei einer Bewertung mit „nicht bestanden (not passed)“ (im Gegensatz zu anderen Studienleistungen) nur einmal wiederholt werden. Die Präsentation ist endgültig nicht bestanden, wenn sie zweimal mit „nicht bestanden“ (not passed) bewertet wurde.“

2. § 12 Absatz 1 wird wie folgt geändert:

a) Satz 1 wird wie folgt gefasst:

„Es gelten die Vorschriften des Gesetzes zum Schutz von Müttern bei der Arbeit, in der Ausbildung und im Studium (Mutterschutzgesetz – MuSchG) in seiner jeweils geltenden Fassung.“

b) Satz 2 wird aufgehoben.

c) Die bisherigen Sätze 3 und 4 werden die Sätze 2 und 3

3. § 14 Absatz 1a wird wie folgt geändert:

In Satz 2 wird nach dem Wort „Bachelorarbeit“ die Angabe „mit 12 LP“ und nach dem Wort „Präsentation“ die Angabe „mit 3 LP“ eingefügt.

4. § 17 Absatz 7 wird wie folgt geändert:

In Satz 4 werden nach dem Wort „Entscheidung“ die Wörter „schriftlich oder zur Niederschrift“ gestrichen.

5. § 18 Absatz 3 wird wie folgt geändert:

Nach dem Wort „sofern“ werden die Wörter „die KIT-Fakultät eine Prüfungsbefugnis erteilt hat und“ gestrichen.

Artikel 2 – Inkrafttreten

Diese Satzung tritt am Tage nach ihrer Bekanntmachung in den Amtlichen Bekanntmachungen des KIT in Kraft.

Karlsruhe, den 28. November 2018

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

Karlsruher Institut für Technologie

Die Forschungsuniversität in der Helmholtz-Gemeinschaft

Amtliche Bekanntmachung

2017 **Ausgegeben Karlsruhe, den 21. Juli 2017** **Nr. 50**

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Satzung für das hochschuleigene Auswahlverfahren im internationalen englischsprachigen Bachelorstudiengang Mechanical Engineering (International) am Karlsruher Institut für Technologie (KIT)

vom 19. Juli 2017

Aufgrund von § 10 Abs. 2 Ziff. 6 und § 20 des Gesetzes über das Karlsruher Institut für Technologie (KIT-Gesetz – KITG) in der Fassung vom 14. Juli 2009 (GBl. S. 317 ff.) zuletzt geändert durch Artikel 5 des Dritten Gesetzes zur Änderung hochschulrechtlicher Vorschriften (3. Hochschulrechtsänderungsgesetz – 3. HRÄG) vom 01. April 2014 (GBl. S. 99, 167), § 63 Abs. 2 Satz 1 des Gesetzes über die Hochschulen in Baden-Württemberg (Landeshoch-schulgesetz – LHG) in der Fassung vom 1. Januar 2005 (GBl. S. 1 ff), zuletzt geändert durch Artikel 2 des Gesetzes zur Verwirklichung der Chancengleichheit von Frauen und Männern im öffentlichen Dienst in Baden-Württemberg und zur Änderung des Landeshochschulgesetzes vom 23. Februar 2016 (GBl. S. 108, 118), § 6 Abs. 1 und 2, §§ 6 a, 6b Hochschulzulassungsgesetz (HZG) in der Fassung vom 15. September 2005 (GBl. S. 629 ff), zuletzt geändert durch Artikel 2 des Hochschulfinanzierungsvertrags- Begleitgesetz (HoFV-Begleitgesetz) vom 5. Mai 2015 (GBl. S. 313), in Verbindung mit § 1 Abs. 3 Satz 2, § 3 Abs. 1 Satz 3, § 10 Abs. 5 und Anlage 1 zu § 1 Abs. 3 der Hochschulvergabeverordnung (HVVO) vom 13. Januar 2003 (GBl. S. 63 ff), zuletzt geändert durch Verordnung vom 27. Juli 2017 (GBl. S. 328), hat der Senat des Karlsruher Instituts für Technologie (KIT) am 20. März 2017 die nachstehende Satzung für das hochschuleigene Auswahlverfahren im Bachelorstudiengang Mechanical Engineerung (International) am Karlsruher Institut für Technologie (KIT) beschlossen.

Das Ministerium für Wissenschaft, Forschung und Kunst hat am 20. April 2017 gem. § 6b HZG seine Zustimmung erteilt (Az.: 7831.14-21-08-4).

§ 1 Anwendungsbereich, Quoten

(1) Das Studienangebot des englischsprachigen internationalen auslandsorientierten Bachelorstudiengangs Mechanical Engineering (International) (im Folgenden: Bachelorstudiengang Mechanical Engineering) ist in besonderer Weise auf ausländische Studienbewerber und Studienbewerberinnen ausgerichtet. Die Lehrveranstaltungen werden ganz in englischer Sprache abgehalten.

(2) Die Ausländerquote beträgt in diesem Studiengang gem. der Anlage 1 zur Hochschulvergabeverordnung (im Folgenden: HVVO) iVm. § 1 Abs. 3 HVVO **70 vom Hundert**. Zugelassen werden in dieser Quote Studienbewerber/innen ausländischer Staatsangehörigkeit oder Staatenlose, die nicht Deutschen nach § 1 Abs. 2 HVVO gleichgestellt sind.

30 vom Hundert der zur Verfügung stehenden Plätze werden an deutsche und Deutschen gem. § 1 Abs. 2 HVVO gleichgestellte Studienbewerber/-bewerberinnen vergeben.

(3) Sind in dem Studiengang Zulassungszahlen nach der jeweils geltenden Verordnung des Ministeriums für Wissenschaft, Forschung und Kunst über die Festsetzung von Zulassungszahlen für die Studiengänge im Vergabeverfahren der Universitäten (ZZVO) festgesetzt, vergibt das Karlsruher Institut für Technologie (im Folgenden: KIT) die zur Verfügung stehenden Studienplätze sowohl in der Ausländerquote von 70 vom Hundert als auch in der Quote für Deutsche und Deutschen Gleichgestellten von 30 vom Hundert nach dem Ergebnis eines hochschuleigenen Auswahlverfahrens gemäß dieser Satzung. Die Auswahlentscheidung wird nach dem Grad der Eignung der Bewerber/innen für den Bachelorstudiengang Mechanical Engineering und den angestrebten Beruf getroffen.

§ 2 Fristen

Eine Zulassung von Studienanfängern/-anfängerinnen erfolgt nur zum Wintersemester. Der Antrag auf Zulassung einschließlich aller erforderlichen Unterlagen muss

bis zum 30.4. eines Jahres

beim KIT eingegangen sein **(Ausschlussfrist).**

§ 3 Form des Antrags

(1) Die Form des Antrags richtet sich nach den allgemeinen für das Zulassungsverfahren geltenden Bestimmungen in der jeweils gültigen Zulassungs- und Immatrikulationsordnung des KIT.

(2) Dem Antrag sind folgende Unterlagen beizufügen:

1. eine Kopie des Zeugnisses der Allgemeinen Hochschulzugangsberechtigung, einer einschlägigen fachgebundenen Hochschulzugangsberechtigung, bzw. einer gleichwertigen n ausländischen oder sonstigen Hochschulzugangsberechtigung im Sinne des § 58 Abs. 2 LHG;
2. Nachweis über die erfolgreiche Teilnahme am SAT (Scholastic Assessment Test bestehend aus „Reading Test, Writing and Language Test, and a Math Test“) mit mindestens 1200 Punkten. Die Nachweisführung erfolgt ausschließlich über den offiziellen Leistungsnachweis mit den erreichten Punktezahlen über die Teilnahme am SAT Test (student score report „CollegeBoard SAT“) ausgestellt durch das CollegeBoard. Dieser ist der Bewerbung in Papierform beizufügen;
3. die in einem vorläufigen Zeugnis nach § 3 Abs. 3 bzw. dem Zeugnis der Hochschulzugangsberechtigung ausgewiesenen Noten in den Fächern Mathematik und Physik; alternativ kann der offizielle Leistungsnachweis mit der erreichten Punktzahl des SAT Subject Test in Physik vorgelegt werden.
4. Nachweise über ausreichende englische Sprachkenntnisse nach § 5 Abs. 1 b;
5. sofern vorhanden: Nachweise über eine abgeschlossene Berufsausbildung und Berufstätigkeit, besondere Vorbildungen, praktische Tätigkeiten, sowie außerschulische Leistungen und Qualifikationen, die über die Eignung für den Studiengang besonderen Aufschluss geben;
6. Motivationsschreiben;
7. die in der jeweils gültigen Zulassungs- und Immatrikulationsordnung genannten sonstigen Unterlagen.

Falls die vorgelegten Unterlagen und Zeugnisse nicht in deutscher oder englischer Sprache abgefasst sind, ist eine amtlich beglaubigte Übersetzung in deutscher oder englischer Sprache erforderlich. Das KIT kann verlangen, dass diese der Zulassungsentscheidung zugrundeliegenden Dokumente bei der Einschreibung im Original vorzulegen sind.

(3) Liegt das Zeugnis der Hochschulzugangsberechtigung nach Abs. 2 Ziffer 1 bis zum Ende der Antragsfrist nach § 2 noch nicht vor, kann der Zulassungsantrag auf ein vorläufiges Zeugnis gestützt werden, wenn zu erwarten ist, dass aufgrund der bisherigen Prüfungsergebnisse die Hochschulzugangsberechtigung rechtzeitig vor Beginn des Bachelorstudiengangs Mechanical Engineering erlangt wird.

Das vorläufige Zeugnis muss eine Bewertung der bisher erbrachten Prüfungsleistungen enthalten, welche in die Note der Hochschulzugangsberechtigung mit einfließen oder Voraussetzung für den Erwerb der HZB sind, und von einer für die Notengebung oder Zeugniserteilung autorisierten Stelle ausgestellt sein. Weiterhin muss der angestrebte Abschluss

im originalsprachlichen Wortlaut angegeben sein, entsprechend der Richtlinien der Zentralstelle für das ausländische (ZAB) Bildungswesen (www.anabin.org).

Bewerber und Bewerberinnen nach Satz 1 nehmen am Auswahlverfahren mit einer Durchschnittsnote, die aufgrund der bisherigen Prüfungsleistungen ermittelt wird, teil; das Ergebnis der endgültigen Hochschulzugangsberechtigung bleibt unbeachtet.

Eine Zulassung ist im Fall einer Bewerbung nach Satz 1 unter dem Vorbehalt auszusprechen, dass die Hochschulzugangsberechtigung bis zur Immatrikulation nachgewiesen wird und sich die vorläufige Zulassung durch das endgültige Zeugnis bestätigt. Im Übrigen bleibt das endgültige Zeugnis bei der Zulassung unbeachtlich. Wird der Nachweis nicht fristgerecht erbracht, erlischt die Zulassung.

§ 4 Auswahlkommission

(1) Zur Vorbereitung der Auswahlentscheidung setzt die KIT-Fakultät Maschinenbau mindestens eine Auswahlkommission ein. Die Auswahlkommission besteht aus mindestens zwei Personen des hauptberuflich tätigen wissenschaftlichen Personals, davon ein/er Professor/in.

Ein/e Studierendenvertreter/in kann mit beratender Stimme an den Sitzungen der Auswahlkommission teilnehmen. Ein/e Vertreter/in des Carl Benz School Office kann mit beratender Stimme an den Sitzungen teilnehmen. Eines der Mitglieder der Auswahlkommission führt den Vorsitz.

(2) Die Auswahlkommission berichtet dem KIT-Fakultätsrat nach Abschluss des Verfahrens über die gesammelten Erfahrungen und macht Vorschläge zur Verbesserung und Weiterentwicklung des Auswahlverfahrens.

§ 5 Auswahlverfahren

(1) Am Auswahlverfahren nimmt nur teil, wer

a) sich frist- und formgerecht um einen Studienplatz beworben hat und

b) ausreichende englische Sprachkenntnisse (Test of English as Foreign Language (TOEFL) mit mindestens 570 Punkten im paper-based TOEFL Test, 250 Punkten im computerbased TOEFL Test oder 88 Punkten im internet-based TOEFL Test; IELTS min. 6,5 oder gleichwertiger Nachweis) nachweist, sofern die Muttersprache der Bewerberin/des Bewerbers nicht Englisch ist. Dieser Nachweis englischer Sprachkenntnisse entfällt für Bewerber/innen, deren Muttersprache Englisch ist oder die ihren Hochschulabschluss in einem englischsprachigen Studiengang oder im englischsprachigen Ausland erworben haben. Die offizielle Sprache des Studienprogramms muss auf dem Abschlusszeugnis, dessen Ergänzung, im Transcript of Records oder in einer entsprechenden Bescheinigung der Hochschule vermerkt sein.

(2) Die Zulassung ist zu versagen, wenn

a) die Unterlagen nach § 3 Abs. 2 nicht frist- oder formgerecht vorgelegt wurden oder

b) im Bachelorstudiengang Mechanical Engineering oder einem verwandten Studiengang mit im Wesentlichen gleichem Inhalt eine nach der Prüfungsordnung erforderliche Prüfung endgültig nicht bestanden wurde oder der Prüfungsanspruch aus sonstigen Gründen nicht mehr besteht (§ 60 Abs. 2 Nr. 2 LHG, § 9 Abs. 2 HZG). Über die Festlegung der Studiengänge mit im Wesentlichen gleichem Inhalt entscheidet die Auswahlkommission des Bachelorstudiengangs Mechanical Engineering im Einvernehmen mit dem Prüfungsausschuss des Bachelorstudiengangs Mechanical Engineering.

(3) Im Übrigen bleiben die allgemeinen für das Zulassungsverfahren geltenden Bestimmungen der Zulassungs- und Immatrikulationsordnung des KIT unberührt.

§ 6 Auswahlkriterien

Die Auswahl erfolgt aufgrund einer gemäß § 8 zu bildenden Rangliste nach dem Ergebnis

a) eines fachspezifischen Studierfähigkeitstests (§ 7),

b) die in den (vorläufigen) Zeugnissen ausgewiesenen Profilnoten in Mathematik und Physik aus den letzten zwei Halbjahren vor dem 30.04., sofern diese in die Note der Hochschulzugangsberechtigung mit einfließen oder Voraussetzung für den Erwerb der Hochschulzugangsberechtigung sind. Die Profilnoten können ersetzt werden durch den SAT-Subject Test Physik.

c) eines Motivationsschreibens,

d) beruflicher und sonstiger Leistungen.

§ 7 Fachspezifischer Studierfähigkeitstest (SAT-Test)

Zur Feststellung der fachspezifischen Studierfähigkeit des Bewerbers / der Bewerberin für den Bachelorstudiengang Mechanical Engineering werden ausschließlich die Ergebnisse des SAT-Tests (bestehend aus den drei Teilen „Reading Test, Writing and Language Test and Math Test) herangezogen. Der SAT-Test dient der Überprüfung der zur Erfüllung der fachspezifischen Anforderungen des Bachelorstudiengangs Mechanical Engineering notwendigen Fachkenntnisse und Fähigkeiten des Bewerbers/ der Bewerberin, die im Nachweis der schulischen Leistungen nicht oder nur unzureichend abgebildet sind. Für das Bestehen des fachspezifischen Studierfähigkeitstests müssen im SAT-Test mindestens 1200 Punkte erreicht worden sein.

§ 8 Erstellen der Rangliste für die Auswahlentscheidung

(1) Die Rangliste wird nach einer Punktzahl, in die nachfolgende Leistungen eingehen, erstellt:

1. Ergebnis des SAT-Test:

   Die im SAT-Test erreichte Punktzahl wird mit maximal 20 Punkten bewertet. Die Umrechnung erfolgt nach der Tabelle in Anlage 1 der Satzung.

2. Die in den (vorläufigen) Zeugnissen ausgewiesenen Profilnoten in Mathematik und Physik aus den letzten zwei Halbjahren vor dem 30.04., sofern diese in die Note der Hochschulzugangsberechtigung mit einfließen oder Voraussetzung für den Erwerb der Hochschulzugangsberechtigung sind. Die Profilnoten können ersetzt werden durch das Ergebnis des SAT-Subject Test Physik:

   Die in den (vorläufigen) Zeugnissen ausgewiesenen Profilnoten in Mathematik und Physik bzw. das Ergebnis des SAT Subject Test Physik werden mit maximal 10 Punkten bewertet. Ausländische Schulnoten werden entsprechend der Bayrischen Formel in deutsche Noten umgerechnet. Aus den (umgerechneten) Schulnoten in Mathematik und Physik wird das arithmetische Mittel gebildet.

   Die Verteilung der maximal 10 Punkte auf das aus den Schulnoten gebildete arithmetische Mittel bzw. das Ergebnis des SAT Subject Test Physik erfolgt gemäß den Tabellen in den Anlagen 2 (Profilnoten) und Anlage 3 (SAT Subject Test) der Satzung.

3. Motivationsschreiben:

   Im Motivationsschreiben soll der Bewerber/ die Bewerberin zu folgenden Themen Stellung beziehen bzw. Angaben machen:

Darstellung der

a) eigenen Persönlichkeit und des Werdegangs

b) fachspezifischen Interessen und Fähigkeiten

c) Entscheidung für die Studienrichtung Maschinenbau

d) Persönliche Ziele für den Studienabschluss Bachelor of Science

e) Spätere Studien- und Berufsziele.

Das Motivationsschreiben ist in englischer Sprache zu verfassen und soll einen Umfang von zwei DIN A4 Seiten nicht überschreiten.

Die Mitglieder der Auswahlkommission bewerten das Motivationsschreiben gemeinsam auf einer Skala von 0 bis 10. Dabei werden die Themen nach Nr. 3 a) bis e) mit jeweils maximal 2 Punkten bewertet, sofern sie über die Eignung des Bewerbers/ der Bewerberin für das angestrebte Studium besonderen Aufschluss geben.

4. Berufliche und sonstige Leistungen:

   Die Mitglieder der Auswahlkommission bewerten die beruflichen und sonstigen Leistungen gesondert auf einer Skala von 0 bis 5. Dabei werden die folgenden Kriterien berücksichtigt, sofern sie über die Eignung für das angestrebte Studium besonderen Aufschluss geben:

   a) eine abgeschlossene Berufsausbildung in einem einschlägigen Ausbildungsberuf und bisherige, für den Studiengang einschlägige Berufsausübung auch ohne abgeschlossene Berufsausbildung,

   b) praktische Tätigkeiten und besondere Vorbildungen

   c) außerschulische Leistungen und Qualifikationen (z.B. Preise und Auszeichnungen).

   Aus der Summe der von den einzelnen Mitgliedern vergebenen Punktzahlen wird das arithmetische Mittel bis auf eine Dezimalstelle hinter dem Komma berechnet. Es wird nicht gerundet.

(2) Die Punktzahl nach Absatz 1 Nr. 1 (SAT-Test), nach Absatz 1 Nr. 2 (Profilnoten bzw. Ergebnis das SAT Subject Test Physik), nach Absatz 1 Nr. 3 (Motivationsschreiben) und Absatz 1 Nr. 4 (Berufliche und sonstige Leistungen) werden addiert (max. 45 Punkte). Auf der Grundlage der so ermittelten Punktzahl wird unter allen Teilnehmenden des Auswahlverfahrens eine Rangliste erstellt.

(3) Bei Ranggleichheit gilt § 16 HVVO.

§ 9 Inkrafttreten

Diese Satzung tritt am Tage nach ihrer Bekanntmachung in den Amtlichen Bekanntmachungen des KIT in Kraft. Sie gilt erstmals für das Bewerbungsverfahren zum Wintersemester 2017/2018.

Karlsruhe, den 19. Juli 2017

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

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Anlage 1:

Umrechnung der im SAT Test erreichten Punktezahl

SAT Test Punktezahl	Zugeordnete Punkte für das Ranking
1200 Minimum	
1200 -1215	1
1216 - 1230	2
1231 - 1245	3
1246- 1260	4
1261 - 1275	5
1276- 1290	6
1291- 1305	7
1306- 1320	8
1321 - 1335	9
1336- 1350	10
1351 - 1365	11
1366 - 1380	12
1381 - 1395	13
1396 - 1410	14
1411 - 1425	15
1426 - 1440	16
1441 - 1455	17
1456 - 1470	18
1471 - 1495	19
>1496	20

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Anlage 2:

Verteilung der Punkte auf das arithmetische Mittel der Profilnoten Mathe und Physik

Note (arithmetisches Mittel)	Punkte
1,0 – 1,3	10 Punkte
1,4 – 1,6	9 Punkte
1,7 – 1,9	8 Punkte
2,0 – 2,2	7 Punkte
2,3 – 2,5	6 Punkte
2,6 – 2,8	5 Punkte
2,9 – 3,1	4 Punkte
3,2 -3,4	3 Punkte
3,5 – 3,7	2 Punkte
3,8 -4,0	1 Punkte

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Anlage 3:

Umrechnung der im SAT Physik Fach-spezifischen Test erreichten Punktezahl

SAT Test Punktezahl Punkteverteilung 200 – 800 Punkte	Zugeordnete Punkte für das Ranking
400 Minimum	
400 - 420	1
421 - 440	2
441 - 460	3
461- 480	4
481 - 500	5
501 - 520	6
521 - 540	7
541 - 560	8
561 - 580	9
>581	10

Curriculum of the KIT Faculty for Mechanical Engineering, for the Bachelor Course Mechanical Engineering (International) according to SPO (Study and Examination Regulations) 2017

Release/edition dated July 27, 2016

Contents

0 List of abbreviations

Semester:	WS	Winter semester
	SS	Summer semester
Major subjects:	CA, CCA (K, KP)	Components of the core area, if necessary compulsory core area component
	CS (E)	Components of the major subject supplementary area
Credits:	CP (LP)	Credit points
	Ex (Pr)	Examination
	(oEx) mPr	Oral examination
	(wEx) sPr	Written examination
	(othEx) PraA	Other examinations
	Cer (Schein)	Certificate/unmarked module performance
	C (TL)	Component/Partial Performance
	W (Gew)	Weight of an examination performance within a module or in the final result mark
Other:	B.Sc.	academic title: Bachelor of Science
	SER (SPO)	Study and examination regulations
	CSW (SWS)	Classes per semester week
	o (w)	optional
	c (p)	compulsory

1 Curriculum, Modules and Examinations

The credit points (CP) are awarded in accordance with the „European Credit Transfer and Accumulation System“ (ECTS) and are based on the workload to be completed by students.

1.1 Examination Modalities

In each semester at least one examination date is offered for written examinations and at least two dates for oral examinations. Examination dates and deadlines for examination registration are determined by the examination board. Registration for the exams usually takes place at least one week before the exam. Enrolment and examination dates will be announced in due time, in the case of written examinations at least 6 weeks before the examination.

The examiner decides which aids may be used in an examination. A list of the approved aids will be published together with the examination date.

The following rules apply to performance reviews in the major subject modules:
The concrete form of the examinations is laid down in the Study and Examination Regulations § 6 paragraph 3.

It is possible to take the core area examinations separately. The core area examination mark is based as the average value of the components/partial performance weighted by the credit points. Changing the component/partial performance of the core area is no longer possible after the component/partial performance examinations have started. It is recommended to take the core area examinations in blocks.

In the case of major subject oral examinations, the duration of the examination should be 5 minutes per credit point. If an oral examination for a specific subject awards more than 12 CP, the duration of the examination should be 60 minutes.

1.2 Bachelor Course Modules

The module handbook indicates whether pre-requisites in the form of course achievements are required for module examinations or module component/partial performance examinations. The duration of written exams is specified in hours. Examination results are included in the module mark or the overall mark with the specified weight (W).

Fach/Subject	Modul/Module	LP/ Modul /CP module	Teilleistungen (TL)/ Components	LP/ TL/ C	Koordinator/Coordinator	Type of performance revue (C)		Pr (h)/ Ex (h)	Weightage
						Academic performance	Examination performance		
Ingenieurwissenschaftliche Grundlagen *Fundamentals in Engineering*	Höhere Mathematik *Advanced Mathematics*	21	Höhere Mathematik I Vorleistungen *Advanced Mathematics I prerequisites*		Aksenovich	Cert			
			Höhere Mathematik I *Advanced Mathematics I*	7			wEx	2	7
			Höhere Mathematik II Vorleistungen *Advanced Mathematics II prerequisites*			Cert			
			Höhere Mathematik II *Advanced Mathematics II*	7			wEx	2	7
			Höhere Mathematik III Vorleistungen *Advanced Mathematics III prerequisites*			Cert			
			Höhere Mathematik III *Advanced Mathematics III*	7			wEx	2	7
	Technische Mechanik *Engineering Mechanics*	23	Technische Mechanik I Vorleistungen *Engineering Mechanics I prerequisites*		Böhlke	Cert			
			Technische Mechanik I *Engineering Mechanics I*	7			wEx	1,5	7
			Technische Mechanik II Vorleistungen *Engineering Mechanics II prerequisites*			Cert			
			Technische Mechanik II *Engineering Mechanics II*	6			wEx	1,5	6
			Technische Mechanik III Vorleistungen *Engineering Mechanics III prerequisites*		Seemann	Cert			
			Technische Mechanik IV Vorleistungen *Engineering Mechanics IV prerequisites*			Cert			
			Technische Mechanik III / IV *Engineering Mechanics III / IV*	10			wEx	3	10
	Fertigungsprozesse Manufacturing Processes	4	Grundlagen der Fertigungstechnik *Basics in Manufacturing Technology*	4	Schulze		wEx	1	4
	Werkstoffkunde *Materials Science*	14	Werkstoffkunde-Praktikum *Materials Science Lab Course*	3	Heilmaier	Cert			3
			Werkstoffkunde I & II *Materials Science I & II*	11			oEx	ca. 0,5	11

Fach /Subject	Modul/Module	LP/ Modul/CP module	Teilleistungen (TL)/ Components	LP/ TL/ C	Koordinator/Coordinator	Type of performance revue (C)		Pr(h)/ Ex(h)	Weightage
						Academic performance	Examination performance		
Ingenieurwissenschaftliche Grundlagen *Fundamentals in Engineering*	Technische Thermodynamik *Technical Themodynamics*	15	Thermodynamik und Wärmeübertragung I Vorleistungen *Technical Thermodynamics and Heat Transfer I Prerequisites*		Maas	Cert			
			Thermodynamik und Wärmeübertragung II Vorleistungen *Technical Thermodynamics and Heat Transfer II prerequisites*			Cert			
			Thermodynamik und Wärmeübertragung I *Technical Thermodynamics and Heat Transfer I*	8			wEx	3	15
			Thermodynamik und Wärmeübertragung II *Technical Thermodynamics and Heat Transfer II*	7				3	
	Strömungslehre *Fluid Mechanics*	8	Strömungslehre I & II *Fluid Mechanics I & II*	8	Frohnapfel		wEx	3	8
	Physik *Physics*	5	Wellen- und Quantenphysik Wave and Quantum Physics	5	Goll		wEx	3	5
	Elektrotechnik *Electrical Engineering*	8	Elektrotechnik und Elektronik *Electrical Engineering and Electronics*	8	Becker		wEx	3	8
	Mess- und Regelungstechnik *Measurement and Control Systems*	7	Grundlagen der Mess- und Regelungstechnik *Basics in Measurement and Control Systems*	7	Stiller		wEx	2,5	7
	Informatik *Computer Science*	6	Informatik im Maschinenbau Vorleistungen *Computer Science in Mechanical Engineering prerequisites*		Ovtcharova	Cert			
			Informatik im Maschinenbau *Computer Science in Mechanical Engineering*	6			wEx	3	6
	Maschinenkonstruktionslehre *Mechanical Design*	20	Maschinenkonstruktionslehre I Vorleistungen *Mechanical Design I prerequisites*		Albers	Cert			
			Maschinenkonstruktionslehre II Vorleistungen *Mechanical Design II prerequisites*			Cert			
			Maschinenkonstruktionslehre I / II *Mechanical Design I / II*	7			wEx	1	7
			Maschinenkonstruktionslehre III Vorleistungen *Mechanical Design III prerequisites*			Cert			
			Maschinenkonstruktionslehre IV Vorleistungen *Mechanical Design IV prerequisites*			Cert			
			Maschinenkonstruktionslehre III / IV *Mechanical Design III / IV*	13			wEx	4	13

Fach/Subject	Modul/Module	LP/Modul/CP module	Teilleistungen (TL)/ Components	LP/TL/C	Koordinator/Coordinator	Type of performance review (C)		Pr(h)/Ex(h)	Weightage
						Academic performance	Examination performance		
Ingenieurwissenschaftliche Grundlagen *Fundamentals in Engineering*	Maschinen und Prozesse *Machines and Processes*	7	Maschinen und Prozesse Vorleistungen *Machines and Processes prerequisites*		Kubach	Cert			
			Maschinen und Prozesse *Machines and Processes*	7			wEx	3	7
	Betriebliche Produktionswirtschaft *Production Operations Management*	5	Betriebliche Produktionswirtschaft *Production Operations Management*	3	Furmans		wEx	1,5	5
			Betriebliche Produktionswirtschaft, Projekt *Production Operations Management, Projects*	2			othEx		
Vertiefung im Maschinenbau (International) *Majors in Mechanical Engineering (International)*	Schwerpunkt *Major Field*	16	Kernbereich, wählbare TL s. Modulhandbuch *Core, selectable TL see Module Handbook*	8	SP-Verantwortlicher		oEx	ca. 0,7	8
			Ergänzungsbereich, wählbare TL s. Modulhandbuch *Additional area, selectable TL see Module Handbook*	8	SP-Verantwortlicher		oEx	ca. 0,3	8
Internationales Projektmanagement und Soft Skills *International Project Management and Soft Skills*	Internationales Projektmanagement und Überfachliche Qualifikationen *International Project Management and Interdisciplinary Qualifications*	6	Arbeitstechniken im Maschinenbau *Working Methods in Mechanical Engineering*	4	Deml	Cert			4
			Schlüsselqualifikationen *Soft Skills*	2	Offered by ZAK and others	Cert			2
Bachelorarbeit *Bachelor Thesis*	Modul Bachelorarbeit *Module Bachelor Thesis*	15	Bachelorarbeit *Bachelor Thesis*	12			othEx		30
			Präsentation *Presentation*	3					

Only one major subject can be chosen. The partial outputs in the core and supplementary areas for the individual major subjects can be found in the module handbook. For further information on the module focus, see Section 2 of this curriculum.

1.3 Curriculum

Components/partial performances 1. to 4. Semester	WS 1. Sem.			SS 2. Sem.			WS 3. Sem.			SS 4. Sem.		
	V	Ü	P	V	Ü	P	V	Ü	P	V	Ü	P
Höhere Mathematik I-III *Advanced Mathematics I-III*	4	2		4	2		4	2				
Grundlagen der Fertigungstechnik *Basics in Manufacturing Technology*	2											
Wellen- und Quantenphysik Wave and Quantum Physics										2	1	
Technische Mechanik I-IV *Engineering Mechanics I-IV*	3	2		3	2		2	2		2	2	
Werkstoffkunde I, II *Materials Science I, II*	4	1		3	1							
Werkstoffkunde-Praktikum[1] *Materials Science Lab Course*						2						
Technische Thermodynamik und Wärmeübertragung I, II / *Technical Thermodyn. and Heat Transfer I, II*							4	2		3	2	
Maschinenkonstruktionslehre I-IV *Mechanical Design I-IV*	2	1		2	2		2	2	1	2	1	1
Informatik im Maschinenbau *Computer Science in Mech. Eng.*				2	2	2						
Elektrotechnik und Elektronik *Electrical Engineering and Electronics*							4	2				
Strömungslehre I *Fluid Mechanics I*										2	1	
Maschinen und Prozesse Machines and Processes										(2)		(2)
Arbeitstechniken im Maschinenbau *Working Methods in Mech.Eng.*										2		2

Components/partial performances 5. bis 6. Semester	WS 5. Sem.			SS 6. Sem.		
	V	Ü	P	V	Ü	P
Grundlagen der Mess- und Regelungstechnik *Basics in Measurement and Control Systems*	3	1				
Strömungslehre II *Fluid Mechanics II*	2	1				
Maschinen und Prozesse *Machines and Processes*				2		2
Betriebliche Produktionswirtschaft + BPW-Projekte *Production Operations Management + POM-Projects*	3	1				
Internationales Projekt und Operations Management *International Project and Operations Management*	2					
Schwerpunkt (8/9 SWS, variabel) / Major Field/Specialization	4 (5)			4		
Bachelorarbeit *Bachelor's Thesis* (12 LP), 6. Sem.						
Präsentation *Presentation* (3 LP), 6. Sem.						

[1] The Materials Science Lab Course takes place during one week in the lecture break between SS and WS.

1.4 Bachelor Thesis

The performance and marking of the bachelor thesis is regulated in § 14 of the study and examination regulations for the bachelor's degree course Mechanical Engineering (International). Further information about module description can be found in the module handbook.

2 Major Subjects/Specialization Subjects

Major subjects approved by the faculty council are listed in the module handbook.

2.1 Major/Specialization Subject Options

For the major subject, components amounting to 16 CP are chosen, of which at least 8 CP are acquired in the core area (CA). Compulsory core area component (CCA) means that the component is mandatory in the core module area, if it has not already been taken. The remaining 8 credit points can come from the supplementary area. In the context of internships, a maximum of 4 CPs may be earned as study achievements if this is an option of a major subject.

Completion of the major subject module with more than 16 LP is only permitted if the addition of the credit points of the selected sub-module examinations within the major subject module does not add up to 16 CP. Participation in further sub-module examinations is not permitted if 16 CP have already been achieved or exceeded.

The main subject mark is based on the component module exams completed with a mark. All component module marks are weighted according to their credit points. When forming the overall mark, the major subject is evaluated with 16 CP. The description of major subjects with regard to content and qualification goals as well as the components contained therein can be found in the current module handbook of the Bachelor's program.

3 Revision history (from July 20, 2016)

May 22, 2017	Division of the subject International project management and interdisciplinary qualifications into two modules (1.2), editorial changes
November 13, 2017	Changes to the list of abbreviations, removal of the module "Fundamentals of Production Engineering" (1.2), adjustment of the type of success control and the examination time for the supplementary section (1.2), adjustment of the weighting and type of success control in the module "Bachelorarbeit" (1.2), editorial changes
July 27, 2018	Correction of SWS for Specialization (1.3) from 16 SWS to 8 SWS, additional editorial changes

8 Field of study structure

Mandatory	
Orientation Exam *This field will not influence the calculated grade of its parent.*	
Bachelor's Thesis	15 CR
Fundamentals of Engineering	143 CR
Majors in Mechanical Engineering (International)	16 CR
International Project Management and Soft Skills	6 CR

8.1 Orientation Exam

Mandatory		
M-MACH-104162	Orientation Exam	0 CR

8.2 Bachelor's Thesis

Credits
15

Mandatory		
M-MACH-103722	Bachelor's Thesis	15 CR

8.3 Fundamentals of Engineering

Credits
143

Mandatory		
M-MATH-104022	Advanced Mathematics	21 CR
M-MACH-102572	Engineering Mechanics	23 CR
M-MACH-104232	Manufacturing Processes (MEI)	4 CR
M-MACH-102562	Materials Science	14 CR
M-MACH-102574	Technical Thermodynamics	15 CR
M-MACH-102565	Fluid Mechanics	8 CR
M-PHYS-104030	Physics	5 CR
M-ETIT-104049	Electrical Engineering	8 CR
M-MACH-102564	Measurement and Control Systems	7 CR
M-MACH-102563	Computer Science	6 CR
M-MACH-102573	Mechanical Design	20 CR
M-MACH-102566	Machines and Processes	7 CR
M-MACH-105106	Production Operations Management *First usage possible from 7/11/2019.*	5 CR

8.4 Majors in Mechanical Engineering (International)

Credits
16

Majors in Mechanical Engineering (International) (Election: 1 item)		
M-MACH-103351	MF A: Global Production Management	16 CR
M-MACH-103350	MF B: Energy Engineering	16 CR
M-MACH-103349	MF C: Automotive Engineering	16 CR

8.5 International Project Management and Soft Skills

Credits
6

Mandatory		
M-MACH-103322	International Project Management and Interdisciplinary Qualifications	6 CR

9 Modules

M 9.1 Module: Advanced Mathematics [M-MATH-104022]

Responsible: Prof. Dr. Maria Aksenovich
PD Dr. Stefan Kühnlein
Organisation: KIT Department of Mathematics
Part of: Fundamentals of Engineering

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

Mandatory			
T-MATH-108266	Advanced Mathematics I	7 CR	Aksenovich, Kühnlein
T-MATH-108268	Advanced Mathematics II	7 CR	Aksenovich, Kühnlein
T-MATH-108270	Advanced Mathematics III	7 CR	Aksenovich, Kühnlein
T-MATH-108265	Advanced Mathematics I Prerequisite *This item will not influence the grade calculation of this parent.*	0 CR	Aksenovich, Kühnlein
T-MATH-108267	Advanced Mathematics II Prerequisite *This item will not influence the grade calculation of this parent.*	0 CR	Aksenovich, Kühnlein
T-MATH-108269	Advanced Mathematics III Prerequisite *This item will not influence the grade calculation of this parent.*	0 CR	Aksenovich, Kühnlein

Competence Certificate
Three written exams for the parts I-III of length 120 minutes each.

Prerequisites
None.

Competence Goal
The students know the foundations of calculus of one and several variables, linear algebra, theory of differential equations, and probability theory. They know and can apply techniques in these fields.

Content
Basic set theoretic notions, proofs, sequences and convergence, functions and continuity, series, derivatives, integrals, vector spaces, matrices, Laplace transform, functions of several variables, applications of multivariate calculus, Fourier analysis, differential equations, probability.

Module grade calculation
The grade for the module is composed from equally weighted grades for the examinations in Advanced Mathematics I-III.

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

Literature

- Lecture notes
- K. F. Riley, M. P. Hobson, S. J. Bence “Mathematical methods for physics and engineering”, Cambridge University Press, 2015

M 9.2 Module: Bachelor's Thesis [M-MACH-103722]

Responsible: Prof. Dr.-Ing. Martin Heilmaier
Organisation: 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	English	3	1

Mandatory			
T-MACH-108685	Bachelor's Thesis	12 CR	Heilmaier
T-MACH-108684	Presentation	3 CR	Heilmaier

Competence Certificate
The module Bachelor Thesis consists of a written bachelor thesis and an oral presentation of a scientific subject chosen by the student himself/herself or given by the supervisor. The bachelor's thesis is designed to show that the student is able to deal with a problem of his/her subject area in an independent manner and within the given period of time using scientific methods.
The work load of the bachelor thesis corresponds to 12 ECTS. The maximal processing time of the bachelor thesis takes three months.
The date of issue of the subject has to be fixed by the supervisor and the student and to be put on record at the examination board. The subject of the bachelor thesis may be only returned once and only within the first month of processing time
On a reasoned request of the student, the examination board can extend the processing time by up to one month. If the bachelor thesis is not completed in time, this examination is "failed" (5,0), unless the student is not responsible.
The bachelor thesis is to be evaluated by not less than a professor or a senior scientist according to § 14 Abs. 3 Ziff. 1 KITG and another examiner. Generally, one of the two examiners is the person who has assigned the thesis. If the examiners do not agree, the bachelor thesis is graded by the examination board within this assessment; another expert can be appointed too. The bachelor thesis has to be graded within a period of six weeks after the submission.
The colloquium presentation must be held within 6 weeks after the submission of the bachelor thesis. The presentation should last around 20 minutes, corresponds to 3 ECTS, and is followed by a scientific discussion with the present expert audience.

Prerequisites
The requirement for admission to the bachelor thesis module are 120 ECTS. As to exceptions, the examination board decides on a request of the student (see § 14 (1) SPO).

Modeled Conditions
The following conditions have to be fulfilled:

1. You need to have earned at least 120 credits in the following fields:
   - Fundamentals of Engineering
   - International Project Management and Soft Skills
   - Majors in Mechanical Engineering (International)

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. The topic is set by the supervisor of the thesis in accordance with § 14 (3) SPO.

Workload
The workload for the preparation and presentation of the bachelor thesis is about 450 hours.

M 9.3 Module: Computer Science (BSc-Modul 09, Inf) [M-MACH-102563]

Responsible: Prof. Dr.-Ing. Jivka Ovtcharova
Organisation: KIT Department of Mechanical Engineering

Part of: Fundamentals of Engineering

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

Mandatory			
T-MACH-105205	Computer Science for Engineers	6 CR	Ovtcharova
T-MACH-105206	Computer Science for Engineers, Prerequisite *This item will not influence the grade calculation of this parent.*	0 CR	Ovtcharova

Competence Certificate
Written examination "Computer Science for Engineers", 100%, 180 minutes; Examination prerequisite: passed lap course.

Prerequisites
None

Competence Goal
Students can identify and explain fundamental terms, problems and concepts of computer science. They can apply the basic methods of the OO modeling with UML and implement the object-oriented programming (OOP) with the programming language JAVA.

Content
Basics: Information representation- and processing, terms and definitions: alphabet, data, signals, information, numeral systems, propositional logic and Boolean algebra, computer architectures, programming paradigms.
Object Orientation: Definition and important characteristics of object orientation, Object-oriented modeling with UML.
Data Structures: Definition, properties and application of graphs, trees, linked lists, queues and stacks.
Algorithms: Characteristics of algorithms, complexity analysis, design methods, important examples.
Database management systems: Relational data model, relational algebra, declarative language SQL. Basics and concepts of JAVA. Introduction to programming using JAVA.

Module grade calculation
Examination result "Computer Science for Engineers" 100%

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

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

Workload
Attendance time: 63 hours

Self-study: 117 hours

Learning type
Lecture and Lab Course

M 9.4 Module: Electrical Engineering [M-ETIT-104049]

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

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

Mandatory			
T-ETIT-108386	Electrical Engineering and Electronics	8 CR	De Carne

Competence Certificate
The control of success takes place by a written examination, duration 3 hours.

By successfully completing two additional exercise sheets (on a voluntary basis), a bonus of up to 6 exam points can be earned (corresponds to a maximum grade improvement of the written exam by the value 0.3 or 0.4).

Prerequisites
none

Competence Goal
After successful attendance of the course, students will be able to apply the electrical engineering fundamentals relevant for mechanical engineers (electric field, magnetic field, resistance, capacitor, coil) to practical issues.

Students will be able to analyze DC and AC electrical circuits using various methods of network analysis.

Furthermore, the students can explain (the natural) points of contact between electrical engineering and mechanical engineering: They can describe the structure and function of the most important electrical machines (transformer, DC, asynchronous and synchronous machine) and are able to perform simple designs and calculations for the stationary operation of machines.

Furthermore, the students can name the most important semiconductor components and describe their physical function.

In addition, students have learned the most important basic power electronic circuits for semiconductor switches that can and cannot be switched off and can also understand more complex circuits derived from them.

Likewise, students can explain and calculate operational amplifier circuits by applying the methods of power system analysis learned at the beginning of the course and transferring them to the study of operational amplifier circuits.

Content
To motivate students, examples are used at the beginning of the lecture to illustrate the constantly increasing importance of electrical energy and electrically operated devices, in order to make it clear that a student of mechanical engineering will also be increasingly confronted with electrical issues in the future.

After the introduction and definition of physical units and basic terms, the electrical components resistor, capacitor and inductor as well as voltage and current sources are dealt with in detail. Capacitors and inductors are derived from the properties of electric and magnetic fields.

With respect to the abrupt switching on or off of voltages on networks, RC and RL circuits are considered, i.e. systems whose time behavior is described with 1st order differential equations.

The chapter AC current deals after the explanation of important characteristics with the time relations between current and voltage for the above mentioned components and in particular with the method of the "complex AC current calculation". The latter allows the simplification of differential equation systems to complex algebraic equation systems for the important special case of sinusoidal curves in steady-state operation. For the graphical representation of the conditions in an equivalent circuit, pointer diagrams are introduced and their application for circuit description is explained.

Starting with the DC machine, the transformer, asynchronous machine and synchronous machines are explained in detail in terms of their structure, characteristic behavior, application purposes and the descriptive equations and diagrams. The chapter on drive technology uses examples to illustrate general aspects of electrical drives.

In the section on semiconductor components, the PN junction with the simplest associated component, the diode, and other components based on semiconductors (without PN junction) are explained in particular, in addition to their manufacture.

By increasing the complexity of the components (at least 2 PN junctions), bipolar transistors, field-effect transistors, thyristors, IGBTs, IGCTs and other semiconductor switches used in power converters are successively introduced and explained in terms of structure, function and purpose.

Power converter circuits are created by interconnecting several semiconductor valves in a suitable manner. AC and three-phase bridges built with diodes and thyristors are described as the most important representatives of line-commutated circuits.

DC-DC converters (buck or boost converters) built with disconnectable switches are explained as well as the construction and control of self-controlled three-phase bridges for the realization of converters for the supply of three-phase machines.

As a link between the output voltages of analog sensors and the AD converters at the input of digital signal processing systems, operational amplifier circuits are typically used for signal preconditioning (e.g. signal amplification for thermocouples or signal attenuation for voltage measurements). The most important circuit variants and the calculation of the circuit elements are presented.

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

Annotation
Exam and Lecture will be held in English.

By successfully completing two additional exercise sheets (on a voluntary basis), a bonus of up to 6 exam points can be earned (corresponds to a maximum grade improvement of the written exam by the value 0.3 or 0.4).

Workload

1. attendance in lectures and exercises: 31 lectures and 14 exercises each 1,5h = 67,5h
2. follow-up on lectures: 31 * 1h = 31h
3. preparation of execises 14* 2h = 28h
4. preparation of additional execises 2* 5h = 10h
5. preparation of examination: 80h
6. Examination time: 3h

A total of 220h = 8 Credit points

Recommendation
Knowledge of mathematics known in the 3rd semester as well as middle school physics.

Learning type
The lecture is structured in such a way that physical phenomena and relationships (possibly not yet known from school lessons) are derived in an explanatory manner. This means that even those students who did not take physics in high school will be able to follow the lecture, provided that they are present at the lecture and the exercises and, if necessary, do some work at home.

M 9.5 Module: Engineering Mechanics (BSc-Modul 03, TM) [M-MACH-102572]

Responsible: Prof. Dr.-Ing. Thomas Böhlke
Prof. Dr.-Ing. Wolfgang Seemann

Organisation: KIT Department of Mechanical Engineering

Part of: Fundamentals of Engineering

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
23	Grade to a tenth	Each winter term	4 terms	German/English	3	1

Mandatory			
T-MACH-100282	Engineering Mechanics I	7 CR	Böhlke, Langhoff
T-MACH-100283	Engineering Mechanics II	6 CR	Böhlke, Langhoff
T-MACH-105201	Engineering Mechanics III & IV	10 CR	Seemann
T-MACH-100528	Tutorial Engineering Mechanics I *This item will not influence the grade calculation of this parent.*	0 CR	Böhlke, Langhoff
T-MACH-100284	Tutorial Engineering Mechanics II *This item will not influence the grade calculation of this parent.*	0 CR	Böhlke, Langhoff
T-MACH-105202	Tutorial Engineering Mechanics III *This item will not influence the grade calculation of this parent.*	0 CR	Seemann
T-MACH-105203	Tutorial Engineering Mechanics IV *This item will not influence the grade calculation of this parent.*	0 CR	Seemann

Competence Certificate
prerequisites EM I, II (see T-MACH-100528 "Engineering Mechanics I (Tutorial)" as well as T-MACH-100284 "Engineering Mechanics II (Tutorial)"): they consist of solving problems of the work sheets in four categories: written mandatory homework, written homework, computational homework, colloquia.

prerequisites EM III, IV

"Engineering Mechanics I", written exam, 90 minutes; graded:
"Engineering Mechanics II", written exam, 90 minutes; graded;
"Engineering Mechanics III/IV", written exam, 180 Minutes; graded;

The final grade of this module is computed as ECTS-based weighted sum of the included exams.

Prerequisites
None

Competence Goal
After having finished the lectures EM I and EM II the students can

- assess stress and strain distributions for the basic load cases within the framework of elasticity and thermoelasticity
- compute and evaluate 3D stress and strain states
- apply the principle of virtual displacements
- apply energy methods and evaluate approximate solutions
- evaluate the stability of equilibrium positions
- solve worksheet problems to topics of the lecture using the computer algebra system MAPLE

In EM III and EM IV the students learn to analyse the motion of points and systems. Based on the axioms of Newton and Euler they know how to derive equations of motion. Besides the synthetic methods they get familiar with analytical methods which are based on energy expressions and can be applied efficiently and formalised. These methods are introduced in the scope of systems of mechanical engineering so that students can determine and analyse motions and the forces which are generated by these motions.

Content
This Module consists of the courses "Engineering Mechanics I (lecture)" up to "Engineering Mechanics IV (lecture)" as well as "Engineering Mechanics I (Tutorial)" up to "Engineering Mechanics IV (Tutorial)"

Contents of "Engineering Mechanics I": 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

Contents of "Engineering Mechanics II": 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

Contents of "Engineering Mechanics III":

Kinematics: Cartesian, cylindrical and natural coordinates. Time derivatives in moving reference frames, angular velocities of reference frames.

Kinetics of a particle:
Newton's axiom, Principle of d'Alembert, work of a force, kinetic and potential energies, principle of linear momentum, principle of moment of momentum, kinetics in moving reference systems

Systems of particles:
Principle of center of mass, Principle of moment of momentum, impacts between particles, systems with variable mass, applications.

Plain motion of rigid bodies:
Pure translation, pure rotation, general plain motion. Instantaneous center of rotation, Kinetics, moment of momentum, principle of work and principle of energy conservation for a rotation around a space-fixed axis. Mass moment of inertia, parallel-axis-theorem.Principle of linear momentum and principle of moment of momentum for arbitrary plain motion. Principle of d'Alembert for plain motion. Principles of linear and moment of momentum in integral form. Applications for impact problems.

Contents of "Engineering Mechanics IV":

Spatial kinematics of a rigid body, Euler angles, angular velocity using Euler angles, Euler's equations, inertia tensor, kinetic energy of a rigid body, free gyroscopes, forced gyroscopes, systems of rigid bodies, principle of d'Alembert, Lagrange's equations of the first and second kind, generalized coordinates, free and forced vibration of one degree of freedom systems, frequency response, vibration of multi degree of freedom systems, vibration absorption

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

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: 204h

homework and preparation of examination: 486h

Learning type
Lectures, Tutorials, Lab course groups, attestation of solved work sheets, colloquiua, consultation hours (optional)

M 9.6 Module: Fluid Mechanics (BSc-Modul 12, SL) [M-MACH-102565]

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

Part of: Fundamentals of Engineering

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

Mandatory			
T-MACH-105207	Fluid Mechanics 1&2	8 CR	Frohnapfel

Competence Certificate
Common examination of "Fluid Mechanics I" and "Fluid Mechanics II"; written exam, 3 hours (graded)

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

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

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

Workload
regular attendance: 64 hoursself-study: 176 hours

Learning type
Lectures + tutorials

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

Kuhlmann, H.: Strömungsmechanik, Pearson Studium

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

Kundu, P.K., Cohen, K.M.: Fluid Mechanics, Elsevier 2008

M 9.7 Module: International Project Management and Interdisciplinary Qualifications [M-MACH-103322]

Responsible: Prof. Dr.-Ing. Barbara Deml
Organisation: KIT Department of Mechanical Engineering

Part of: International Project Management and Soft Skills

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

Election notes
Interdisciplinary qualifications (IQ) completed at the Sprachenzentrum (SpZ) can be assigned in Self-Service. First select a self-service partial achievement in your study schedule and then assign an IQ achievement via the "IQ achievements" tab.

Mandatory			
T-MACH-105296	Working Methods in Mechanical Engineering	4 CR	Deml
Soft Skills (Election: at least 2 credits)			
T-ZAK-112561	Africa – insight and inside	2 CR	
T-ZAK-112565	Deconstructing Unconscious Bias into Intercultural Competence: A neurological look into how the brain constructs reality	2 CR	
T-MACH-106700	Do it! – Service-Learning for prospective mechanical engineers	2 CR	Deml
T-ZAK-112563	Drawing 101: Develop Your Visual Skills. Drawing (Basic skills and exercises)	2 CR	
T-ZAK-112570	Environmentally Induced Migrants (EIMs)	2 CR	
T-ZAK-112564	Intercultural Communications: USA and Germany	2 CR	
T-ZAK-112562	Key Concepts in cultural studies	2 CR	
T-MACH-110961	Steering of a Global Operating Company - The Robert BOSCH GmbH as an Example	2 CR	Maier
T-ZAK-112560	Sustainable Leadership	2 CR	
T-ZAK-112566	Urban transformations: exploring the circles of sustainability	2 CR	
T-MACH-112568	Self-Booking-BSc-SPZ-Non-Graded	2 CR	Heilmaier
T-MACH-112569	Self-Booking-BSc-SPZ-Graded	2 CR	Heilmaier

Competence Certificate
Success is monitored within the framework of academic achievements.

Prerequisites
None

Competence Goal
After completing the module International Project Management and Interdisciplinary Qualifications, students will be able to

- build up and expand basic cognitive, communicative and social skills (thinking in contexts, logical and abstract thinking, transfer skills, problem-solving skills, written and oral expression skills, presentation techniques, conflict skills, teamwork skills, leadership skills, etc.),
- apply practice-relevant techniques and skills (basic economic knowledge, foreign languages, project management),
- build up and apply orientation knowledge (general education enabling interdisciplinary thinking and thinking in contexts, epistemological and ethical-practical reflection of the knowledge taught in the subjects),
- apply principles to ensure good scientific practice.

Content
Working Methods in Mechanical Engineering:

1. Time and self management
2. Teamwork
3. Literature research
4. Scientific Writing
5. Scientific Presentation

In addition to Working tMethods in Mechanical Engineering, the module "International Project Management and Interdisciplinary Qualifications" consists of a freely selectable course of the compulsory elective block. The content of the courses is mentioned in each brick.

Workload
The total workload for this module is approximately 180 hours. The total workload per course is obtained from the workload contributing to lecture and exercise attendance, exam hours, and the required time which it takes for an average student with average capacities to achieve the specified learning targets of this module.

Learning type
The learning types depend on the courses selected. They can consist of lectures, seminars, exercises or practicals.

Literature
The script and references are available for download on ILIAS.

M 9.8 Module: Machines and Processes (mach13BSc-Modul 13, MuP) [M-MACH-102566]

Responsible: Dr.-Ing. Heiko Kubach
Organisation: KIT Department of Mechanical Engineering

Part of: Fundamentals of Engineering

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

Mandatory			
T-MACH-105208	Machines and Processes	7 CR	Bauer, Kubach, Maas, Pritz
T-MACH-105232	Machines and Processes, Prerequisite *This item will not influence the grade calculation of this parent.*	0 CR	Bauer, Kubach, Maas, Pritz

Competence Certificate
written exam (2 h)

Prerequisites
None.

Competence Goal
The students can name and describe basic energy conversion processes and energy converting machines. They can explain the application of these energy conversion processes in various machines. They can analyze and evaluate the processes and machines in terms of functionality and efficiency and they are able to solve basic technical problems in terms of operating the machines.

Content

- Internal combsution engines
- Hydraulic fluid machinery
- Thermal turbo machines
- Thermodynamics

Module grade calculation
Grade out of written exam (100%)

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

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

Workload
regular attendance: 48 h

self-study: 162 h

Learning type
Lecture+Tutorial

Lab Course

M 9.9 Module: Manufacturing Processes (MEI) [M-MACH-104232]

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

Part of: Fundamentals of Engineering

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

Mandatory			
T-MACH-108747	Basics of Manufacturing Technology (MEI)	4 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 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.

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: 21 hours
self-study: 99 hours

Learning type
Lecture

M 9.10 Module: Materials Science (BSc-Modul 04, WK) [M-MACH-102562]

Responsible: Prof. Dr.-Ing. Martin Heilmaier
Organisation: KIT Department of Mechanical Engineering

Part of: Fundamentals of Engineering

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

Mandatory			
T-MACH-105145	Materials Science I & II	11 CR	Gibmeier, Heilmaier, Pundt
T-MACH-105146	Materials Science Lab Course	3 CR	Gibmeier, Heilmaier, Pundt

Competence Certificate
not graded: participation in 10 lab experiments, introductory colloquia must be passed and 1 short presentation must be presented. The lab course must be finished successfully prior to the registration for the oral exam;

graded: oral exam covering the whole module, about 25 minutes.

Prerequisites
none

Competence Goal
Within this Module the students should

- gain knowledge of basics about structural and functional materials
- be able to draw relationships between atomic structure, microstructure and properties
- be able to apply appropriate methods to determine mechanical and other relevant properties as well as to characterize the microstructure of materials
- be able to assess material properties and corresponding applications

Content
WK I

Structure of atoms and atomic bonding

Crystalline solids

Defects in crystalline solids

Amorphous and partially crystalline solids

Constitution of alloys and materials

Diffusion and phase transformation in the solid state

Microscopic characterization method

Characterization with X-Rays and neutrons

Non-destructive Testing

Mechanical Testing

WK II

Iron based alloys

Non-iron based alloys

Ceramics

Glases

Polymers

Composite Materials

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

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

Workload
The work load of the module is about 420 hours.

The workload for the lab course Materials Science is 90 h in total and consists of the presence during the 10 experiments (one week half-time, 4 hours per day) as well as preparation and rework time at home.

The workload for the lecture Materials Science I & II is 165 h per semester and consists of the presence during the lectures (WS: 4 SWS, SS: 2SWS) and the exercises (1 SWS per WS and 1 SWS per SS) as well as preparation and rework time at home.

Learning type
The module "Materials Science" consists of the lectures "Materials Science I and II" with additional tutorials for small groups and a one week materials science laboratory course.

M 9.11 Module: Measurement and Control Systems (BSc-Modul 11, MRT) [M-MACH-102564]

Responsible: Prof. Dr.-Ing. Christoph Stiller
Organisation: KIT Department of Mechanical Engineering

Part of: Fundamentals of Engineering

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

Mandatory			
T-MACH-104745	Basics in Measurement and Control Systems	7 CR	Stiller

Competence Certificate
Type of Examination: written exam

Duration of Examination: 150 minutes

Prerequisites
none

Competence Goal

- Students are able to name, describe and explain control principles applied to physical quantities.
- They are able to name, analyze and assess system theoretic characteristics of dynamical systems.
- Students are able to represent real systems in a system theoretic model and to assess the suitability of a given model.
- Students are able to apply methods for controller design and to analyze their properties.
- Students are able to select appropriate principles of metrology and to model, analyze and assess measurement setups.
- Students are able to quantify and assess measurement uncertainties.

Content
1. Dynamic systems
2. Properties of important systems and modeling
3. Transfer characteristics and stability
4. Controller design
5. Fundamentals of measurement
6. Estimation
7. Sensors
8. Introduction to digital measurement

Module grade calculation
result of exam

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

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

Workload
84 hours presence time, 126 hours selfstudies

Recommendation
Fundamentals in physics and electrical engineering, ordinary linear diffential epuations, Laplace transform

Learning type
Lecture

Tutorials

Literature

Buch zur Vorlesung:
C. Stiller: Grundlagen der Mess- und Regelungstechnik, Shaker Verlag, Aachen, 2005

- Measurement and Control Systems:

R.H. Cannon: Dynamics of Physical Systems, McGraw-Hill Book Comp., New York, 1967
G.F. Franklin: Feedback Control of Dynamic Systems, Addison-Wesley Publishing Company, USA, 1988
R. Dorf and R. Bishop: Modern Control Systems, Addison-Wesley
C. Phillips and R. Harbor: Feedback Control Systems, Prentice-Hall

- Regelungstechnische Bücher:

J. Lunze: Regelungstechnik 1 & 2, Springer-Verlag
R. Unbehauen: Regelungstechnik 1 & 2, Vieweg-Verlag
O. Föllinger: Regelungstechnik, Hüthig-Verlag
W. Leonhard: Einführung in die Regelungstechnik, Teubner-Verlag
Schmidt, G.: Grundlagen der Regelungstechnik, Springer-Verlag, 2. Aufl., 1989

- Messtechnische Bücher:

E. Schrüfer: Elektrische Meßtechnik, Hanser-Verlag, München, 5. Aufl., 1992
U. Kiencke, H. Kronmüller, R. Eger: Meßtechnik, Springer-Verlag, 5. Aufl., 2001
H.-R. Tränkler: Taschenbuch der Messtechnik, Verlag Oldenbourg München, 1996
W. Pfeiffer: Elektrische Messtechnik, VDE Verlag Berlin 1999
Kronmüller, H.: Prinzipien der Prozeßmeßtechnik 2, Schnäcker-Verlag, Karlsruhe, 1. Aufl., 1980

Measurement and Control Systems

M 9.12 Module: Mechanical Design (BSc-Modul 06, MKL) [M-MACH-102573]

Responsible: Prof. Dr.-Ing. Sven Matthiesen
Organisation: KIT Department of Mechanical Engineering

Part of: Fundamentals of Engineering

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
20	Grade to a tenth	Each winter term	4 terms	German/English	3	4

Mandatory			
T-MACH-105286	Mechanical Design I and II	5 CR	Matthiesen
T-MACH-104810	Mechanical Design III and IV	11 CR	Matthiesen
T-MACH-105282	Mechanical Design I, Prerequisites *This item will not influence the grade calculation of this parent.*	1 CR	Matthiesen
T-MACH-105283	Mechanical Design II, Prerequisites *This item will not influence the grade calculation of this parent.*	1 CR	Matthiesen
T-MACH-110955	Mechanical Design III, Tutorial	1 CR	Matthiesen
T-MACH-110956	Mechanical Design IV, Tutorial	1 CR	Matthiesen

Competence Certificate
Mechanical Design I and II:

Preliminary examination: Successful participation in workshops in the field of mechanical Design I, as well as successful processing of output power in mechanical design II

Written examination in the field of mechanical engineering I and II: duration 90 min plus reading time

Mechanical Design III and IV:

Preliminary examination: Successful participation in workshops in the field of mechanical Design III & IV

- Examination in the field of mechanical Design III & IV consisting of
  written part with duration 60 min plus reading time and
- constructive part with duration 180 min plus reading ime

Prerequisites
None

Competence Goal
In mechanical design, students acquire skills in analysis and synthesis using examples (= leading examples). The examples include individual machine elements such as bearings or springs as well as more complex systems such as gears or clutches. After completing the machine design course, the students can apply the learned contents to further technical systems - even those not known from the lecture - by transferring the exemplary learned operating principles and basic functions to other contexts. This enables students to independently analyze unknown technical systems and to synthesize systems suitable for given problems.

Content
MKL I:

- Introduction to product development
- Springs
- Tools for visualization (technical drawing)
- Technical systems
- Bearings and guides

MKL II:

- Basics of the design
- Basics of screw connections
- Basics Seals

MKL III:

- Component connections
- Tolerances and clearance
- Transmission

MKL IV:

- Clutches
- Fluid Technology
- Dimensioning
- Electrical machines

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

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

Workload
MKL1:

presence: 33,5 h

Attendance in lectures: 15 * 1.5 h = 22.5 h

Presence in exercises: 8 * 1.5 h = 12 h

self-study: 56,5 h

Personal preparation and wrap-up of lecture and exercises including the processing of the test certificates and preparation for the exam: 56.5 h

Total: 90 h = 3 LP

MKL2:

Presence: 33 h

Attendance in lectures: 15 * 1.5 h = 22.5 h

Presence in exercises: 7 * 1.5 h = 10.5 h

Self study: 87 h

Personal preparation and wrap-up of lectures and exercises, including the processing of the test certificates and preparation for the exam: 87h

Total: 120 h = 4 LP

MKL 3:

Presence: 45h

Attendance lectures (15 L): 22,5h

Presence exercises (7 exercises): 10,5h

Attendance milestones project work (3x 4h): 12h

Self-study: 135h

Project work in a team: 90h

Personal preparation and follow-up of lecture and exercise: 45h

Total: 180 h = 6 LP

MKL 4:

Presence: 40,5h

Attendance lectures (13 L): 19,5h

Presence exercises (6 exercises): 9h

Attendance milestones project work (3x 4h): 12h

Self-study: 169,5h

Project work in a team: 105h

Personal preparation and follow-up of lecture and exercise, incl. preparation for the exam: 64,5h

Total: 210 h = 7 LP

Learning type
Lecture

Tutorial

Project work during the semester

M 9.13 Module: MF A: Global Production Management [M-MACH-103351]

Responsible: Prof. Dr.-Ing. Gisela Lanza
Organisation: KIT Department of Mechanical Engineering

Part of: Majors in Mechanical Engineering (International)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
16	Grade to a tenth	Each term	2 terms	English	3	1

Mandatory			
T-MACH-106731	Global Production Engineering (MEI)	4 CR	Lanza
T-MACH-105379	Global Logistics	4 CR	Furmans
SP A: Global Production Management (Election: at least 8 credits)			
T-MACH-106733	SmartFactory@Industry (MEI)	4 CR	Lanza
T-MACH-105381	Virtual Engineering (Specific Topics)	4 CR	Ovtcharova
T-MACH-106732	Automated Production Systems (MEI)	4 CR	Fleischer

Competence Certificate
Oral exams: duration approx. 5 min per credit point
Amount, type and scope of the success control can vary according to the individually choice.

Prerequisites
None

Competence Goal
The students acquire in the compulsory core subjects profound knowledge about the scientific theories, principles and methods of Production Engineering. Afterwards they are able to evaluate and design complex production systems according to problems of manufacturing and process technologies, materials handling, handling techniques, information engineering as well as production organisation and management.

After completion this module, the students are able

- to analyse and solve planning and layout problems on the level of the enterprise, production, processes and work tasks,
- to plan and control a production,
- to evaluate and configure the quality and efficiency of production, processes and products.

Content
The aim of "SP A: Global Production Management" is to present the challenges of globally operating companies and to give an overview of the central aspects of global production networks as well as to gain in-depth knowledge of common methods and procedures for designing them. For this purpose, methods for site selection, approaches for the site-specific adaptation of production technologies as well as planning approaches for setting up a new production location will be imparted during the module. The module will be rounded off by presenting Industry 4.0 methods and technologies.

The topics in detail are:

- Framework conditions and influencing factors of global production (historical development, goals, opportunities and risks)
- Site selection
- Site-specific production adaptation
- Planning a new production site
- Design and management of global production networks
- Integration of Industry 4.0 methods and technologies

Workload
The work load is about 480 hours, corresponding to 16 credit points.

Recommendation
none

Learning type
Lectures, seminars, workshops, excursions

M 9.14 Module: MF B: Energy Engineering [M-MACH-103350]

Responsible: Prof. Dr.-Ing. Hans-Jörg Bauer
Organisation: KIT Department of Mechanical Engineering
Institute of Thermal Turbomachinery
Part of: Majors in Mechanical Engineering (International)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
16	Grade to a tenth	Each term	2 terms	English	3	1

Mandatory			
T-MACH-105220	Fundamentals of Energy Technology	8 CR	Badea, Cheng
SP B: Energy Engineering (Election: at least 8 credits)			
T-MACH-105213	Fundamentals of Combustion I	4 CR	Maas
T-MACH-105292	Heat and Mass Transfer	4 CR	Maas, Yu

Competence Certificate
Oral exams: duration approx. 5 min. per credit point.
However, amount, type and scope of the success control can vary according to the individually choice.

Prerequisites
None

Competence Goal
After completion of SP B students are able

- to describe the elements of an energy system and their interactions,
- to list different conventional energy sources and assess their static range,
- to name the fluctuating supply of renewable energies such as wind, solar radiation, ocean currents and tides etc. and
- describe its effects on the energy system,
- to assess the technical boundary conditions of energy systems
- to derive approaches for an optimal mix of different energy technologies,
- to explain the operational principle of well-established power plants as well as of power plants based on renewables,
- to name the physical and chemical processes during energy conversion

Content
The aim of SP B "Energy Engineering" is to bring the students closer to the challenges of modern energy systems. The functional principles of conventional and regenerative power plant types are presented and the underlying physical principles of technical combustion and heat and mass transfer are explained. The students learn the basics to evaluate energy systems on a technical and economic basis.

Topics include:

- forms of energy
- energy sources: fossil fuels, nuclear energy, renewable energies
- energy demand structures
- principles of thermal and electrical power plants (conventional and renewable)
- physical basics of technical combustion
- stationary and transient heat and mass transfer phenomena
- environmental aspects of energy production
- role of renewable energies
- conversion, transport and storage of energy
- economic feasibility study of energy systems
- future of the energy sector

Workload
The work load is about 480 hours, corresponding to 16 credit points.

Learning type
Lectures

Tutorials

M 9.15 Module: MF C: Automotive Engineering [M-MACH-103349]

Responsible: Prof. Dr. Frank Gauterin
Organisation: KIT Department of Mechanical Engineering

Part of: Majors in Mechanical Engineering (International)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
16	Grade to a tenth	Each term	2 terms	English	3	1

Mandatory			
T-MACH-100092	Automotive Engineering I	8 CR	Gauterin, Unrau
SP C: Automotive Engineering (Election: at least 8 credits)			
T-MACH-102117	Automotive Engineering II	4 CR	Gauterin, Unrau
T-MACH-105154	Vehicle Comfort and Acoustics I	4 CR	Gauterin
T-MACH-105155	Vehicle Comfort and Acoustics II	4 CR	Gauterin
T-MACH-105210	Machine Dynamics	5 CR	Proppe

Competence Certificate
Oral exams: duration approx. 5 min. per credit point.
However, amount, type and scope of the success control can vary according to the individually choice.

Prerequisites
none

Competence Goal
The students know the movements and the forces at the vehicle and are familiar with active and passive safety. They have proper knowledge about operation of engines and alternative drives, the necessary transmission between engine and drive wheels and the power distribution. They have an overview of the components necessary for the drive and have the basic knowledge, to analyse, to evaluate, and to develop the complex system "vehicle".

Further learning objectives according to the selected courses of supplementary subjects.

Content
1. History and future of the automobile

2. Driving mechanics: driving resistances and driving performance, mechanics of longitudinal and lateral forces, active and passive safety

3. Drive systems: combustion engine, hybrid and electric drive systems

4. Transmissions: clutches (e.g. friction clutch, visco clutch), transmission (e.g. mechanical transmission, hydraulic fluid transmission)

5.Power transmission and distribution: drive shafts, cardon joints, differentials

Workload
The work load is about 480 hours, corresponding to 16 credit points.

Learning type
Lectures

Tutorials

M 9.16 Module: Orientation Exam [M-MACH-104162]

Organisation: University
Part of: Orientation Exam

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

Mandatory			
T-MACH-100282	Engineering Mechanics I	7 CR	Böhlke, Langhoff
T-MACH-100283	Engineering Mechanics II	6 CR	Böhlke, Langhoff
T-MATH-108266	Advanced Mathematics I	7 CR	Aksenovich, Kühnlein

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

Annotation
For students who are or were enrolled in a degree program in the summer semester 2020, winter semester 2020/2021, summer semester 2021, or winter semester 2021/2022, the deadline for taking the orientation exam has been extended by one semester in each case (section 32 (5 a), sentence 1 LHG).
This means that the deadline has been extended for
- students enrolled in one of the above semesters in the same program by one semester;
- students enrolled in two of the above semesters in the same program by two semesters;
- students enrolled in three or more of the above semesters in the same program by a maximum of three semesters.

M 9.17 Module: Physics [M-PHYS-104030]

Responsible: apl. Prof. Dr. Gernot Goll
apl. Prof. Dr. Bernd Pilawa
Organisation: KIT Department of Physics
Part of: Fundamentals of Engineering

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

Mandatory			
T-PHYS-108322	Wave and Quantum Physics	5 CR	Goll, Pilawa

Competence Certificate
The assessment consists of a written exam according to Section 4(2), 1 of the examination regulation.

Prerequisites
None

Competence Goal
The students

- are familiar with the properties of waves and can discuss those
- can reflect on the principles of relativity
- comprehend the coherence of the particle and wave description of light and matter
- can explain the limits of wave physics
- are able the apply the Schrödinger-equation to basic problems in quantum mechanics
- can explain the basic properties of atoms, especially for the hydrogen atom
- can discuss fundamental aspects of the electronic properties of solids

Content

- Properties of waves
- Acoustic and electromagnetic waves
- Interference and diffraction
- Relativity
- Wave-particle dualism
- Basic properties of atoms
- Basic electronic properties of solids

Annotation
For the Bachelor's program Mechanical Engineering the module (including all brick details, exams and courses) is offered in German.

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

Workload
150 hours, consisting of attendance times (45), follow-up of the lecture including exam preparation and preparation of exercises (105)

Learning type
Lecture and Tutorial

M 9.18 Module: Production Operations Management [M-MACH-105106]

Responsible: Prof. Dr.-Ing. Kai Furmans
Organisation: KIT Department of Mechanical Engineering

Part of: Fundamentals of Engineering (Usage from 7/11/2019)

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

Mandatory			
T-MACH-110327	Production Operations Management	3 CR	Furmans
T-MACH-110326	Production Operations Management-Project	2 CR	Furmans

Competence Certificate
The success control takes place in the form of partial examinations in the individual courses of the module. These are a written exam (duration: 90 minutes) and a different type of examination. The module grade is made up of the grades of the courses in the module weighted by credit points.

Prerequisites
None

Competence Goal
If you successfully passed this course you will be able to:

- state the relevant technical terms of business administration, logistics and production engineering
- describe the interrelation between these technical terms
- describe the most important decision problems qualitatively and quantitatively
- apply the appropriate decision models to solve the respective decision problems
- critically evaluate the results and draw appropriate conclusions
- extend the learned methods and models by researching on you own

Content
The institutes alternate with each cycle. Basic skills about the planning and operation of a production plant are taught. The lecture covers the basics of operations and supply chain management as well as business management basics in accounting, investment calculation and legal forms.

Annotation
It is a joint module of the Institute of Materials Handling and Logistics (IFL) and the Institute of Production Science (WBK).

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

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

Workload
Attendance time: 42 hours,

Self-study: 108 hours

Learning type

1. Lectures (Obligatory)
2. Tutorials (Obligatory)
3. Group work (Obligatory)
4. Oral defense of the group work (Obligatory)

M 9.19 Module: Technical Thermodynamics (BSc-Modul 05, TTD) [M-MACH-102574]

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

Part of: Fundamentals of Engineering

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

Mandatory			
T-MACH-104747	Technical Thermodynamics and Heat Transfer I	8 CR	Maas
T-MACH-105287	Technical Thermodynamics and Heat Transfer II	7 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
T-MACH-105288	Excercises in Technical Thermodynamics and Heat Transfer II *This item will not influence the grade calculation of this parent.*	0 CR	Maas

Competence Certificate
Prerequisite: attestation each semester by homework assignments

Thermodynamics I: Written exam, graded, approx. 3 hours

Thermodynamics II: Written exam, graded, approx. 3 hours

Prerequisites
None

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

An integral part of the model is that students can define the fundamental laws of thermodynamics and their application. 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 of humid air as well explaining the properties on a molecular basis and analyzing them with the help of the laws of thermodynamic. Furthermore, the students are capable of explaining chemical reactions in the context of thermodynamics as well as defining and applying the heat transfer mechanisms.

Content
Thermodynamics I:

- 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

Thermodynamics II:

- Repetition of the topics of "Thermodynamics and Heat Transfer I"
- Behavior of mixtures
- Moist air
- Kinetic theory of gases
- Behavior of real substances described by equations of state
- Chemical reactions and applications of the laws of thermodynamics to chemical reactions
- Reaction kinetics
- Heat Transfer

Module grade calculation
weight according to CP

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

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: 150h

homework and preparation of examination: 300h

Learning type
Lecture
Exercise course
Tutorial

10 Courses

T 10.1 Course: Advanced Mathematics I [T-MATH-108266]

Responsible: Prof. Dr. Maria Aksenovich
PD Dr. Stefan Kühnlein
Organisation: KIT Department of Mathematics
Part of: M-MACH-104162 - Orientation Exam
M-MATH-104022 - Advanced Mathematics

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

Events					
WT 22/23	0140000	Advanced Mathematics I (Lecture)	4 SWS	Lecture / 🗣	N.N.
Exams					
ST 2022	7700053	Advanced Mathematics I			Kühnlein

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

Competence Certificate
Assessment is carried out in form of a written examinations of 120 minutes length.

Prerequisites
Passing scores for homework and the midterm test are prerequesites for the examination.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MATH-108265 - Advanced Mathematics I Prerequisite must have been passed.

T 10.2 Course: Advanced Mathematics I Prerequisite [T-MATH-108265]

Responsible: Prof. Dr. Maria Aksenovich
PD Dr. Stefan Kühnlein
Organisation: KIT Department of Mathematics
Part of: M-MATH-104022 - Advanced Mathematics

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

Events					
WT 22/23	0150000	Advanced Mathematics I (Problemclass)	2 SWS	Practice / 🗣	N.N.

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

Competence Certificate
Assessment is carried out based on written homework assignments and a midterm test. Exact requirements will be detailed in class.

Prerequisites
None.

T 10.3 Course: Advanced Mathematics II [T-MATH-108268]

Responsible: Prof. Dr. Maria Aksenovich
PD Dr. Stefan Kühnlein
Organisation: KIT Department of Mathematics
Part of: M-MATH-104022 - Advanced Mathematics

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

Events					
ST 2022	0120010	Advanced Mathematics II	4 SWS	Lecture	Kühnlein
Exams					
ST 2022	7700064	Advanced Mathematics II			Kühnlein

Competence Certificate
Assessment is carried out in form of a written examinations of 120 minutes length.

Prerequisites
Passing scores for homework and the midterm test are prerequesites for the examination.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MATH-108267 - Advanced Mathematics II Prerequisite must have been passed.

T 10.4 Course: Advanced Mathematics II Prerequisite [T-MATH-108267]

Responsible: Prof. Dr. Maria Aksenovich
PD Dr. Stefan Kühnlein
Organisation: KIT Department of Mathematics
Part of: M-MATH-104022 - Advanced Mathematics

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

Events					
ST 2022	0120020	Advanced Mathematics II (Problem Session)	2 SWS	Practice	Kühnlein
Exams					
ST 2022	7700079	Advanced Mathematics II Prerequisite			Kühnlein

Competence Certificate
Assessment is carried out based on written homework assignments and a midterm test. Exact requirements will be detailed in class.

Prerequisites
None.

T 10.5 Course: Advanced Mathematics III [T-MATH-108270]

Responsible: Prof. Dr. Maria Aksenovich
PD Dr. Stefan Kühnlein
Organisation: KIT Department of Mathematics
Part of: M-MATH-104022 - Advanced Mathematics

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

Events					
WT 22/23	0160000	Advanced Mathematics III (Lecture)	4 SWS	Lecture	Corro Tapia
Exams					
ST 2022	7700100	Advanced Mathematics III			Zhang, Corro Tapia

Competence Certificate
Assessment is carried out in form of a written examinations of 120 minutes length.

Prerequisites
Passing scores for homework and the midterm test are prerequesites for the examination.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MATH-108269 - Advanced Mathematics III Prerequisite must have been passed.

T 10.6 Course: Advanced Mathematics III Prerequisite [T-MATH-108269]

Responsible: Prof. Dr. Maria Aksenovich
PD Dr. Stefan Kühnlein
Organisation: KIT Department of Mathematics
Part of: M-MATH-104022 - Advanced Mathematics

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

Events					
WT 22/23	0170000	Advanced Mathematics III (Tutorial)	2 SWS	Practice	Corro Tapia

Competence Certificate
Assessment is carried out based on written homework assignments and a midterm test. Exact requirements will be detailed in class.

Prerequisites
None.

T 10.7 Course: Africa – insight and inside [T-ZAK-112561]

Organisation:

Part of: M-MACH-103322 - International Project Management and Interdisciplinary Qualifications

Type	Credits	Grading scale	Version
Completed coursework	2	pass/fail	1

Events					
WT 22/23	1130258	Africa - Insight and Inside. Intercultural Competence and Challenges	2 SWS	Seminar	Kilanowski
Exams					
WT 22/23	1200003	Africa - insight and inside intercultural competence and challenges			

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

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

V Africa - Insight and Inside. Intercultural Competence and Challenges

1130258, WS 22/23, 2 SWS, Language: English, Open in study portal **Seminar (S)**

Content
Attention, this seminar focuses on sub-Saharan Africa, not the Maghreb. Africa is a complex continent with more than 50 nations with different political, economical and social conditions as well as individual histories, languages and traditions. Often the cultural diversity is ignored, nevertheless African societies share a common codex of values and behaviour patterns different from the Western cultures. It becomes obvious when dealing with hierarchies, the management of time, the indirect communication style and the process of decision making which takes the collective much more into account than the individual.

These differences in cultural dimensions tend to lead to misunderstandings, irritations and counter productivity. The seminar will give an introduction to intercultural competence. Students are invited to reflect their own values and the perception of the „otherness“ of their cultural counterpart. After an input on the African continent we will work with interactive methods (culture shock, reframing of cultural conflicts, simulations of negations between Africans and Europeans.

Bringing in your personal experience in Africa/with Africans is highly welcome.

Organizational issues
Registration required via:

T 10.8 Course: Automated Production Systems (MEI) [T-MACH-106732]

Responsible: Prof. Dr.-Ing. Jürgen Fleischer
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103351 - MF A: Global Production Management

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	2

Events					
ST 2022	3150012	Automated Production Systems (MEI)	2 SWS	Lecture /	Fleischer
Exams					
ST 2022	76-T-MACH-106732	Automated Production Systems (MEI)			Fleischer

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

Competence Certificate
oral exam (approx. 20 min)

Prerequisites
T-MACH-102162 - Automated Manufacturing Systems must not have been started.
T-MACH-108844 - Automated Manufacturing Systems must not have been started.

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

V Automated Production Systems (MEI)

3150012, SS 2022, 2 SWS, Language: English, Open in study portal

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

Content
The lecture provides an overview of the structure and functioning of automated production systems. In the introduction chapter the basic elements for the realization of automated production systems are given. This includes:

- Drive and control technology
- Handling technology for handling work pieces and tools
- Industrial Robotics
- automatic machines, cells, centers and systems for manufacturing and assembly
- planning of automated manufacturing systems

In the second part of the lecture, the basics are illustrated using implemented manufacturing processes for the production of automotive components. The analysis of automated manufacturing systems for manufacturing of defined components is also included.

Learning Outcomes:

The students …

- are able to analyze implemented automated manufacturing systems and describe their components.
- are capable to assess the implemented examples of implemented automated manufacturing systems and apply them to new problems.
- are able to name automation tasks in manufacturing plants and name the components which are necessary for the implementation of each automation task.

Organizational issues
Die genauen Termine und Raum werden über die wbk-Homepage bekannt gegeben.

T 10.9 Course: Automotive Engineering I [T-MACH-100092]

Responsible: Prof. Dr. Frank Gauterin
Dr.-Ing. Hans-Joachim Unrau
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103349 - MF C: Automotive Engineering

Type	Credits	Grading scale	Recurrence	Expansion	Language	Version
Written examination	8	Grade to a third	Each winter term	1 terms		3

Events					
WT 22/23	2113805	Automotive Engineering I	4 SWS	Lecture / 🗣	Gauterin, Unrau
WT 22/23	2113809	Automotive Engineering I	4 SWS	Lecture / 🗣	Gauterin, Gießler
Exams					
ST 2022	76-T-MACH-100092	Automotive Engineering			Gauterin, Unrau
WT 22/23	76-T-MACH-100092	Automotive Engineering			Unrau, Gauterin

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

Competence Certificate
Written examination

Duration: 120 minutes

Auxiliary means: none

Prerequisites
The brick "T-MACH-102203 - Automotive Engineering I" is not started or finished. The bricks "T-MACH-100092 - Grundlagen der Fahrzeugtechnik I" and "T-MACH-102203 - Automotive Engineering I" can not be combined.

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

V Automotive Engineering I

2113805, WS 22/23, 4 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
1. History and future of the automobile

2. Driving mechanics: driving resistances and driving performance, mechanics of longitudinal and lateral forces, active and passive safety

3. Drive systems: combustion engine, hybrid and electric drive systems

4. Transmission: clutches (e.g. friction clutch, visco clutch), transmission (e.g. mechanical transmission, hydraulic fluid transmission)

5. Power transmission and distribution: drive shafts, cardon joints, differentials

Learning Objectives:

The students know the movements and the forces at the vehicle and are familiar with active and passive safety. They have proper knowledge about operation of engines and alternative drives, the necessary transmission between engine and drive wheels and the power distribution. They have an overview of the components necessary for the drive and have the basic knowledge, to analyze, to evaluate, and to develop the complex system "vehicle".

Organizational issues
Kann nicht mit der Veranstaltung [2113809] kombiniert werden.

Can not be combined with lecture [2113809].

Literature
1. Mitschke, M. / Wallentowitz, H.: Dynamik der Kraftfahrzeuge, Springer Vieweg, Wiesbaden 2014

2. Pischinger, S. / Seiffert, U.: Handbuch Kraftfahrzeugtechnik, Springer Vieweg, Wiesbaden 2016

3. Gauterin, F. / Unrau, H.-J. / Gnadler, R.: Scriptum zur Vorlesung "Grundlagen der Fahrzeugtechnik I", KIT, Institut für Fahrzeugsystemtechnik, Karlsruhe, jährlich aktualisiert

V Automotive Engineering I

Lecture (V)
On-Site

2113809, WS 22/23, 4 SWS, Language: English, Open in study portal

Content
1. History and future of the automobile

2. Driving mechanics: driving resistances and driving performances, mechanics of longitudinal and lateral forces, active and passive safety

3. Drive systems: combustion engine, hybrid and electric drive systems

4. Transmission: clutches (e.g. friction clutch, visco clutch), transmission (e.g. mechanical transmission, hydraulic fluid transmission)

5.Power transmission and distribution: drive shafts, cardon joints, differentials

Learning Objectives:

The students know the movements and the forces at the vehicle and are familiar with active and passive safety. They have proper knowledge about operation of engines and alternative drives, the necessary transmission between engine and drive wheels and the power distribution. They have an overview of the components necessary for the drive and have the basic knowledge, to analyze, to evaluate, and to develop the complex system "vehicle".

Organizational issues
Kann nicht mit LV Grundlagen der Fahrzeugtechnik I [2113805] kombiniert werden.

Can not be combined with lecture [2113805] Grundlagen der Fahrzeugtechnik I.

Literature
1. Robert Bosch GmbH: Automotive Handbook, 9th Edition, Wiley, Chichister 2015

2. Onori, S. / Serrao, L: / Rizzoni, G.: Hybrid Electric Vehicles - Energy Management Strategies, Springer London, Heidelberg, New York, Dordrecht 2016

3. Reif, K.: Brakes, Brake Control and Driver Assistance Systems - Function, Regulation and Components, Springer Vieweg, Wiesbaden 2015

4. Gauterin, F. / Gießler, M. / Gnadler, R.: Scriptum zur Vorlesung 'Automotive Engineering I', KIT, Institut für Fahrzeugsystemtechnik, Karlsruhe, jährlich aktualisiert

T 10.10 Course: Automotive Engineering II [T-MACH-102117]

Responsible: Prof. Dr. Frank Gauterin
Dr.-Ing. Hans-Joachim Unrau

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103349 - MF C: Automotive Engineering

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

Events					
ST 2022	2114835	Automotive Engineering II	2 SWS	Lecture / 🗣	Unrau
ST 2022	2114855	Automotive Engineering II	2 SWS	Lecture / 🧩	Gießler
Exams					
ST 2022	76-T-MACH-102117	Automotive Engineering II			Unrau, Gauterin
WT 22/23	76-T-MACH-102117	Automotive Engineering II			Unrau, Gauterin
WT 22/23	76T-MACH-102117-2	Automotive Engineering II			Gauterin, Unrau

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

Competence Certificate
Written Examination

Duration: 90 minutes

Auxiliary means: none

Prerequisites
none

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

V Automotive Engineering II

2114835, SS 2022, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
1. Chassis: Wheel suspensions (rear axles, front axles, kinematics of axles), tyres, springs, damping devices
2. Steering elements: Manual steering, servo steering, steer by wire
3. Brakes: Disc brake, drum brake, comparison of designs

Learning Objectives:

The students have an overview of the modules which are necessary for the tracking of a motor vehicle and the power transmission between vehicle bodywork and roadway. They have knowledge of different wheel suspensions, tyres, steering elements, and brakes. They know different design versions, functions and the influence on driving and braking behavior. They are able to correctly develop the appropriate components. They are ready to analyze, to evaluate, and to optimize the complex interaction of the different components under consideration of boundary conditions.

Organizational issues
Kann nicht mit der Veranstaltung [2114855] kombiniert werden.

Can not be combined with lecture [2114855]

Literature

1. Heißing, B. / Ersoy, M.: Fahrwerkhandbuch: Grundlagen, Fahrdynamik, Komponenten, Systeme, Mechatronik, Perspektiven, Springer Vieweg, Wiesbaden, 2013

2. Breuer, B. / Bill, K.-H.: Bremsenhandbuch: Grundlagen - Komponenten - Systeme - Fahrdynamik, Springer Vieweg, Wiesbaden, 2017

3. Unrau, H.-J. / Gnadler, R.: Scriptum zur Vorlesung 'Grundlagen der Fahrzeugtechnik II', KIT, Institut für Fahrzeugsystemtechnik, Karlsruhe, jährliche Aktualisierung

V Automotive Engineering II

2114855, SS 2022, 2 SWS, Language: English, Open in study portal

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

Content

1. Chassis: Wheel suspensions (rear axles, front axles, kinematics of axles), tyres, springs, damping devices
2. Steering elements: Manual steering, servo steering, steer by wire
3. Brakes: Disc brake, drum brake, comparison of the designs

Learning Objectives:

The students have an overview of the modules which are necessary for the tracking of a motor vehicle and the power transmission between vehicle and roadway. They have knowledge of different wheel suspensions, tyres, steering elements, and brakes. They know different design versions, functions and the influence on driving and braking behavior. They are able to correctly develop the appropriate components. They are ready to analyze, to evaluate, and to optimize the complex interaction of the different components under consideration of boundary conditions.

Literature
Elective literature:

1. Robert Bosch GmbH: Automotive Handbook, 9th Edition, Wiley, Chichester 2015
2. Heißing, B. / Ersoy, M.: Chassis Handbook - fundamentals, driving dynamics, components, mechatronics, perspectives, Vieweg+Teubner, Wiesbaden 2011
3. Gießler, M. / Gnadler, R.: Script to the lecture "Automotive Engineering II", KIT, Institut of Vehicle System Technology, Karlsruhe, annual update

T 10.11 Course: Bachelor's Thesis [T-MACH-108685]

Responsible: Prof. Dr.-Ing. Martin Heilmaier
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-103722 - Bachelor's Thesis

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

Competence Certificate
The bachelor thesis is designed to show that the student is able to deal with a problem of his/her subject area in an independent manner and within the given period of time using scientific methods.

The work load of the bachelor thesis corresponds to 12 ECTS. The maximal processing time of the bachelor thesis takes three months. The date of issue of the subject has to be fixed by the supervisor and the student and to be put on record at the examination board. The subject of the bachelor thesis may be only returned once and only within the first month of processing time.

On a reasoned request of the student, the examination board can extend the processing time by up to one month. If the bachelor thesis is not completed in time, this examination is "failed" (5,0), unless the student is not responsible.

The bachelor thesis is to be evaluated by not less than a professor or a senior scientist according to § 14 Abs. 3 Ziff. 1 KITG and another examiner. Generally, one of the two examiners is the person who has assigned the thesis. If the examiners do not agree, the bachelor thesis is graded by the examination board within this assessment; another expert can be appointed too. The bachelor thesis has to be graded within a period of six weeks after the submission.

Prerequisites
The requirement for admission to the bachelor thesis module are 120 ECTS. As to exceptions, the examination board decides on a request of the student (see § 14 (1) SPO).

Modeled Conditions
The following conditions have to be fulfilled:

1. You need to have earned at least 120 credits in the following fields:
   - Fundamentals of Engineering
   - International Project Management and Soft Skills
   - Majors in Mechanical Engineering (International)

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

Submission deadline	3 months
Maximum extension period	1 months
Correction period	6 weeks

Annotation
The workload for the preparation of the bachelor thesis is about 360 hours.

T 10.12 Course: Basics in Measurement and Control Systems [T-MACH-104745]

Responsible: Prof. Dr.-Ing. Christoph Stiller
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102564 - Measurement and Control Systems

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

Events					
WT 22/23	2137301	Measurement and Control Systems	3 SWS	Lecture / 🗣	Stiller
WT 22/23	2137302	Measurement and Control Systems (Tutorial)	1 SWS	Practice / 🗣	Stiller, Fischer, Mißigmann
WT 22/23	3137020	Measurement and Control Systems	3 SWS	Lecture / 🗣	Stiller
WT 22/23	3137021	Measurement and Control Systems (Tutorial)	1 SWS	Practice / 🗣	Stiller, Fischer, Mißigmann
Exams					
ST 2022	76-T-MACH-104745	Basis of Measurement and Control Systems			Stiller

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

Competence Certificate
written exam

2,5 hours

Prerequisites
none

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

V Measurement and Control Systems

2137301, WS 22/23, 3 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
Lehrinhalt (EN):

1 Dynamic systems
2 Properties of important systems and modeling
3 Transfer characteristics and stability
4 Controller design
5 Fundamentals of measurement
6 Estimation
7 Sensors
8 Introduction to digital measurement

Lernziele (EN):

Measurement and control of physical entities is a vital requirement in most technical applications. Such entities may comprise e.g. pressure, temperature, flow, rotational speed, power, voltage and electrical current, etc.. From a general perspective, the objective of measurement is to obtain information about the state of a system while control aims to influence the state of a system in a desired manner. This lecture provides an introduction to this field and general systems theory. The control part of the lecture presents classical linear control theory. The measurement part discusses electrical measurement of non-electrical entities.

Voraussetzungen (EN)

Fundamentals in physics and electrical engineering; ordinary linear differential equations; Laplace transform

Nachweis (EN)

written exam; duration 2,5 h; paper reference materials only (no calculator)

Arbeitsaufwand (EN):

210 hours

Literature
Buch zur Vorlesung:
C. Stiller: Grundlagen der Mess- und Regelungstechnik, Shaker Verlag, Aachen, 2005

- Measurement and Control Systems:

R.H. Cannon: Dynamics of Physical Systems, McGraw-Hill Book Comp., New York, 1967
G.F. Franklin: Feedback Control of Dynamic Systems, Addison-Wesley Publishing Company, USA, 1988
R. Dorf and R. Bishop: Modern Control Systems, Addison-Wesley
C. Phillips and R. Harbor: Feedback Control Systems, Prentice-Hall

- Regelungstechnische Bücher:

J. Lunze: Regelungstechnik 1 & 2, Springer-Verlag
R. Unbehauen: Regelungstechnik 1 & 2, Vieweg-Verlag
O. Föllinger: Regelungstechnik, Hüthig-Verlag
W. Leonhard: Einführung in die Regelungstechnik, Teubner-Verlag
Schmidt, G.: Grundlagen der Regelungstechnik, Springer-Verlag, 2. Aufl., 1989

- Messtechnische Bücher:

E. Schrüfer: Elektrische Meßtechnik, Hanser-Verlag, München, 5. Aufl., 1992
U. Kiencke, H. Kronmüller, R. Eger: Meßtechnik, Springer-Verlag, 5. Aufl., 2001
H.-R. Tränkler: Taschenbuch der Messtechnik, Verlag Oldenbourg München, 1996
W. Pfeiffer: Elektrische Messtechnik, VDE Verlag Berlin 1999
Kronmüller, H.: Prinzipien der Prozeßmeßtechnik 2, Schnäcker-Verlag, Karlsruhe, 1. Aufl., 1980

V **Measurement and Control Systems** — **Lecture (V) On-Site**
3137020, WS 22/23, 3 SWS, Language: English, Open in study portal

Content
Lehrinhalt (EN):

1 Dynamic systems
2 Properties of important systems and modeling
3 Transfer characteristics and stability
4 Controller design
5 Fundamentals of measurement
6 Estimation
7 Sensors
8 Introduction to digital measuremen

Lernhziele (EN):

Measurement and control of physical entities is a vital requirement in most technical applications. Such entities may comprise e.g. pressure, temperature, flow, rotational speed, power, voltage and electrical current, etc.. From a general perspective, the objective of measurement is to obtain information about the state of a system while control aims to influence the state of a system in a desired manner. This lecture provides an introduction to this field and general systems theory. The control part of the lecture presents classical linear control theory. The measurement part discusses electrical measurement of non-electrical entities.

Nachweis (EN): written exam; duration 2,5 h; paper reference materials only (no calculator)

Arbeitsaufwand (EN): 180 hours

Literature

- Measurement and Control Systems:

R.H. Cannon: Dynamics of Physical Systems, McGraw-Hill Book Comp., New York,1967
G.F. Franklin: Feedback Control of Dynamic Systems, Addison-Wesley Publishing Company, USA, 1988
R. Dorf and R. Bishop: Modern Control Systems, Addison-Wesley
C. Phillips and R. Harbor: Feedback Control Systems, Prentice-Hall

- Regelungstechnische Bücher:

J. Lunze: Regelungstechnik 1 & 2, Springer-Verlag
R. Unbehauen: Regelungstechnik 1 & 2, Vieweg-Verlag
O. Föllinger: Regelungstechnik, Hüthig-Verlag
W. Leonhard: Einführung in die Regelungstechnik, Teubner-Verlag
Schmidt, G.: Grundlagen der Regelungstechnik, Springer-Verlag, 2. Aufl., 1989

- Messtechnische Bücher:

E. Schrüfer: Elektrische Meßtechnik, Hanser-Verlag, München, 5. Aufl., 1992
U. Kiencke, H. Kronmüller, R. Eger: Meßtechnik, Springer-Verlag, 5. Aufl., 2001
H.-R. Tränkler: Taschenbuch der Messtechnik, Verlag Oldenbourg München, 1996
W. Pfeiffer: Elektrische Messtechnik, VDE Verlag Berlin 1999
Kronmüller, H.: Prinzipien der Prozeßmeßtechnik 2, Schnäcker-Verlag, Karlsruhe, 1. Aufl., 1980

V Measurement and Control Systems (Tutorial)

3137021, WS 22/23, 1 SWS, Language: English, Open in study portal

Practice (Ü)
On-Site

Content
Tutorial for Measurement and Control Systems

T 10.13 Course: Basics of Manufacturing Technology (MEI) [T-MACH-108747]

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

Part of: M-MACH-104232 - Manufacturing Processes (MEI)

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

Events					
WT 22/23	3118092	Basics of Manufacturing Technology (MEI)	2 SWS	Lecture / 🗣	Schulze
Exams					
ST 2022	76-T-MACH-108747	Basics of Manufacturing Technology (MEI)			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 (MEI)

3118092, WS 22/23, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

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: 21 hours
self-study: 99 hours

Organizational issues
Start: 28.10.2022

Vorlesungstermine, Vorlesungsunterlagen und weitere Informationen werden über Ilias bekannt gegeben.
The lecture notes and further information on onganisation of the lecture will be available on ILIAS.

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 10.14 Course: Computer Science for Engineers [T-MACH-105205]

Responsible: Prof. Dr.-Ing. Jivka Ovtcharova
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102563 - Computer Science

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

Events					
ST 2022	2121390	Computer Science for Engineers	4 SWS	Lecture / Practice (/	Ovtcharova, Elstermann
ST 2022	3121034	Computer Science for Engineers	4 SWS	Lecture / Practice (/	Ovtcharova, Elstermann
Exams					
ST 2022	76-T-MACH-105205	Computer Science for Engineers			Ovtcharova, Elstermann

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

Competence Certificate
Written exam [180 min]

Prerequisites
Computer Science for Engineers, passed

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-105206 - Computer Science for Engineers, Prerequisite must have been passed.

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

V Computer Science for Engineers

2121390, SS 2022, 4 SWS, Language: German, Open in study portal

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

Content
Basics: Information representation- and processing, terms and definitions: alphabet, data, signals, information, numeral systems, propositional logic and Boolean algebra, computer architectures, programming paradigms.

Object Orientation: Definition and important characteristics of object orientation, Object-oriented modeling with UML.

Data Structures: Definition, properties and application of graphs, trees, linked lists, queues and stacks.

Algorithms: Characteristics of algorithms, complexity analysis, design methods, important examples.

Database management systems: Relational data model, relational algebra, declarative language SQL.

Literature
Propädeutikum Java (2. Auflage), KIT Scientific Publishing; ISBN: 978 3 86644 914 5

„Grundkurs Programmieren in Java“ Carl Hanser Verlag GmbH & CO. KG; Auflage 6, ISBN 10: 3446426639

Robert Sedgewick : Algorithms in Java. Part 1-4. 3. Auflage. Addison Wesley, 2002, ISBN 0201361205

Robert Sedgewick : Algorithms in Java. Part 5. 3. Auflage. Addison Wesley, 2003, ISBN 0201361213

Peter Drake: Data Structures and Algorithms in Java 1. Auflage. Prentice Hall, 2005, ISBN 0131469142

Russ Miles, Kim Hamilton: Learning UML 2.0 , 1. Auflage, O'Reilly , 2006, ISBN 0596009828

Craig Larman : Applying UML and Patterns: An Introduction to Object Oriented Analysis and Design and Iterative Development , 3 Auflage. Prentice Hall, 2004, ISBN 0131489062

V Computer Science for Engineers

3121034, SS 2022, 4 SWS, Language: English, Open in study portal

Lecture / Practice (VÜ)
On-Site

Content

Basics: Information representation- and processing, terms and definitions: alphabet, data, signals, information, numeral systems, propositional logic and Boolean algebra, computer architectures, programming paradigms.

Object Orientation: Definition and important characteristics of object orientation, Object-oriented modeling with UML.

Data Structures: Definition, properties and application of graphs, trees, linked lists, queues and stacks.

Algorithms: Characteristics of algorithms, complexity analysis, design methods, important examples.

Database management systems: Relational data model, relational algebra, declarative language SQL.

Literature

Robert Sedgewick : Algorithms in Java. Part 1-4. 3. Auflage. Addison Wesley, 2002, ISBN 0201361205

Robert Sedgewick : Algorithms in Java. Part 5. 3. Auflage. Addison Wesley, 2003, ISBN 0201361213

Peter Drake: Data Structures and Algorithms in Java 1. Auflage. Prentice Hall, 2005, ISBN 0131469142

Russ Miles, Kim Hamilton: Learning UML 2.0 , 1. Auflage, O'Reilly , 2006, ISBN 0596009828

Craig Larman : Applying UML and Patterns: An Introduction to Object Oriented Analysis and Design and Iterative Development , 3 Auflage. Prentice Hall, 2004, ISBN 0131489062

T 10.15 Course: Computer Science for Engineers, Prerequisite [T-MACH-105206]

Responsible: Prof. Dr.-Ing. Jivka Ovtcharova
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102563 - Computer Science

Type	Credits	Grading scale	Recurrence	Version
Completed coursework (practical)	0	pass/fail	Each summer term	2

Events					
ST 2022	2121392	Computer Lab for Computer Science in Mechanical Engineering	2 SWS	/	Ovtcharova, Elstermann, Mitarbeiter
ST 2022	3121036	Computer Science for Engineers Lab Course	2 SWS	/	Ovtcharova, Elstermann
Exams					
ST 2022	76-T-MACH-105206	Computer Science for Engineers, Prerequisite			Ovtcharova, Elstermann

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

Competence Certificate
Programming assignments, that are to be implemented at the computer, are given every two weeks. The students are supervised by tutors while they work on the assignments. Therefore online tests must be solved by the students to assess the understanding of the tasks and the lecture material. All assignments have to be handed in, before they can take part in the exam.

Prerequisites
none

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

V Computer Lab for Computer Science in Mechanical Engineering

2121392, SS 2022, 2 SWS, Language: German, Open in study portal **Online**

Content
JAVA programming assignments, that are to be implemented at the computer, are given every two weeks. The students are supervised by tutors while they work on the assignments. Therefore online tests must be solved by the students to assess the understanding of the tasks and the lecture material. All assignments have to be handed in, before they can take part in the exam.

Organizational issues
Wenn Poolräume nutzbar, dann Poolräume

Literature
Übungsblätter / exercise sheets

V Computer Science for Engineers Lab Course

3121036, SS 2022, 2 SWS, Language: English, Open in study portal **Online**

Content
JAVA programming assignments, that are to be implemented at the computer, are given every two weeks. The students are supervised by tutors while they work on the assignments. Therefore online tests must be solved by the students to assess the understanding of the tasks and the lecture material. All assignments have to be handed in, before they can take part in the exam.

Organizational issues
Wenn Präsenz möglich, dann ID-Raum Nutzung

Literature
Exercise sheets / Übungsblätter

T 10.16 Course: Deconstructing Unconscious Bias into Intercultural Competence: A neurological look into how the brain constructs reality [T-ZAK-112565]

Organisation:

Part of: M-MACH-103322 - International Project Management and Interdisciplinary Qualifications

Type	Credits	Grading scale	Version
Completed coursework	2	pass/fail	1

Events					
WT 22/23	1130206	Deconstructing Unconscious Bias into Intercultural Competence: A neurological look into how our brain constructs reality	2 SWS	Seminar / 🗣	Schmidt
Exams					
WT 22/23	1200007	Deconstructing Unconscious Bias into Intercultural Competence: A neurological look into how the brain constructs reality			

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

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

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

V Deconstructing Unconscious Bias into Intercultural Competence: A neurological look into how our brain constructs reality

Seminar (S)
On-Site

1130206, WS 22/23, 2 SWS, Language: English, Open in study portal

Content
One of the first steps towards intercultural competence is to recognize that we are all susceptible to unconscious bias and need support in understanding and overcoming hidden prejudices. This course examines the key characteristics and different kinds of unconscious bias that can influence our relationships in cross-cultural situations. Participants will learn why the brain receives and processes information in a biased manner, how to recognize unconscious bias, how bias can affect attitudes, behaviour and decision making, and why recognizing unconscious bias benefits us all.

Topics include:

- analyzing the neuroscience of a productive brain
- understanding the characteristics of unconscious bias
- differentiating between explicit and implicit bias
- examining the different kinds of unconscious bias
- recognizing unconscious bias in the intercultural setting and how to address it
- developing intercultural competence

2-4 LP

Organizational issues
Registration required via:

T 10.17 Course: Do it! – Service-Learning for prospective mechanical engineers [T-MACH-106700]

Responsible: Prof. Dr.-Ing. Barbara Deml
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103322 - International Project Management and Interdisciplinary Qualifications

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

Events					
WT 22/23	2109039	Do it! – Service-Learning for prospective mechanical engineers	2 SWS	Seminar / 🗣	Deml

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

Competence Certificate
Active and regular participation (compulsory attendance) in all appointments; no marking.

Prerequisites
Timely enrollment in ILIAS; limited number of participants.

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

V Do it! – Service-Learning for prospective mechanical engineers

2109039, WS 22/23, 2 SWS, Language: German, Open in study portal

Seminar (S)
On-Site

Content
The course combines university learning with social engagement. The students leave the well-known academic working conditions and apply engineering skills (such as the ergonomic workplace design) within a social institution.

The course will take place every two weeks with each session lasting three hours. A part of the course will not be held at KIT, but at a workshop for persons with disabilities.

1) Introductory session

Technical and generic preparation of the work assignment

2) Work assignment (3 sessions)

Getting to know the working conditions in a workshop for persons with disabilities and conducting a work analysis in small groups

3) Interim review session

Sharing about the experiences

4) Implementation phase (2 sessions)

Implementing improvement measures concerning workplace/-process design in small groups

5) Evaluation session

Evaluating and reflecting as well as transfering and integrating the new experiences in their student and working life

Learning target:

The aim of this course is to enable students to get to know different social living and working conditions (such as a workshop for persons with disabilities), to engage in society as prospective mechanical engineers, and in doing so to develop their personality.

The overall goal is to learn by service for people, which again is an important factor for client-oriented behavior. This kind of experience and action oriented learning by social engagement is also called “service-learning”. This is supposed to encourage students’ willingness to change their perspective and to achieve some level of understanding for other living and working conditions in order to enhance their social skills such as empathy, communication skills, individual initiative, and conflict management as well as to support self-organized learning.

This course is carried out in cooperation with external partners; the concept also exists at other universities *(http://www.agentur-mehrwert.de/de/hochschulen/do-it-studierendenprojekte.html).*

Literature
Die Kursmaterialien stehen auf ILIAS zum Download zur Verfügung.

T 10.18 Course: Drawing 101: Develop Your Visual Skills. Drawing (Basic skills and exercises) [T-ZAK-112563]

Organisation:

Part of: M-MACH-103322 - International Project Management and Interdisciplinary Qualifications

Type	Credits	Grading scale	Version
Completed coursework	2	pass/fail	1

Events					
WT 22/23	1130456	Drawing 101: Develop Your Visual Skills (Basic skills and exercises)		Seminar / 🗣	Müller
Exams					
WT 22/23	1200005	Drawing 101: Develop Your Visual Skills. Drawing (Basic skills and exercises)			

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

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

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

V Drawing 101: Develop Your Visual Skills (Basic skills and exercises)

1130456, WS 22/23, SWS, Language: English, Open in study portal

Seminar (S)
On-Site

Content
Freehand Drawing

If you know how to write, you can learn how to draw. Drawing, like writing, is a skill that can be developed over time with practice.

For instance, do you know what your eyeballs are actually looking at? Can you mentally break the world down into shapes, lines, angles, sizes, colors, brightness, etc.?

In drawing, one has to focus on both holistic proportional relationships as well as focus on detail isolated from the whole. These two modes of seeing are what underpins a successful drawing.

Skills we will work on in this class:

- recognizing edges, lines, and angles
- understanding proportion and perspective
- deciphering shadows, highlights, and gradations of tone

Come and learn what it means to “see!”

Train the eye and learn how to solve visual problems.

Develop the tools and techniques associated with artistic practice.

Understand the principles underlying all creative and representational drawing through practical exercises.

Weather permitting, we will likely meet at the Botanical Garden of Karlsruhe for at least one course.

2-3 LP

Organizational issues
Registration required via:

T 10.19 Course: Electrical Engineering and Electronics [T-ETIT-108386]

Responsible: Dr. Giovanni De Carne
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-ETIT-104049 - Electrical Engineering

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

Events					
WT 22/23	2306350	Electrical Engineering and Electronics for Mechanical Engineers	4 SWS	Lecture	De Carne
WT 22/23	2306351	Tutorial for 2306350 Electrical Engineering and Electronics for Mechanical Engineers	2 SWS	Practice	De Carne, Hähnlein, Digel, Bremer
Exams					
ST 2022	7306350	Electrical Engineering and Electronics for Mechanical Engineers			Becker

Competence Certificate
The control of success takes place by a written examination, duration 3 hours.

By successfully completing two additional exercise sheets (on a voluntary basis), a bonus of up to 6 exam points can be earned (corresponds to a maximum grade improvement of the written exam by the value 0.3 or 0.4).

Prerequisites
none

Annotation
Exam will be held in english language.

T 10.20 Course: Engineering Mechanics I [T-MACH-100282]

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

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102572 - Engineering Mechanics
M-MACH-104162 - Orientation Exam

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

Events					
WT 22/23	2161245	Engineering Mechanics I	3 SWS	Lecture /	Böhlke
WT 22/23	3161010	Engineering Mechanics I (Lecture)	3 SWS	Lecture /	Langhoff, Böhlke
Exams					
ST 2022	76-T-MACH-100282	Engineering Mechanics I			Böhlke, Langhoff
ST 2022	76-T-MACH-100282-englisch	Engineering Mechanics I			Böhlke, Langhoff
WT 22/23	76-T-MACH-100282	Engineering Mechanics I			Böhlke, Langhoff
WT 22/23	76-T-MACH-100282-englisch	Engineering Mechanics I			Böhlke, Langhoff

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

Competence Certificate
written exam, 90 min, graded

Prerequisites
successful participation in "Engineering Mechanics I (Tutorial)" (see T-MACH-100528)

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-100528 - 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 22/23, 3 SWS, Language: German, Open in study portal

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

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 10.21 Course: Engineering Mechanics II [T-MACH-100283]

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

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102572 - Engineering Mechanics
M-MACH-104162 - Orientation Exam

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

Events					
ST 2022	2162250	Engineering Mechanics II	3 SWS	Lecture /	Böhlke, Langhoff
ST 2022	3162010	Engineering Mechanics II (Lecture)	3 SWS	Lecture /	Langhoff
Exams					
ST 2022	76-T-MACH-100283	Engineering Mechanics II			Böhlke, Langhoff
ST 2022	76-T-MACH-100283-englisch	Engineering Mechanics II			Böhlke, Langhoff
WT 22/23	76-T-MACH-100283	Engineering Mechanics II			Böhlke, Langhoff
WT 22/23	76-T-MACH-100283-englisch	Engineering Mechanics II			Böhlke, Langhoff

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

Competence Certificate
written exam, 90 min, graded

Prerequisites
successful participation in "Engineering Mechanics II (Tutorial)" (see T-MACH-100284)

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-100284 - 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 2022, 3 SWS, Language: German, Open in study portal

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

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.

V

Engineering Mechanics II (Lecture)

3162010, SS 2022, 3 SWS, Language: English, Open in study portal

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

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

T 10.22 Course: Engineering Mechanics III & IV [T-MACH-105201]

Responsible: Prof. Dr.-Ing. Wolfgang Seemann
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102572 - Engineering Mechanics

Type	Credits	Grading scale	Recurrence	Version
Written examination	10	Grade to a third	Each winter term	2

Events					
ST 2022	2162231	Engineering Mechanics IV	2 SWS	Lecture /	Proppe
ST 2022	3162012	Engineering Mechanics 4	2 SWS	Lecture /	Proppe
WT 22/23	2161203	Engineering Mechanics III	2 SWS	Lecture /	Fidlin
WT 22/23	3161012	Engineering Mechanics III (Lecture)	2 SWS	Lecture /	Römer
Exams					
ST 2022	76-T-MACH-105201	Engineering Mechanics III & IV			Seemann
WT 22/23	76-T-MACH-105201	Engineering Mechanics III & IV			Fidlin

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

Competence Certificate
Written Exam (3 h), graded

Prerequisites
Succesful accomplishment of the exercise sheets in Engineering Mechanics III (T-MACH-105202) and of the exercise sheets in Engineering Mechanics IV (T-MACH-105203).

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-105202 - Tutorial Engineering Mechanics III must have been passed.
2. The course T-MACH-105203 - Tutorial Engineering Mechanics IV must have been passed.

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

V Engineering Mechanics IV

2162231, SS 2022, 2 SWS, Language: German, Open in study portal

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

Content
Spatial kinematics of a rigid body, Euler angles, angular velocity using Euler angles, Euler's equations, inertia tensor, kinetic energy of a rigid body, free gyroscopes, forced gyroscopes, systems of rigid bodies, principle of d'Alembert, Lagrange's equations of the first and second kind, generalized coordinates, free and forced vibration of one degree of freedom systems, frequency response, vibration of multi degree of freedom systems, vibration absorption

Literature
Hibbeler: Technische Mechanik 3, Dynamik, München, 2006
Marguerre: Technische Mechanik III, Heidelberger Taschenbücher, 1968
Magnus: Kreisel, Theorie und Anwendung, Springer-Verlag, Berlin,
1971 Klotter: Technische Schwingungslehre, 1. Bd. Teil A, Heidelberg

V Engineering Mechanics 4

3162012, SS 2022, 2 SWS, Language: English, Open in study portal

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

Content
The students know some possibilities to describe the position and orientation of a rigid body for an abitrary 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 boy and notice that this is much more complicated compared to a plain motion. The students can caculate the coordinates of the intertia 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 interprete the most important expressions like eigenfrequency, resonance or eigenvalue problem. Forced vibration of systems with the degree of freedom can be investigated by the students.

V Engineering Mechanics III

2161203, WS 22/23, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
Kinematics: Cartesian, cylindrical and natural coordinates. Time derivatives in moving reference frames, angular velocities of reference frames.

Kinetics of a particle:
Newton's axiom, Principle of d'Alembert, work of a force, kinetic and potential energies, principle of linear momentum, principle of moment of momentum, kinetics in moving reference systems

Systems of particles:
Principle of center of mass, Principle of moment of momentum, impacts between particles, systems with variable mass, applications.

Plain motion of rigid bodies:
Pure translation, pure rotation, general plain motion. Instantaneous center of rotation, Kinetics, moment of momentum, principle of work and principle of energy conservation for a rotation around a space-fixed axis. Mass moment of inertia, parallel-axis-theorem.Principle of linear momentum and principle of moment of momentum for arbitrary plain motion. Principle of d'Alembert for plain motion. Principles of linear and moment of momentum in integral form. Applications for impact problems.

Literature
Hibbeler: Technische Mechanik 3, Dynamik, München, 2006

Gross, Hauger, Schnell: Technische Mechanik Bd. 3, Heidelberg, 1983

Lehmann: Elemente der Mechanik III, Kinetik, Braunschweig, 1975

Göldner, Holzweissig: Leitfaden der Technischen Mechanik.

Hagedorn: Technische Mechanik III.

V Engineering Mechanics III (Lecture)

3161012, WS 22/23, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content
Kinematics: Cartesian, cylindrical and natural coordinates. Time derivatives in moving reference frames, angular velocities of reference frames.

Kinetics of a particle: Newton's axiom, principle of d'Alembert, work of force, kinetic and potential energies, principle of linear momentum, principle of moment of momentum, kinetics in moving reference systems

Systems of particles: principle of center of mass, principle of moment of momentum, impacts between particles, systems with variable mass, applications

Plain motion of rigid bodies: pure translation, pure rotation, general plain motion. Instantaneous center of rotation , kinetics, moment of momentum, principle of work and princicple of energy conservation for a rotation around a space-fixed axis. Mass moment of inertia, parallel-axis-theorem. Principle of linear momentum and principle of moment of momentum for arbitrary plain motion. Principle of d'Alembert for plain motion. Principles of linear and moment of momentum in integral form. Applications for impact problems.

T 10.23 Course: Environmentally Induced Migrants (EIMs) [T-ZAK-112570]

Organisation:

Part of: M-MACH-103322 - International Project Management and Interdisciplinary Qualifications

Type	Credits	Grading scale	Version
Completed coursework	2	pass/fail	1

Events					
WT 22/23	1130411	Environmentally Induced Migrants (EIMs)	2 SWS	Seminar /	Pacini
Exams					
WT 22/23	1200009	Environmentally Induced Migrants (EIMs)			

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

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

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

V Environmentally Induced Migrants (EIMs)

1130411, WS 22/23, 2 SWS, Language: English, Open in study portal

Seminar (S)
Blended (On-Site/Online)

Content
Environmental disasters displace every year millions of people around the world, doubling the number of displaced persons due to conflicts and violence. While the latter have different options of international protection, yet no international legal status has been recognized to the Environmentally-Induced Migrants (EIMs). Considering that climate change contributes to the increase of environmental disaster and therefore displacement, this type of mass migration is in the spotlight at United Nations conferences on climate change.

This course aims to clarify the complexity of the drivers behind this phenomenon to comprehend the characteristics of this particular migratory movement. This will allow the identification of those needs of EIM that must be addressed in possible legal protection. Students will be provided with basic knowledge of human rights and forced migrations instruments, environmental and climate change laws that are relevant to EIM. Finally, participants will be prepared and involved in a simulation of an international conference during which they will have to negotiate the protection for EIMs. No previous legal knowledge is required.

2-3 ECTS

Organizational issues
Registration required via:

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-102574 - Technical Thermodynamics

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

Events					
WT 22/23	2165502	Exercise course Technical Thermodynamics and Heat Transfer I	2 SWS	Practice / 🗣	Maas
WT 22/23	3165015	Technical Thermodynamics and Heat Transfer I (Tutorial)	2 SWS	Tutorial (/ 🗣	Schießl, Maas
Exams					
ST 2022	76T-MACH-105204	Excercises in Technical Thermodynamics and Heat Transfer I			Maas
ST 2022	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
Homework is mandatory.

T 10.25 Course: Excercises in Technical Thermodynamics and Heat Transfer II [T-MACH-105288]

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

Part of: M-MACH-102574 - Technical Thermodynamics

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

Events					
ST 2022	2166556	Technical Thermodynamics and Heat Transfer II (Tutorial)	2 SWS	Practice /	Maas
ST 2022	3166033	Technical Thermodynamics and Heat Transfer II (Tutorial)	2 SWS	Practice /	Schießl, Maas
Exams					
ST 2022	76T-MACH-105288	Excercises in Technical Thermodynamics and Heat Transfer II			Maas, Schießl

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

Competence Certificate
Homework is mandatory.

Prerequisites
none

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

V Technical Thermodynamics and Heat Transfer II (Tutorial)

2166556, SS 2022, 2 SWS, Language: German, Open in study portal

Practice (Ü)
Blended (On-Site/Online)

Content
Calculation of thermodynamical problems

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 10.26 Course: Fluid Mechanics 1&2 [T-MACH-105207]

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

Part of: M-MACH-102565 - Fluid Mechanics

Type	Credits	Grading scale	Recurrence	Version
Written examination	8	Grade to a third	Each summer term	2

Events					
ST 2022	2154512	Fluid Mechanics I	3 SWS	Lecture / Practice (/)	Frohnapfel
ST 2022	3154510	Fluid Mechanics I	3 SWS	Lecture / Practice (/)	Frohnapfel
WT 22/23	2153512	Fluid Mechanics II	3 SWS	Lecture / Practice (/)	Frohnapfel
WT 22/23	3153511	Fluid Mechanics II	3 SWS	Lecture / Practice (/)	Frohnapfel
Exams					
ST 2022	76-T-MACH-105207	Fluid Mechanics (1+2)			Frohnapfel, Kriegseis
ST 2022	76-T-MACH-105207 engl.	Fluid Mechanics 1&2			Frohnapfel
WT 22/23	76-T-MACH-105207	Fluid Mechanics (1+2)			Frohnapfel
WT 22/23	76-T-MACH-105207 engl.	Fluid Mechanics 1&2			Frohnapfel

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

Competence Certificate
written exam 3 hours

Prerequisites
none

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

V Fluid Mechanics I

2154512, SS 2022, 3 SWS, Language: German, Open in study portal

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

Content
Introduction to the fundamentals of fluid mechanics for students of mechanical engineering and related fields, physics and mathematics. The lecture is complemented by a tutorial.

- Introduction
- Flows in Nature and Technologie
- Fundamentals of Fluid Mechanics
- Properties of Fluids and Characteristic Fluid Regimes
- Fundamental Equations of Fluid Mechanics (Conservation of Mass, Momentum and Energy)
  - Continuity equation
  - Navier-Stokes equations (Euler Equations)
  - Energy equation
- Hydro- und Aerostatics
- Flows without dissipation (lossless)
- Technical Flows with Losses
- Introduction to Similarity Analysis
- Two-Dimensional Viscous Flows
- Integral Form of the Governing Equations
- Introduction to Gas Dynamics

Literature
Kundu, P.K., Cohen, K.M.: Fluid Mechanics, Elsevier, 4th Edition, 2008

Durst, F.: Grundlagen der Strömungsmechanik, Springer, 2006

Oertel, H.: Strömungsmechanik, Vieweg-Verlag, 4. Auflage 2006
Oertel, H., Böhle, M.: Übungsbuch Strömungsmechanik, Vieweg-Verlag, 5. Auflage 2006

Zierep, J., Bühler, K.: Strömungsmechanik, Springer Lehrbuch bzw. entsprechende Kapitel in Hütte.Das Ingenieurwissen, Springer

V Fluid Mechanics I

3154510, SS 2022, 3 SWS, Language: English, Open in study portal

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

Content
Introduction to the fundamentals of fluid mechanics for students of mechanical engineering and related fields, physics and mathematics. The lecture is complemented by a tutorial.

- Introduction
- Flows in Nature and Technologie
- Fundamentals of Fluid Mechanics
- Properties of Fluids and Characteristic Fluid Regimes
- Fundamental Equations of Fluid Mechanics (Conservation of Mass, Momentum and Energy)
  - Continuity equation
  - Navier-Stokes equations (Euler Equations)
  - Energy equation
- Hydro- und Aerostatics
- Flows without dissipation (lossless)
- Technical Flows with Losses
- Introduction to Similarity Analysis
- Two-Dimensional Viscous Flows
- Integral Form of the Governing Equations
- Introduction to Gas Dynamics

Literature
Kundu, P.K., Cohen, K.M.: Fluid Mechanics, Elsevier, 4th Edition, 2008

Durst, F.: Grundlagen der Strömungsmechanik, Springer, 2006

Oertel, H.: Strömungsmechanik, Vieweg-Verlag, 4. Auflage 2006
Oertel, H., Böhle, M.: Übungsbuch Strömungsmechanik, Vieweg-Verlag, 5. Auflage 2006

Zierep, J., Bühler, K.: Strömungsmechanik, Springer Lehrbuch bzw. entsprechende Kapitel in Hütte. Das Ingenieurwissen, Springer

V Fluid Mechanics II

2153512, WS 22/23, 3 SWS, Language: German, Open in study portal

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

Content
The students know how to derive the fundamental equations for mass and momentum conservation and can introduce material laws for fluids into those. They can discuss the physical meaning of the different terms in the Navier-Stokes-Equations. They are capable of simplifying the mathematical equations that describe the motion of fluids and can compute flow quantities for generic problems based on these simplified equations. This includes the calculation of static and dynamic forces acting from the fluid onto the solid as well as the detailed analysis of two-dimensional viscous flows.

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

Literature
Kundu, P.K., Cohen, K.M.: Fluid Mechanics, Elsevier, 4th Edition, 2008

Durst, F.: Grundlagen der Strömungsmechanik, Springer, 2006

Oertel, H.: Strömungsmechanik, Vieweg-Verlag, 4. Auflage 2006
Oertel, H., Böhle, M.: Übungsbuch Strömungsmechanik, Vieweg-Verlag, 5. Auflage 2006

Zierep, J., Bühler, K.: Strömungsmechanik, Springer Lehrbuch bzw. entsprechende Kapitel in Hütte.Das Ingenieurwissen, Springer

V Fluid Mechanics II

3153511, WS 22/23, 3 SWS, Language: English, Open in study portal

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

Content
The students know how to derive the fundamental equations for mass and momentum conservation and can introduce material laws for fluids into those. They can discuss the physical meaning of the different terms in the Navier-Stokes-Equations. They are capable of simplifying the mathematical equations that describe the motion of fluids and can compute flow quantities for generic problems based on these simplified equations. This includes the calculation of static and dynamic forces acting from the fluid onto the solid as well as the detailed analysis of two-dimensional viscous flows.

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

Literature
Kundu, P.K., Cohen, K.M.: Fluid Mechanics, Elsevier, 4th Edition, 2008

Durst, F.: Grundlagen der Strömungsmechanik, Springer, 2006

Oertel, H.: Strömungsmechanik, Vieweg-Verlag, 4. Auflage 2006
Oertel, H., Böhle, M.: Übungsbuch Strömungsmechanik, Vieweg-Verlag, 5. Auflage 2006

Zierep, J., Bühler, K.: Strömungsmechanik, Springer Lehrbuch bzw. entsprechende Kapitel in Hütte.Das Ingenieurwissen, Springer

T 10.27 Course: Fundamentals of Combustion I [T-MACH-105213]

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

Part of: M-MACH-103350 - MF B: Energy Engineering

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

Events					
WT 22/23	2165515	Fundamentals of Combustion I	2 SWS	Lecture /	Maas
WT 22/23	2165517	Fundamentals of Combustion I (Tutorial)	1 SWS	Practice /	Bykov
WT 22/23	3165016	Fundamentals of Combustion I	2 SWS	Lecture /	Maas
WT 22/23	3165017	Fundamentals of Combustion I (Tutorial)	1 SWS	Practice /	Bykov
Exams					
ST 2022	76-T-MACH-105213	Fundamentals of Combustion I			Maas
ST 2022	76-T-MACH-105464	Fundamentals of Combustion I			Maas

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

Competence Certificate
Written exam, approx. 3 hours

Prerequisites
none

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

V Fundamentals of Combustion I

2165515, WS 22/23, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

- Fundamental concepts and phenomena
- Experimental analysis of flames
- Conservation equations for laminar flat flames
- Chemical reactions
- Chemical kinetics mechanisms
- Laminar premixed flames
- Laminar diffusion flames
- Ignition processes
- NOx formation
- Formation of hydrocarbons and soot

Literature
Vorlesungsskript,

Buch Verbrennung - Physikalisch-Chemische Grundlagen, Modellbildung, Schadstoffentstehung, Autoren: U. Maas, J. Warnatz, R.W. Dibble, Springer-Lehrbuch, Heidelberg 1996

V Fundamentals of Combustion I (Tutorial)

2165517, WS 22/23, 1 SWS, Language: German, Open in study portal

Practice (Ü)
On-Site

Literature

- Vorlesungsskript
- J. Warnatz; U. Maas; R.W. Dibble: Verbrennung, Springer, Heidelberg 1996

V

Fundamentals of Combustion I

3165016, WS 22/23, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content

- Fundamental concepts and phenomena
- Experimental analysis of flames
- Conservation equations for laminar flat flames
- Chemical reactions
- Chemical kinetics mechanisms
- Laminar premixed flames
- Laminar diffusion flames
- Ignition processes
- NOx formation
- Formation of hydrocarbons and soot

Literature
Vorlesungsskript,

Buch Verbrennung - Physikalisch-Chemische Grundlagen, Modellbildung, Schadstoffentstehung, Autoren: U. Maas, J. Warnatz, R.W. Dibble, Springer-Lehrbuch, Heidelberg 1996

T 10.28 Course: Fundamentals of Energy Technology [T-MACH-105220]

Responsible: Dr. Aurelian Florin Badea
Prof. Dr.-Ing. Xu Cheng

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103350 - MF B: Energy Engineering

Type	Credits	Grading scale	Recurrence	Version
Written examination	8	Grade to a third	Each summer term	1

Events					
ST 2022	2130927	Fundamentals of Energy Technology	3 SWS	Lecture /	Cheng, Badea
ST 2022	3190923	Fundamentals of Energy Technology	3 SWS	Lecture /	Badea
Exams					
ST 2022	76-T-MACH-105220	Fundamentals of Energy Technology			Cheng, Badea
ST 2022	76-T-MACH-105220 Fundamentals of Energy Technology	Fundamentals of Energy Technology			Badea
WT 22/23	76-T-MACH-105220	Fundamentals of Energy Technology			Badea, Cheng

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

Competence Certificate
Written examination, 90 min

Prerequisites
none

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

V Fundamentals of Energy Technology

2130927, SS 2022, 3 SWS, Language: German, Open in study portal

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

Content
The objective of the course is to train the students on state of the art knowledge about the challenging fields of energy industry and the permanent competition between the economical profitability and the long-term sustainability. The students obtain basic knowledge on thermodynamics relevant to the energy sector and comprehensive knowledge on the energy sector: demand, energy types, energy mix, installations for energy production (conventional, nuclear and renewable), transport and energy storage, environmental impact and future tendencies. Students are able to use methods of economic efficiency optimization for the energy sector in a creative way, practice oriented, also specifically trained during the corresponding tutorial. The students are qualified for further training in energy engineering related fields and for (also research-related) professional activity in the energy sector.

The following relevant fields of the energy industry are covered:
- Energy demand and energy situation
- Energy types and energy mix
- Basics. Thermodynamics relevant to the energy sector
- Conventional fossil-fired power plants
- Combined Cycle Power Plants
- Cogeneration
- Nuclear energy
- Regenerative energies: hydropower, wind energy, solar energy, other energy systems
- Energy demand structures. Basics of economic efficiency and calculus. Optimization
- Energy storage
- Transport of energy
- Power generation and environment. Future of the energy industry

V

Fundamentals of Energy Technology

3190923, SS 2022, 3 SWS, Language: English, Open in study portal

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

Content

The objective of the course is to train the students on state of the art knowledge about the challenging fields of energy industry and the permanent competition between the economical profitability and the long-term sustainability. The students obtain basic knowledge on thermodynamics relevant to the energy sector and comprehensive knowledge on the energy sector: demand, energy types, energy mix, installations for energy production (conventional, nuclear and renewable), transport and energy storage, environmental impact and future tendencies. Students are able to use methods of economic efficiency optimization for the energy sector in a creative way, practice oriented, also specifically trained during the corresponding tutorial. The students are qualified for further training in energy engineering related fields and for (also research-related) professional activity in the energy sector.

The following relevant fields of the energy industry are covered:
- Energy forms
- Thermodynamics relevant to energy industry
- Energy sources: fossil fuels, nuclear energy, renewable sources
- Energy industry in Germany, Europe and worldwide
- Power generation and environment
- Evaluation of energy conversion processes
- Thermal/electrical power plants and processes
- Transport of energy / energy carriers
- Energy storage
- Systems utilizing renewable energy sources
- Basics of economic efficiency and calculus / Optimisation
- Future of the energy industry

T 10.29 Course: Global Logistics [T-MACH-105379]

Responsible: Prof. Dr.-Ing. Kai Furmans
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103351 - MF A: Global Production Management

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

Events					
ST 2022	3118095	Global Logistics	2 SWS	/	Furmans, Kivelä, Jacobi
Exams					
ST 2022	76-T-MACH-105379	Global Logistics			Furmans, Jacobi
WT 22/23	7600002	Global Logistics			Furmans, Jacobi

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

Competence Certificate
oral exam (approx. 20 min)

Prerequisites
none

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

V Global Logistics

3118095, SS 2022, 2 SWS, Language: English, Open in study portal **Blended (On-Site/Online)**

Content
Conveyor Systems

- Basic elements of conveyor systems
- Key figures
- Branching elements
- continuous/partially-continuous
- deterministic/stochastic switch
- Integration elements
- continuous/partially-continuous
- dispatching rules

Queueing Theory and Production Logistics

- Basic queueing systems
- Distributions
- M|M|1 and M|G|1 model
- Application on production logistics

Distribution Centers and Order Picking

- The location problem
- Distribution centers
- Inventory management
- Order picking

Vehicle Routing

- Types of vehicle routing problems
- Linear programming model and graph theoretic model
- Heuristics
- Supporting technologies

Optimization of Logistical Networks

- Objectives
- Cooperative strategies
- Supply chain management
- Implementation

Organizational issues
Attendance during lecture is required. Admission to the exam is only possible when attending the lecture.

Literature
Arnold, Dieter; Furmans, Kai : Materialfluss in Logistiksystemen; Springer-Verlag Berlin Heidelberg

T 10.30 Course: Global Production Engineering (MEI) [T-MACH-106731]

Responsible: Prof. Dr.-Ing. Gisela Lanza
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103351 - MF A: Global Production Management

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

Events					
ST 2022	3150040	Global Production Engineering (MEI)	2 SWS	Lecture /	Lanza, Peukert
Exams					
ST 2022	76-T-MACH-106731	Global Production Engineering (MEI)			Lanza

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

Competence Certificate
oral exam (approx. 45 min, group examination with 3 students)

Prerequisites
none

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

V Global Production Engineering (MEI)

3150040, SS 2022, 2 SWS, Language: English, Open in study portal

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

Content
Target of the lecture is to depict the challenges of global operating companies and to give an overview of central aspects and methods in production planning. The lecture will regard site-related production factors and give the basic steps in site-selection, before the planning of manufacturing systems is focused. Herein, not only the planning phases are regarded, but also the methods used.

The topics are:

- Challenges of global production
- Establishing of new production sites
- The basic steps in manufacturing system planning
- Steps and methods of factory planning
- Manufacturing and assembly planning. Assembly panning will be focused
- Layout and material flow of production sites
- Production planning and control basics

Learning Outcomes:

The students …

- can explain the challenges of global production.
- can explain site-related production factors.
- can name the basic steps in site-selection.
- can explain the basic steps in planning a production site.
- are able to explain methods of production analysis, layout planning, production planning and control, etc.
- can apply the methods to new problems.
- can explain links between different planning steps.

Organizational issues
Die genauen Termine und Raum werden über die wbk-Homepage bekannt gegeben.

T 10.31 Course: Heat and Mass Transfer [T-MACH-105292]

Responsible: Prof. Dr. Ulrich Maas
Dr.-Ing. Chunkan Yu

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103350 - MF B: Energy Engineering

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

Events					
ST 2022	3122512	Heat and Mass Transfer	2 SWS	Lecture /	Maas
WT 22/23	2165512	Heat and mass transfer	2 SWS	Lecture /	Maas
Exams					
ST 2022	76-T-MACH-105292	Heat and Mass Transfer			Maas

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

Competence Certificate
Written exam, approx. 3 h

Prerequisites
none

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

V Heat and Mass Transfer

3122512, SS 2022, 2 SWS, Language: English, Open in study portal

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

Content

- Steady and unsteady heat transfer in homogenous materials; Plates, pipe sections and sperical shells
- Molecular diffusion in gases; analogies between heat conduction and mass diffusion
- Convective, forced heat transfer in pipes/channels and around plates and profiles.
- Convective mass transfer, heat-/mass transfer analogy
- Multi phase convective heat transfer (ceondensation, evaporation)
- Radiative heat transfer

Organizational issues
Bitte beachten Sie den Aushang.

Literature

- Maas ; Vorlesungsskript "Wärme- und Stoffübertragung"
- Baehr, H.-D., Stephan, K.: "Wärme- und Stoffübertragung" , Springer Verlag, 1993
- Incropera, F., DeWitt, F.: "Fundamentals of Heat and Mass Transfer" , John Wiley & Sons, 1996
- Bird, R., Stewart, W., Lightfoot, E.: "Transport Phenomena" , John Wiley & Sons, 1960

V Heat and mass transfer

2165512, WS 22/23, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

- Steady and unsteady heat transfer in homogenous materials; Plates, pipe sections and sperical shells
- Molecular diffusion in gases; analogies between heat conduction and mass diffusion
- Convective, forced heat transfer in pipes/channels and around plates and profiles.
- Convective mass transfer, heat-/mass transfer analogy
- Multi phase convective heat transfer (ceondensation, evaporation)
- Radiative heat transfer

Literature

- Maas ; Vorlesungsskript "Wärme- und Stoffübertragung"
- Baehr, H.-D., Stephan, K.: "Wärme- und Stoffübertragung" , Springer Verlag, 1993
- Incropera, F., DeWitt, F.: "Fundamentals of Heat and Mass Transfer" , John Wiley & Sons, 1996
- Bird, R., Stewart, W., Lightfoot, E.: "Transport Phenomena" , John Wiley & Sons, 1960

T 10.32 Course: Intercultural Communications: USA and Germany [T-ZAK-112564]

Organisation:

Part of: M-MACH-103322 - International Project Management and Interdisciplinary Qualifications

Type	Credits	Grading scale	Version
Completed coursework	2	pass/fail	1

Events					
WT 22/23	1130138	Intercultural Communications: USA and Germany	2 SWS	Seminar / 🗣	Schmidt
Exams					
WT 22/23	1200006	Intercultural Communications: USA and Germany			

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

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

T 10.33 Course: Key Concepts in cultural studies [T-ZAK-112562]

Organisation:

Part of: M-MACH-103322 - International Project Management and Interdisciplinary Qualifications

Type	Credits	Grading scale	Version
Completed coursework	2	pass/fail	1

Events					
WT 22/23	1130286	Key Concepts in Cultural Studies	2 SWS	Seminar / 🗣	Krstic
Exams					
WT 22/23	1200004	Key Concepts in Cultural Studies			

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

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

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

V Key Concepts in Cultural Studies

1130286, WS 22/23, 2 SWS, Language: English, Open in study portal

Seminar (S)
On-Site

Content
This seminar will provide an overview of some of the major concepts of cultural studies. Each session will focus on a different concept and will provide historical and theoretical contexts, while applying these concepts to relevant examples. The concepts that we will discuss are the following: culture and popular culture, representation and the media, race, class and gender, (urban) space, place and cultural geography, postcolonialism, transnationalism, cosmopolitanism and globalization.
The contexts will be provided by in-class viewings and discussions of the following documentary films: The Stuart Hall Project (2013), I Am Not Your Negro (2016), Citizen Jane: Battle for the City (2017), Human Flow (2017).
2-6 ECTS

Organizational issues
Registration required via:

T 10.34 Course: Machine Dynamics [T-MACH-105210]

Responsible: Prof. Dr.-Ing. Carsten Proppe
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103349 - MF C: Automotive Engineering

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

Events					
ST 2022	2161224	Machine Dynamics	2 SWS	Lecture /	Proppe
ST 2022	2161225	Machine Dynamics (Tutorial)	1 SWS	Practice /	Proppe, Fischer
WT 22/23	2161224	Machine Dynamics	2 SWS	Lecture /	Proppe
Exams					
ST 2022	76-T-MACH-105210	Machine Dynamics			Proppe

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

Competence Certificate
written exam, 180 min.

Prerequisites
none

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

V Machine Dynamics

2161224, SS 2022, 2 SWS, Language: German/English, Open in study portal

Lecture (V)
Online

Content
1. Introduction
2. Machine as mechatronic system
3. Rigid rotors: equations of motion, transient and stationary motion, balancing
4. Flexible rotors: Laval rotor (equations of motion, transient and stationary behavior, critical speed, secondary effects), refined models)
5. Slider-crank mechanisms: kinematics, equations of motion, mass and power balancing

Literature
Biezeno, Grammel: Technische Dynamik, 2. Aufl., 1953

Holzweißig, Dresig: Lehrbuch der Maschinendynamik, 1979

Dresig, Vulfson: Dynamik der Mechanismen, 1989

V Machine Dynamics (Tutorial)

2161225, SS 2022, 1 SWS, Language: English, Open in study portal

Practice (Ü)
Blended (On-Site/Online)

Content
Exercises related to the lecture

V Machine Dynamics

2161224, WS 22/23, 2 SWS, Language: English, Open in study portal

Lecture (V)
Online

Content
1. Introduction

2. Machine as mechatronic system
3. Rigid rotors: equations of motion, transient and stationary motion, balancing
4. Flexible rotors: Laval rotor (equations of motion, transient and stationary behavior, critical speed, secondary effects), refined models)
5. Slider-crank mechanisms: kinematics, equations of motion, mass and power balancing

Literature
Biezeno, Grammel: Technische Dynamik, 2. Aufl., 1953

Holzweißig, Dresig: Lehrbuch der Maschinendynamik, 1979

Dresig, Vulfson: Dynamik der Mechanismen, 1989

T 10.35 Course: Machines and Processes [T-MACH-105208]

Responsible: Prof. Dr.-Ing. Hans-Jörg Bauer
Dr.-Ing. Heiko Kubach
Prof. Dr. Ulrich Maas
Dr. Balazs Pritz

Organisation: KIT Department of Mechanical Engineering
Institute of Thermal Turbomachinery

Part of: M-MACH-102566 - Machines and Processes

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

Events					
ST 2022	3134140	Machines and Processes	4 SWS	Lecture / Practice (/ 🗣	Bauer, Maas, Kubach, Pritz
WT 22/23	2185000	Machines and Processes	4 SWS	Lecture / Practice (/ 🗣	Bauer, Kubach, Maas, Pritz
Exams					
ST 2022	76-T-MACH-105208	Machines and Processes			Kubach, Bauer, Maas, Pritz
ST 2022	76-T-MACH-105208e	Machines and Processes			Kubach, Bauer, Maas, Pritz
WT 22/23	76-T-MACH-105208	Machines and Processes			Kubach, Maas, Bauer

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

Competence Certificate
written exam (duration: 120 min)

Prerequisites
Taking part at the exam is possible only when lab course has been successfully completed

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-105232 - Machines and Processes, Prerequisite must have been passed.

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

V Machines and Processes

2185000, WS 22/23, 4 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Content
basics of thermodynamics

thermal fluid machines

- steam turbunes
- gas turbines
- combined-cycle plants
- turbines and compressors
- aircraft engines

hydraulic fluid machines

- oerating performance
- characterization
- control
- cavitation
- wind turbines, propellers

internal combustion engines

- characteristic parameters
- engine parts
- kinematics
- engine processes
- emissions

T 10.36 Course: Machines and Processes, Prerequisite [T-MACH-105232]

Responsible: Prof. Dr.-Ing. Hans-Jörg Bauer
Dr.-Ing. Heiko Kubach
Prof. Dr. Ulrich Maas
Dr. Balazs Pritz

Organisation: KIT Department of Mechanical Engineering

Institute of Thermal Turbomachinery

Part of: M-MACH-102566 - Machines and Processes

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

Events					
ST 2022	2187000	Machines and Processes (Lab Course)	1 SWS	Practical course / 🗣	Bauer, Kubach, Maas, Pritz
WT 22/23	2187000	Machines and Processes	1 SWS	Practical course / 🗣	Bauer, Kubach, Pritz, Schmidt, Bykov
Exams					
ST 2022	76-T-MACH-105232	Machines and Processes, Prerequisite			Kubach, Bauer, Maas, Pritz

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

Competence Certificate
successful completed training course

Prerequisites
none

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

V Machines and Processes (Lab Course)

2187000, SS 2022, 1 SWS, Language: German, Open in study portal

Practical course (P)
On-Site

Content
successful lab course and written exam (2 h)

Taking part at the exam is possible only when lab course has been successfully completed

Lab course and lecture take place in summer and winter semester.

In the SS the lecture is held in English. The lab course is always bilingual.

Media:

slides to download

Documentation of the labcourse

basics of thermodynamics

thermal fluid machines

- steam turbunes
- gas turbines
- combined-cycle plants
- turbines and compressors
- aircraft engines

hydraulic fluid machines

- oerating performance
- characterization
- control
- cavitation
- wind turbines, propellers

internal combustion engines

- characteristic parameters
- engine parts
- kinematics
- engine processes
- emissions

regular attendance: 48 h, self-study: 160 h

The students can name and describe basic energy conversion processes and energy converting machines. They can explain the application of these energy conversion processes in various machines. They can analyze and evaluate the processes and machines in terms of functionality and efficiency and they are able to solve basic technical problems in terms of operating the machines.

V **Machines and Processes** **Practical course (P)**
2187000, WS 22/23, 1 SWS, Open in study portal **On-Site**

Content
Lab Course Experiment

T 10.37 Course: Materials Science I & II [T-MACH-105145]

Responsible: Dr.-Ing. Jens Gibmeier
Prof. Dr.-Ing. Martin Heilmaier
Prof. Dr. Astrid Pundt

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102562 - Materials Science

Type	Credits	Grading scale	Recurrence	Version
Oral examination	11	Grade to a third	Each winter term	2

Events					
ST 2022	2174560	Materials Science and Engineering II for mach, phys	3 SWS	Lecture /	Heilmaier, Pundt
ST 2022	2174563	Exercises in Materials Science and Engineering II for mach, phys	1 SWS	Practice /	Heilmaier, Kauffmann
ST 2022	3174015	Materials Science and Engineering II (Lecture)	3 SWS	Lecture /	Gibmeier
ST 2022	3174026	Materials Science and Engineering II (Tutorials)	1 SWS	Practice /	Gibmeier, Mitarbeiter
WT 22/23	2173550	Materials Science and Engineering I for mach, phys	4 SWS	Lecture /	Pundt, Kauffmann
WT 22/23	2173552	Exercises in Materials Science and Engineering I for mach, phys	1 SWS	Practice /	Pundt, Kauffmann
WT 22/23	3173008	Materials Science and Engineering I (Lecture)	4 SWS	Lecture /	Gibmeier
WT 22/23	3173009	Materials Science and Engineering I (Tutorial)	1 SWS	Practice /	Gibmeier
Exams					
ST 2022	76-T-MACH-105145	Materials Science I, II			Heilmaier, Pundt
ST 2022	76-T-MACH-105145-2	Materials Science I, II			Heilmaier, Pundt
ST 2022	76-T-MACH-105145-English	Materials Science I & II (Exam in English)			Heilmaier, Gibmeier
ST 2022	76-T-MACH-105145-Re-English	Materials Science I & II (Re-exam in English)			Gibmeier, Heilmaier
ST 2022	76-T-MACH-105145-W	Materials Science I & II			Heilmaier, Pundt

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

Competence Certificate
oral exam, about 25 minutes

Prerequisites
Lab course must be finished successfully prior to the registration for the oral exam.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-105146 - Materials Science Lab Course must have been passed.

Annotation
The workload for the lecture Materials Science I & II is 165 h per semester and consists of the presence during the lectures (WS: 4 SWS, SS: 2SWS) and the exercises (1 SWS per WS and 1 SWS per SS) as well as preparation and rework time at home.

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

V **Materials Science and Engineering II for mach, phys** **Lecture (V)**
2174560, SS 2022, 3 SWS, Language: German, Open in study portal **Blended (On-Site/Online)**

Content
Topics:
Ferrous materials

Non-ferrous metals and alloys

Engineering ceramics

Glasses

Polymers

Composites

Learning Objectives:
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.

Requirements:
Materials Science and Engineering I

Workload:

regular attendance: 42 hours
self-study: 108 hours

Examination:

Combined with 'Materials Science and Engineering I'; oral; about 30 minutes

The successful partcipation in the lab course is obligatory for the admission to the examination.

Organizational issues
Weitere Informationen zu dieser Veranstaltung finden Sie hier: https://www.iam.kit.edu/wk/lehre.php

Literature
Vorlesungsskript, Vorlesungsvideos, Übungsblätter, Übungsvideos

Weiterführende Informationen gibt es hier:

J. F. Shackelford: „Werkstofftechnologie für Ingenieure. Grundlagen - Prozesse - Anwendungen“, Pearson Studium (2005)
https://services.bibliothek.kit.edu/primo/start.php?recordid=KITSRC117341509

A. Rösler, H. Harders, M. Bäker: „Mechanisches Verhalten der Werkstoffe“, Springer Vieweg (2016)
http://dx.doi.org/10.1007/978-3-658-13795-3 (frei im KIT-Netz erhältlich)

G. Gottstein: „Materialwissenschaft und Werkstofftechnik: Physikalische Grundlagen“, Springer (2014)
http://dx.doi.org/10.1007/978-3-642-36603-1 (frei im KIT-Netz erhältlich)

J. Freudenberger: „Skript zur Vorlesung Physikalische Werkstoffeigenschaften“, IFW Dresden (2004)
https://www.ifw-dresden.de/de/ifw-institutes/ikm/lectures/vorlesungsskript-physikalische-werkstoffeigenschaften (frei zugänglich)

V Exercises in Materials Science and Engineering II for mach, phys

2174563, SS 2022, 1 SWS, Language: German, Open in study portal

Practice (Ü)
Blended (On-Site/Online)

Content
Learning Objectives:

The students can apply the knowledge gained through the lacture as well as self-studies and transfer this knowledge to problems given.

They can carry out calculations independantly dealing with different subjects of materials science. Therefore, they are able to decide which formulas allow the calculation based on the question given.

Theyare able to discuss aspects of materials science both quantitatively and qualitatively and can present these results oraly.

Requirements:
Lecture on Materials Science and Engineering II

Organizational issues
Weitere Informationen finden Sie hier: https://www.iam.kit.edu/wk/lehre.php

Literature
Vorlesungsskript, Vorlesungsvideos, Übungsblätter, Übungsvideos

Weiterführende Informationen gibt es hier:

J. F. Shackelford: „Werkstofftechnologie für Ingenieure. Grundlagen - Prozesse - Anwendungen“, Pearson Studium (2005)
https://services.bibliothek.kit.edu/primo/start.php?recordid=KITSRC117341509

G. Gottstein: „Materialwissenschaft und Werkstofftechnik: Physikalische Grundlagen“, Springer (2014)
http://dx.doi.org/10.1007/978-3-642-36603-1 (frei über die KIT-Lizenz abrufbar)

J. Freudenberger: „Skript zur Vorlesung Physikalische Werkstoffeigenschaften“, IFW Dresden (2004)
http://www.ifw-dresden.de/institutes/imw/lectures/pwe

P. Haasen: „Physikalische Metallkunde“, Cambridge University Press (2003)
http://services.bibliothek.kit.edu/primo/start.php?recordid=KITSRC309606810

R.W. Cahn, P. Haasen (Editoren): „Physical Metallurgy“, Serie, North Holland (1996)
http://services.bibliothek.kit.edu/primo/start.php?recordid=KITSRC052463656

D. A. Porter, K. Easterling: „Phase Transformation in Metals and Alloys“, Chapman & Hall (2009)
http://services.bibliothek.kit.edu/primo/start.php?recordid=KITSRC27759961X

E. Hornbogen, H. Warlimont: „Metalle: Struktur und Eigenschaften von Metallen und Legierungen“, Springer (2016)
http://dx.doi.org/10.1007/978-3-662-47952-0 (frei über die KIT-Lizenz abrufbar)

E. Hornbogen, G. Eggeler, E. Werner: „Werkstoffe: Aufbau und Eigenschaften von Keramik-, Metall-, Polymer- und Verbundwerkstoffen“, Springer (2012)
http://dx.doi.org/10.1007/978-3-642-22561-1 (frei über die KIT-Lizenz abrufbar)

H.-J. Bargel, G. Schulze: „Werkstoffkunde“, Springer (2012)
http://dx.doi.org/10.1007/978-3-642-17717-0 (frei über die KIT-Lizenz abrufbar)

J. Rösler, H. Harders, M. Bäker: „Mechanisches Verhalten der Werkstoffe“, Springer Vieweg (2016)
http://dx.doi.org/10.1007/978-3-658-13795-3 (frei über die KIT-Lizenz abrufbar)

V Materials Science and Engineering II (Lecture)

3174015, SS 2022, 3 SWS, Language: English, Open in study portal

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

Content

Ferrous materials

Non-ferrous metals and alloys

Engineering ceramics

Glasses

Polymers

Composites

learning objectives:

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.

requirements:
Materials Science and Engineering I
workload:

regular attendance: 42 hours
self-study: 108 hours

examination:

Combined with 'Materials Science and Engineering I'; oral; about 30 minutes

The successful partcipation in the lab course is obligatory for the admission to the examination.

Organizational issues
The event will be held in accordance with the Corona rules currently in force at KIT. In any case, we still ask you to wear a nose and mouth covering.

The course (first lecture) will start on 26.04.2022.

Literature
Vorlesungsskript; Übungsaufgabenblätter;

Shackelford, J.F.
Werkstofftechnologie für Ingenieure
Verlag Pearson Studium, 2005

V Materials Science and Engineering II (Tutorials)

3174026, SS 2022, 1 SWS, Language: English, Open in study portal

Practice (Ü)
Blended (On-Site/Online)

Content
Examplary calculations

learning objectives:

The students can apply the knowledge gained through the lacture as well as self-studies and transfer this knowledge to problems given.

They can carry out calculations independantly dealing with different subjects of materials science. Therefore, they are able to decide which formulas allow the calculation based on the question given.

Theyare able to discuss aspects of materials science both quantitatively and qualitatively and can present these results oraly.

requirements:
Lecture Materials Science and Engineering II
workload:

Literature
see lecture notes

V Materials Science and Engineering I for mach, phys

2173550, WS 22/23, 4 SWS, Language: German, Open in study portal

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

Content
Atomic structure and atomic bonds

Structures of crystalline solids

Defects in crystalline solids

Structure of amorphous and semi-crystalline solids

Alloys

Transport and transformation phenomena in the solid state

Microscopy methods

Characterization by means of X-rays, Neutrons and Electrons

Nondestructive testing of materials

Mechanical testing of materials

learning objectives:
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 profies 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.

requirements:

None, **Recommendations:** None.

workload:

regular attendance: 53 hours
self-study: 157 hours

Literature
Vorlesungsskript; Übungsaufgabenblätter;

Shackelford, J.F.
Werkstofftechnologie für Ingenieure
Verlag Pearson Studium, 2005

V Exercises in Materials Science and Engineering I for mach, phys

2173552, WS 22/23, 1 SWS, Language: German, Open in study portal

Practice (Ü)
Blended (On-Site/Online)

Content
Examplary calculations

learning objectives:

The students can apply the knowledge gained through the lacture as well as self-studies and transfer this knowledge to problems given.

They can carry out calculations independantly dealing with different subjects of materials science. Therefore, they are able to decide which formulas allow the calculation based on the question given.

Theyare able to discuss aspects of materials science both quantitatively and qualitatively and can present these results oraly.

requirements:
Lecture Materials Science and Engineering I

workload:

regular attendance: 21 hrs, self studies: 21 hrs.

Literature
Institut für Werkstoffkunde I: Vorlesungsskript

V Materials Science and Engineering I (Lecture)

3173008, WS 22/23, 4 SWS, Language: English, Open in study portal

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

Content

Ferrous materials

Non-ferrous metals and alloys

Engineering ceramics

Glasses

Polymers

Composites

learning objectives:

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.

requirements:
Materials Science and Engineering I

workload:

regular attendance: 42 hours
self-study: 108 hours

examination:

Combined with 'Materials Science and Engineering I'; oral; about 30 minutes

The successful partcipation in the lab course is obligatory for the admission to the examination.

Organizational issues

-

Literature
Vorlesungsskript; Übungsaufgabenblätter;

Shackelford, J.F.
Werkstofftechnologie für Ingenieure
Verlag Pearson Studium, 2005

V

Materials Science and Engineering I (Tutorial)

3173009, WS 22/23, 1 SWS, Language: English, Open in study portal

Practice (Ü)
Blended (On-Site/Online)

Content
Examplary calculations

learning objectives:

The students can apply the knowledge gained through the lacture as well as self-studies and transfer this knowledge to problems given.

They can carry out calculations independantly dealing with different subjects of materials science. Therefore, they are able to decide which formulas allow the calculation based on the question given.

Theyare able to discuss aspects of materials science both quantitatively and qualitatively and can present these results oraly.

requirements:
Lecture Materials Science and Engineering II
workload:

Organizational issues
information please see entries under ´lecture´

02.95 ID SR Raum 101

Literature
see lecture notes

T 10.38 Course: Materials Science Lab Course [T-MACH-105146]

Responsible: Dr.-Ing. Jens Gibmeier
Prof. Dr.-Ing. Martin Heilmaier
Prof. Dr. Astrid Pundt

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102562 - Materials Science

Type	Credits	Grading scale	Recurrence	Version
Completed coursework (practical)	3	pass/fail	Each summer term	1

Events					
ST 2022	2174597	Experimental Lab Course in Material Science	3 SWS	Practical course /	Wagner, Heilmaier, Pundt, Dietrich, Guth
ST 2022	3174016	Materials Science and Engineering Lab Course	3 SWS	Practical course /	Gibmeier, Heilmaier, Pundt
Exams					
ST 2022	76-T-MACH-105146	Materials Science, Lab Course			Heilmaier, Pundt

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

Competence Certificate
Oral colloquium at the beginning of each topic; certificate of successful attendance.

Prerequisites
none

Annotation
The workload for the lab course Materials Science is 90 h in total and consists of the presence during the 10 experiments (one week half-time, 4 hours per day) as well as preparation and rework time at home.

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

V Experimental Lab Course in Material Science

2174597, SS 2022, 3 SWS, Language: German, Open in study portal

Practical course (P)
Blended (On-Site/Online)

Content
Performing and evaluating of laboratory experiments in the following topics:

Mechanical testing of materials
Nonmetallic materials
Microstructure and properties
Cyclic loading / fatigue
Influence of manufacturing technique on materials

learning objectives:

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

The students can name standard materials characterization methods and can describe the execution of the tests as well as the evaluation of the results. The students are able to asses materials on base of the data obtained by these methods.

The students are capable to select appropriate experiments to clarify probelms regarding the materials behaviour. They can describe the experimental procedures and can carry out experiments. They can derive material properties from data gained in experiments. They can interpret these properties regarding microstructure-propety-relations.

requirements:
Materials Science and Engineering I & II
workload:

regular attendance: 22 hours
self-study: 68 hours

Organizational issues
Blockveranstaltung. Infos durch Aushang am IAM-WK und in der VL WK II. Anmeldung erforderlich.

Literature
Praktikumsskriptum

Shackelford, J.F.
Werkstofftechnologie für Ingenieure
Verlag Pearson Studium, 2005

V

Materials Science and Engineering Lab Course

3174016, SS 2022, 3 SWS, Language: English, Open in study portal

Practical course (P)
Blended (On-Site/Online)

Content
Performing and evaluating of laboratory experiments in the following topics:

Mechanical testing of materials
Nonmetallic materials
Microstructure and properties
Cyclic loading / fatigue
Influence of manufacturing technique on materials

learning objectives:

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

The students can name standard materials characterization methods and can describe the execution of the tests as well as the evaluation of the results. The students are able to asses materials on base of the data obtained by these methods.

The students are capable to select appropriate experiments to clarify probelms regarding the materials behaviour. They can describe the experimental procedures and can carry out experiments. They can derive material properties from data gained in experiments. They can interpret these properties regarding microstructure-propety-relations.

requirements:
Materials Science and Engineering I & II
workload:

regular attendance: 22 hours
self-study: 68 hours

Organizational issues
Registration required. Note announcements (MSE lecture and IAM-WK bulletin board)

Literature
Praktikumsskriptum

Shackelford, J.F.
Werkstofftechnologie für Ingenieure
Verlag Pearson Studium, 2005

T 10.39 Course: Mechanical Design I and II [T-MACH-105286]

Responsible: Prof. Dr.-Ing. Sven Matthiesen
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102573 - Mechanical Design

Type	Credits	Grading scale	Recurrence	Version
Written examination	5	Grade to a third	Each winter term	3

Events					
ST 2022	2146178	Mechanical Design II	2 SWS	Lecture / 🗣	Albers, Matthiesen
ST 2022	3146017	Mechanical Design II Lecture	2 SWS	Lecture / 🗣	Albers, Burkardt
WT 22/23	2145178	Mechanical Design I	2 SWS	Lecture / 🗣	Albers, Matthiesen
WT 22/23	3145186	Mechanical Design I (Lecture)	2 SWS	Lecture / 🗣	Albers, Burkardt
Exams					
ST 2022	76-T-MACH-105286	Mechanical Design I & II			Albers, Matthiesen
ST 2022	76T-MACH-105286_EN	Mechanical Design I & II (english)			Albers, Matthiesen

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

Competence Certificate
written exam, graded, duration: 90 min

Prerequisites
Admission to the exam only with successful completion of the T-MACH-105282 - Mechanical Design I, prerequisites and T-MACH-105283 - Mechanical Design II, prerequisites.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-105282 - Mechanical Design I, Prerequisites must have been passed.
2. The course T-MACH-105283 - Mechanical Design II, Prerequisites must have been passed.

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

V Mechanical Design II

2146178, SS 2022, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
Lecture content:

Bearings

Sealings

Design

Bolted Connections

Prerequisites

Concomitant to the lecture 2 online tests were carried out and the knowledge from the lecture will be tested. The knowledge from mechanical design I and II will further be controlled with a design and a CAD task.

Further information's will be announced at Ilias and at the beginning of the lecture mechanical design II.

Literature
Konstruktionselemente des Maschinenbaus - 1 und 2
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)

Vorlesungsumdruck:

Über die ILIAS-Plattform des RZ werden alle relevanten Inhalte (Folien zu Vorlesung und Saalübung, sowie Übungsblätter) entprechend den Vorlesungsblöcken gebündelt zur Verfügung gestellt.

V Mechanical Design II Lecture
3146017, SS 2022, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content
Bearings

Sealings

Design

Bolted Connections

Tutorials take place in concomitant to the lectures.

Prerequisites

Concomitant to the lecture 2 online tests were carried out and the knowledge from the lecture will be tested. The knowledge from mechanical design I and II will further be controlled with a design and a CAD task.

Further information's will be announced at Ilias and at the beginning of the lecture mechanical design II.

Organizational issues
Lecture takes place on Do, 15:45 - 17:15, 11.10 in Engelbert-Arnold-Hörsaal (EAS)

Literature
Konstruktionselemente des Maschinenbaus - 1 und 2
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)

V Mechanical Design I
2145178, WS 22/23, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Literature
Vorlesungsumdruck:

Der Umdruck zur Vorlesung kann über die eLearning-Plattform Ilias bezogen werden.

Literatur:

Konstruktionselemente des Maschinenbaus - 1 und 2
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

V Mechanical Design I (Lecture)
3145186, WS 22/23, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Literature
Vorlesungsumdruck:

Der Umdruck zur Vorlesung kann über die eLearning-Plattform Ilias bezogen werden.

Literatur:

Konstruktionselemente des Maschinenbaus - 1 und 2
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 10.40 Course: Mechanical Design I, Prerequisites [T-MACH-105282]

Responsible: Prof. Dr.-Ing. Sven Matthiesen
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102573 - Mechanical Design

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

Events					
WT 22/23	2145185	Tutorials Mechanical Design I	1 SWS	Practice / 🗣	Albers, Matthiesen, Mitarbeiter
WT 22/23	3145187	Mechanical Design I (Tutorial)	2 SWS	Practice / 🗣	Albers, Burkardt

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.

Furthermore an online test is carried out.

Prerequisites
none

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

V Tutorials Mechanical Design I

Practice (Ü)
On-Site

2145185, WS 22/23, 1 SWS, Language: German, Open in study portal

Literature
Konstruktionselemente des Maschinenbaus - 1 und 2
Grundlagen der Berechnung und Gestaltung von Maschinenelementen;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X

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

V Mechanical Design I (Tutorial)

Practice (Ü)
On-Site

3145187, WS 22/23, 2 SWS, Language: English, Open in study portal

Literature
Konstruktionselemente des Maschinenbaus - 1 und 2
Grundlagen der Berechnung und Gestaltung von Maschinenelementen;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X

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

T 10.41 Course: Mechanical Design II, Prerequisites [T-MACH-105283]

Responsible: Prof. Dr.-Ing. Sven Matthiesen
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102573 - Mechanical Design

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	1	pass/fail	Each summer term	3

Events					
ST 2022	2146185	Tutorials Mechanical Design II	2 SWS	Practice / 🗣	Albers, Matthiesen, Mitarbeiter
ST 2022	3146018	Mechanical Design II Tutorials	2 SWS	Practice / 🗣	Albers, Mitarbeiter
Exams					
ST 2022	76-T-MACH-105283	Mechanical Design II			Albers, Matthiesen

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

Competence Certificate
Successful completion of a design task is required to pass the prerequisite.

Prerequisites
None

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

V Tutorials Mechanical Design II

2146185, SS 2022, 2 SWS, Language: German, Open in study portal

Practice (Ü)
On-Site

Content
Bearings

Sealings

Desing

Bolted connections

tutorials: 10,5 h

prerequisites and preparation to exam: 55 h

Literature
Konstruktionselemente des Maschinenbaus - 1 und 2
Grundlagen der Berechnung und Gestaltung von
Maschinenelementen;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X

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

CAD:

3D-Konstruktion mit Pro/Engineer - Wildfire, Paul Wyndorps, Europa Lehrmittel, ISBN: 978-3-8085-8948-9

Pro/Engineer Tipps und Techniken, Wolfgang Berg, Hanser Verlag, ISBN: 3-446-22711-3 (für Fortgeschrittene)

V Mechanical Design II Tutorials

3146018, SS 2022, 2 SWS, Language: English, Open in study portal

Practice (Ü)
On-Site

Content
Bearings

Sealings

Design

Bolted Connections

Organizational issues
Tutorials take place on Fr, 11:30 - 13:00, in 30.35 Hochspannungstechnik-Hörsaal (HSI)

Literature
Konstruktionselemente des Maschinenbaus - 1 und 2
Grundlagen der Berechnung und Gestaltung von
Maschinenelementen;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X

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

CAD:

3D-Konstruktion mit Pro/Engineer - Wildfire, Paul Wyndorps, Europa Lehrmittel, ISBN: 978-3-8085-8948-9

Pro/Engineer Tipps und Techniken, Wolfgang Berg, Hanser Verlag, ISBN: 3-446-22711-3 (für Fortgeschrittene)

T 10.42 Course: Mechanical Design III and IV [T-MACH-104810]

Responsible: Prof. Dr.-Ing. Sven Matthiesen
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102573 - Mechanical Design

Type	Credits	Grading scale	Recurrence	Version
Written examination	11	Grade to a third	Each term	3

Events					
ST 2022	2146177	Mechanical Design IV	2 SWS	Lecture / 🗣	Albers, Matthiesen
ST 2022	3146020	Mechanical Design IV Lecture	2 SWS	Lecture / 🗣	Albers, Burkardt
WT 22/23	2145151	Mechanical Design III	2 SWS	Lecture / 🗣	Albers, Matthiesen, Mitarbeiter
WT 22/23	3145016	Mechanical Design III (Lecture)	2 SWS	Lecture / 🗣	Albers, Burkardt
Exams					
ST 2022	76-T-MACH-104810	Mechanical Design III & IV			Albers, Matthiesen
ST 2022	76-T-MACH-104810_EN	Mechanical Design III & IV (english)			Albers, Matthiesen

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

Competence Certificate
written exam consisting of:

- written part duration 60 min and
- design part duration 180 min

Sum: 240 min

Prerequisites
Admission to the exam only with successful completion of the Mechanical Design III, Tutorial and Mechanical Design IV, Tutorial.

Modeled Conditions
You have to fulfill one of 2 conditions:

1. The course T-MACH-110955 - Mechanical Design III, Tutorial must have been passed.
2. The course T-MACH-110956 - Mechanical Design IV, Tutorial must have been passed.

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

V Mechanical Design III

2145151, WS 22/23, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Literature
Vorlesungsumdruck:

Der Umdruck zur Vorlesung kann über die eLearning-Plattform Ilias bezogen werden.

Literatur:

Konstruktionselemente des Maschinenbaus - 1 und 2
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

CAD:

3D-Konstruktion mit Pro/Engineer - Wildfire, Paul Wyndorps, Europa Lehrmittel, ISBN: 978-3-8085-8948-9

Pro/Engineer Tipps und Techniken, Wolfgang Berg, Hanser Verlag, ISBN: 3-446-22711-3(für Fortgeschrittene)

V

Mechanical Design III (Lecture)

3145016, WS 22/23, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Literature
Vorlesungsumdruck:

Der Umdruck zur Vorlesung kann über die eLearning-Plattform Ilias bezogen werden.

Literatur:

Konstruktionselemente des Maschinenbaus - 1 und 2
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

CAD:

3D-Konstruktion mit Pro/Engineer - Wildfire, Paul Wyndorps, Europa Lehrmittel, ISBN: 978-3-8085-8948-9

Pro/Engineer Tipps und Techniken, Wolfgang Berg, Hanser Verlag, ISBN: 3-446-22711-3(für Fortgeschrittene)

T 10.43 Course: Mechanical Design III, Tutorial [T-MACH-110955]

Responsible: Prof. Dr.-Ing. Sven Matthiesen
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102573 - Mechanical Design

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

Events					
WT 22/23	2145153	Tutorials Mechanical Design III	2 SWS	Practice / 🗣	Albers, Matthiesen, Mitarbeiter
WT 22/23	2145154	Mechanical Design III Workshop	1 SWS	Practical course / 🗣	Albers, Matthiesen, Albers Assistenten
WT 22/23	3145017	Mechanical Design III (Tutorial)	2 SWS	Practice / 🗣	Albers, Burkardt
WT 22/23	3145018	Mechanical Design III (Workshop)	1 SWS	/ 🗣	Albers, Burkardt

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 CAD-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

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

V Tutorials Mechanical Design III

Practice (Ü)
On-Site

2145153, WS 22/23, 2 SWS, Language: German, Open in study portal

Literature
Konstruktionselemente des Maschinenbaus - 1 und 2
Grundlagen der Berechnung und Gestaltung von Maschinenelementen;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X

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

CAD:

3D-Konstruktion mit Pro/Engineer - Wildfire, Paul Wyndorps, Europa Lehrmittel, ISBN: 978-3-8085-8948-9

Pro/Engineer Tipps und Techniken, Wolfgang Berg, Hanser Verlag, ISBN: 3-446-22711-3 (für Fortgeschrittene)

V Mechanical Design III Workshop

Practical course (P)
On-Site

2145154, WS 22/23, 1 SWS, Open in study portal

Literature
Konstruktionselemente des Maschinenbaus - 1 und 2
Grundlagen der Berechnung und Gestaltung von Maschinenelementen;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X

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

CAD:

3D-Konstruktion mit Pro/Engineer - Wildfire, Paul Wyndorps, Europa Lehrmittel, ISBN: 978-3-8085-8948-9

Pro/Engineer Tipps und Techniken, Wolfgang Berg, Hanser Verlag, ISBN: 3-446-22711-3 (für Fortgeschrittene)

V

Mechanical Design III (Tutorial)

3145017, WS 22/23, 2 SWS, Language: English, Open in study portal

Practice (Ü)
On-Site

Literature
Konstruktionselemente des Maschinenbaus - 1 und 2
Grundlagen der Berechnung und Gestaltung von Maschinenelementen;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X

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

CAD:

3D-Konstruktion mit Pro/Engineer - Wildfire, Paul Wyndorps, Europa Lehrmittel, ISBN: 978-3-8085-8948-9

Pro/Engineer Tipps und Techniken, Wolfgang Berg, Hanser Verlag, ISBN: 3-446-22711-3 (für Fortgeschrittene)

V

Mechanical Design III (Workshop)

3145018, WS 22/23, 1 SWS, Language: English, Open in study portal

On-Site

Organizational issues
Termine siehe Lehrveranstaltung 2145154

Literature
Konstruktionselemente des Maschinenbaus - 1 und 2
Grundlagen der Berechnung und Gestaltung von Maschinenelementen;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X

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

CAD:

3D-Konstruktion mit Pro/Engineer - Wildfire, Paul Wyndorps, Europa Lehrmittel, ISBN: 978-3-8085-8948-9

Pro/Engineer Tipps und Techniken, Wolfgang Berg, Hanser Verlag, ISBN: 3-446-22711-3 (für Fortgeschrittene)

T 10.44 Course: Mechanical Design IV, Tutorial [T-MACH-110956]

Responsible: Prof. Dr.-Ing. Sven Matthiesen
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102573 - Mechanical Design

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

Events					
ST 2022	2146184	Tutorials Mechanical Design IV	1 SWS	Practice / 🗣	Albers, Matthiesen, Mitarbeiter
ST 2022	2146187	Workshop 'Mechanical Design IV'	1 SWS	/ 🗣	Albers, Matthiesen, Mitarbeiter
ST 2022	3146021	Mechanical Design IV Tutorials	1 SWS	Practice / 🗣	Albers, Mitarbeiter
ST 2022	3146022	Mechanical Design IV Workshop	1 SWS	/ 🗣	Albers, Mitarbeiter
Exams					
ST 2022	76-T-MACH-105285	Mechanical Design IV, tutorial			Albers, 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

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

V Mechanical Design IV Workshop

3146022, SS 2022, 1 SWS, Language: English, Open in study portal **On-Site**

Organizational issues
Registration required, information on the IPEK website.

Literature
Konstruktionselemente des Maschinenbaus - 1 und 2
Grundlagen der Berechnung und Gestaltung von Maschinenelementen;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-22033-X

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

CAD:

3D-Konstruktion mit Pro/Engineer - Wildfire, Paul Wyndorps, Europa Lehrmittel, ISBN: 978-3-8085-8948-9

Pro/Engineer Tipps und Techniken, Wolfgang Berg, Hanser Verlag, ISBN: 3-446-22711-3 (für Fortgeschrittene)

T 10.45 Course: Presentation [T-MACH-108684]

Responsible: Prof. Dr.-Ing. Martin Heilmaier
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-103722 - 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 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-108685 - Bachelor's Thesis must have been started.

Annotation
The workload for the presentation of the bachelor thesis is about 90 hours.

T 10.46 Course: Production Operations Management [T-MACH-110327]

Responsible: Prof. Dr.-Ing. Kai Furmans
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-105106 - Production Operations Management

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

Events					
WT 22/23	3118031	Production Operations Management	3 SWS	Lecture / Practice (/	Furmans, Lanza
Exams					
ST 2022	76-T-MACH-110327	Production Operations Management (MEI)			Lanza

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

Competence Certificate
written exam (duration: 90 min)

Prerequisites
T-MACH-110326 - Production Operations Management-Project must have been completed successfully.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-110326 - Production Operations Management-Project must have been passed.

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

V Production Operations Management

3118031, WS 22/23, 3 SWS, Language: English, Open in study portal

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

Content
T-MACH-110326 - Production Operations Management-Project must have been completed successfully when registering for this course.

It is a joint lecture of the Institute of Materials Handling and Logistics (IFL) and the Institute of Production Science (wbk). The institutes alternate with each cycle.

The lecture covers the basics of operations and supply chain management as well as business management basics in accounting, investment calculation and legal forms.

If you successfully passed this course you will be able to:

- state the relevant technical terms of business administration, logistics and production engineering
- describe the interrelation between these technical terms
- describe the most important decision problems qualitatively and quantitatively
- apply the appropriate decision models to solve the respective decision problems
- critically evaluate the results and draw appropriate conclusions
- extend the learned methods and models by researching on you own

Attendance time: 25 hours,

Self-study: 65 hours

Organizational issues
Räume werden vom Institut bekannt gegeben.

T 10.47 Course: Production Operations Management-Project [T-MACH-110326]

Responsible: Prof. Dr.-Ing. Kai Furmans
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-105106 - Production Operations Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	2	Grade to a third	Each winter term	1

Events					
WT 22/23	3118032	Production Operations Management-Project	1 SWS	Project (P / ⛭	Furmans, Lanza

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

Competence Certificate
Assignments during the semester consisting of solving 4 and presenting 1 case studies, whereof:

- 80% assessment of the case study as group work
- 20% evaluation of the defense of the case studies as an individual grade

Prerequisites
none

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

V Production Operations Management-Project

3118032, WS 22/23, 1 SWS, Language: English, Open in study portal

Project (PRO)
Blended (On-Site/Online)

Content
Students are divided into groups for this course. Four case studies will be carried out in these groups. The results of the group work will be presented and evaluated in writing. Prerequisite for the participation in the case study is the previous successful participation in a multiple choice test, which can be repeated online several times in a given period. The result of the group work is presented and evaluated in writing. In addition, selected groups will present and defend their results.

After successful completion of the lecture you will be able to work alone and in a team

- to **name** the treated **technical terms** in the areas of production, logistics and business administration,
- to accurately **describe** the connections between these areas in a discussion with experts,
- to describe **qualitatively** and **quantitatively** the most important decision-making problems in this field,
- to use the corresponding qualitative and quantitative decision models,
- to critically **evaluate** their results and draw conclusions from them,
- as well as to expand the methods and models discussed through **own research**.

The participation of all members of the selected groups in the oral defenses is compulsory and will be controlled. Four written submissions must be passed. For the written submission the group receives a common grade, in the defense each group member is evaluated individually. The defenses are fully included in the grade, but they do not have to be passed in order to pass the entire event. The final score of the event consists of 80% of the written submissions and 20% of the defense evaluation.

It is a joint lecture of the Institute of Materials Handling and Logistics (IFL) and the Institute of Production Science (wbk). The institutes alternate with each cycle.

Attendance time: 17 hours,

Self-study: 43 hours

Organizational issues
Räume werden vom Institut bekannt gegeben.

T 10.48 Course: Self-Booking-BSc-SPZ-Graded [T-MACH-112569]

Responsible: Prof. Dr.-Ing. Martin Heilmaier
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-103322 - International Project Management and Interdisciplinary Qualifications

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:

- Sprachenzentrum

Annotation
Interdisciplinary qualifications (IQ) completed 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 10.49 Course: Self-Booking-BSc-SPZ-Non-Graded [T-MACH-112568]

Responsible: Prof. Dr.-Ing. Martin Heilmaier
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-103322 - International Project Management and Interdisciplinary Qualifications

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:

- Sprachenzentrum

Annotation
Interdisciplinary qualifications (IQ) completed 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 10.50 Course: SmartFactory@Industry (MEI) [T-MACH-106733]

Responsible: Prof. Dr.-Ing. Gisela Lanza
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103351 - MF A: Global Production Management

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

Events					
ST 2022	3150044	SmartFactory@Industry	2 SWS	/	Lanza
Exams					
ST 2022	76-T-MACH-106733	SmartFactory@Industry (MEI)			Lanza

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

Competence Certificate
alternative test achievement (graded)

- colloquium (approx. 15 min)
- presentation (approx. 20 min)

Prerequisites
Successful completion of the following courses:

- M-MACH-102563 - Computer Science
- MACH-102573 - Mechanical Design

Modeled Conditions
The following conditions have to be fulfilled:

1. The module M-MACH-102563 - Computer Science must have been passed.
2. The module M-MACH-102573 - Mechanical Design must have been passed.

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

V SmartFactory@Industry

3150044, SS 2022, 2 SWS, Language: English, Open in study portal **Blended (On-Site/Online)**

Content
The students will get to know different real industrial tasks and problems and will learn how to address them with the methods they got to know and even beyond these.

- Drive and control technology
- Handling technology for handling work pieces and tools
- Industrial Robotics
- automatic machines, cells, centers and systems for manufacturing and assembly
- planning of automated manufacturing systems

In the second part of the lecture, the basics are illustrated using implemented manufacturing processes for the production of automotive components. The analysis of automated manufacturing systems for manufacturing of defined components is also included.

Learning Goals:

The students …

- know about different processes in industry
- can accomplish industrial tasks on their-own and in groups
- can summarize their work in a comprehensive presentation for industrial receivers

Prerequisites:

S. Modul

Successful completion of the following courses:
Mechanical Design I-IV
Computer Science

Organizational issues
For organizational reasons the number of participants for the course is limited. Hence a selection process will take place.
The course is held as block modules.

Die Veranstaltung wird partiell beim Industriepartner stattfinden. Die genauen Termine werden rechtzeitig vor Beginn der Veranstaltung über die wbk-Homepage bekannt gegeben.

T 10.51 Course: Steering of a Global Operating Company - The Robert BOSCH GmbH as an Example [T-MACH-110961]

Responsible: Dr. Rudolf Maier
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103322 - International Project Management and Interdisciplinary Qualifications

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

Events					
WT 22/23	2149663	Steering of a Global Operating Company - The Robert BOSCH GmbH as an Example	2 SWS	Seminar / 🗣	Grube

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

Competence Certificate
alternative achievement (ungraded):
- attendance on at least 12 lecture units

Prerequisites
T-MACH-106375 – The Value Stream in an Industrial Company - The Value Chain at BOSCH as an Example must not have been startet.

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

V Steering of a Global Operating Company - The Robert BOSCH GmbH as an Example

Seminar (S)
On-Site

2149663, WS 22/23, 2 SWS, Language: German, Open in study portal

Content
The seminar provides an insight into the main functional units of a company and their typical processes by using Bosch as an example. Furthermore it is based on discussions with the students. Former Bosch top managers explain the essential business processes and functions of the individual departments as well as the classic tasks of an engineer in a worldwide operating automotive supplier. The seminar also provides an insight into the careers of the Bosch directors. In addition to the company processes, the seminar will therefore focus on reports of challenges, successes, failures and product and process innovations.

The topics are as follows:

- Introduction, strategy, innovation
- R&D, product development process
- Production
- Quality management
- Market, marketing, sales
- Aftermarket, service
- Finance, controlling
- Logistics
- Purchasing, supply chain
- IT
- HR, leadership, compliance

Learning Outcomes:

The students …

- are able to deduce, understand and assess the structure of a global operating enterprise.
- are capable to identify and compare the work flows and processes within a global operating enterprise.
- are able to recognize and assess the problems within interfaces between functional and organizational units which are identified by the experts. Furthermore the students can develop solutions based on this knowledge in order to overcome these problems.

Workload:

regular attendance: 21 hours
self-study: 39 hours

Organizational issues
Start: 26.10.2022

Die Anmeldung zum Seminar erfolgt über Ilias. (https://ilias.studium.kit.edu/)
Das Passwort wird im ersten Termin bekanntgegeben.

The registration for the seminar is via Ilias. (https://ilias.studium.kit.edu/)
The password will be announced in the first appointment.

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

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

T 10.52 Course: Sustainable Leadership [T-ZAK-112560]

Organisation:

Part of: M-MACH-103322 - International Project Management and Interdisciplinary Qualifications

Type	Credits	Grading scale	Version
Completed coursework	2	pass/fail	1

Events					
WT 22/23	1130506	Sustainable Leadership	2 SWS	Seminar / 🗣	Jungmann
Exams					
WT 22/23	1200001	Sustainable Leadership			

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

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

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

V Sustainable Leadership

1130506, WS 22/23, 2 SWS, Language: English, Open in study portal

Seminar (S)
On-Site

Content
For many of us, experiences with leaders are a lasting memory. The principles of sustainable corporate and organizational leadership are not only of central importance for CEOs and other senior managers. In one form or another, we all already bear responsibility for others and can benefit accordingly from the concepts and concrete techniques of "Sustainable Leadership". Therefore, this workshop introduces the theory and practice of sustainable leadership and enables participants to learn concrete techniques in the areas of personal sustainability, interpersonal sustainability and sustainable management as well as to develop their own implementation strategies. Previous experience regarding management techniques or sustainable development is not required, but active participation is expected throughout the entire seminar. The seminar is designed in an interactive manner to engage students at all times and to facilitate joint learning experiences.

2-3 LP

Organizational issues
Registration required via:

T 10.53 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-102574 - Technical Thermodynamics

Type	Credits	Grading scale	Recurrence	Version
Written examination	8	Grade to a third	Each winter term	2

Events					
WT 22/23	2165501	Technical Thermodynamics and Heat Transfer I	4 SWS	Lecture / 🗣	Maas
WT 22/23	3165014	Technical Thermodynamics and Heat Transfer I	4 SWS	Lecture / 🗣	Schießl, Maas
Exams					
ST 2022	76-T-MACH-104747	Technical Thermodynamics and Heat Transfer I			Maas, Schießl
ST 2022	76-T-MACH-104747-englisch	Technical Thermodynamics and Heat Transfer I			Maas, Schießl
WT 22/23	76-T-MACH-104747	Technical Thermodynamics and Heat Transfer I			Maas, Schießl
WT 22/23	76-T-MACH-104747-english	Technical Thermodynamics and Heat Transfer I			Maas, Schießl

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

Competence Certificate
Prerequisite: attestation each semester by homework assignments

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 22/23, 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

Organizational issues
Die Vorlesung findet bis Ende November online statt.

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 22/23, 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 10.54 Course: Technical Thermodynamics and Heat Transfer II [T-MACH-105287]

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

Part of: M-MACH-102574 - Technical Thermodynamics

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

Events					
ST 2022	2166526	Technical Thermodynamics and Heat Transfer II	3 SWS	Lecture /	Maas
ST 2022	3166526	Technical Thermodynamics and Heat Transfer II	3 SWS	Lecture /	Schießl
Exams					
ST 2022	76-T-MACH-105287	Technical Thermodynamics and Heat Transfer II			Maas, Schießl
ST 2022	76-T-MACH-105287-englisch	Technical Thermodynamics and Heat Transfer II			Maas, Schießl
WT 22/23	76-T-MACH-105287	Technical Thermodynamics and Heat Transfer II			Maas, Schießl
WT 22/23	76-T-MACH-105287-english	Technical Thermodynamics and Heat Transfer II			Maas, Schießl

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

Competence Certificate
Prerequisite: attestation each semester by homework assignments

Written exam, approx. 3 hours

Prerequisites
Successful participation in the tutorial (T-MACH-105288 - Exercises in Technical Thermodynamics and Heat Transfer II)

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-105288 - Excercises in Technical Thermodynamics and Heat Transfer II must have been passed.

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

V Technical Thermodynamics and Heat Transfer II

2166526, SS 2022, 3 SWS, Language: German, Open in study portal

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

Content

- Repetition of the topics of "Thermodynamics and Heat Transfer I"
- Behavior of mixtures
- Moist air
- Kinetic theory of gases
- Behavior of real substances described by equations of state
- Chemical reactions and applications of the laws of thermodynamics to chemical reactions
- Reaction kinetics
- Heat Transfer

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 II

3166526, SS 2022, 3 SWS, Language: English, Open in study portal

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

Content

- Repetition of the topics of "Thermodynamics and Heat Transfer I"
- Behavior of mixtures
- Moist air
- Kinetic theory of gases
- Behavior of real substances described by equations of state
- Chemical reactions and applications of the laws of thermodynamics to chemical reactions
- Reaction kinetics
- Heat Transfer

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 10.55 Course: Tutorial Engineering Mechanics I [T-MACH-100528]

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

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102572 - Engineering Mechanics

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	0	pass/fail	Each winter term	2

Events					
WT 22/23	2161246	Tutorial Engineering Mechanics I	2 SWS	Practice /	Dyck, Sterr, Böhlke
WT 22/23	3161011	Engineering Mechanics I (Tutorial)	2 SWS	Practice /	Kehrer, Görthofer, Langhoff

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

Competence Certificate
Attestations have to be achieved in the following four categories: mandatory written homework problems, written homework problems, computational homework problems, colloquia.

This course is passed if all mandatory written homework problems are passed and if in the other three categories (written homework problems, computational homework problems, colloquia) in total at most three attestations have been finally not passed, at most one in each of the three categories.

Succesful participation in this course allows for registration to the Exam "Engineering Mechanics I" (see T-MACH-100282)

Prerequisites
None

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

V Tutorial Engineering Mechanics I

2161246, WS 22/23, 2 SWS, Language: German, Open in study portal

Practice (Ü)
Blended (On-Site/Online)

Content
Please refer to the lecture Engineering Mechanics I.

Literature
Siehe Vorlesung Technische Mechanik I

T 10.56 Course: Tutorial Engineering Mechanics II [T-MACH-100284]

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

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102572 - Engineering Mechanics

Type	Credits	Grading scale	Recurrence	Version
Completed coursework (written)	0	pass/fail	Each summer term	2

Events					
ST 2022	2162251	Tutorial Engineering Mechanics II	2 SWS	Practice /	Dyck, Sterr, Böhlke
ST 2022	3162011	Engineering Mechanics II (Tutorial)	2 SWS	Practice /	Kehrer, Görthofer, Langhoff
Exams					
ST 2022	76-T-MACH-100284	Tutorial Engineering Mechanics II			Böhlke, Langhoff
ST 2022	76-T-MACH-100284-englisch	Tutorial Engineering Mechanics II			Böhlke, Langhoff

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

Competence Certificate
Attestations have to be achieved in the following four categories: mandatory written homework problems, written homework problems, computational homework problems, colloquia.

This course is passed if all mandatory written homework problems are passed and if in the other three categories (written homework problems, computational homework problems, colloquia) in total at most two attestations have been finally not passed, at most one in each of the three categories.

Succesful participation in this course allows for registration to the Exam "Engineering Mechanics II" (see T-MACH-100283)

Prerequisites
None

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

V Tutorial Engineering Mechanics II

2162251, SS 2022, 2 SWS, Language: German, Open in study portal

Practice (Ü)
Blended (On-Site/Online)

Content
see lecture Engineering Mechanics II

Literature
Siehe Vorlesung Technische Mechanik II

V Engineering Mechanics II (Tutorial)

3162011, SS 2022, 2 SWS, Language: English, Open in study portal

Practice (Ü)
Blended (On-Site/Online)

Content
see lecture "Engineering Mechanics II"

Literature
see lecture "Engineering Mechanics II"

T 10.57 Course: Tutorial Engineering Mechanics III [T-MACH-105202]

Responsible: Prof. Dr.-Ing. Wolfgang Seemann
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102572 - Engineering Mechanics

Type	Credits	Grading scale	Recurrence	Version
Completed coursework (written)	0	pass/fail	Each winter term	2

Events					
WT 22/23	2161204	Engineering Mechanics III (Tutorial)	2 SWS	Practice / 🗣	Fidlin, Altoé
WT 22/23	3161013	Engineering Mechanics III (Tutorial)	2 SWS	Practice / 🗣	Römer, Altoé

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

Competence Certificate
Attestations, succesful accomplishment of exercise sheets

Prerequisites
None

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

V Engineering Mechanics III (Tutorial)

2161204, WS 22/23, 2 SWS, Language: German, Open in study portal

Practice (Ü)
On-Site

Content
In the Tutorial excercises for the corresponding subjects of the lecture are presented. During the tutorial part of the tutorial excercises are presented and instructions for those excercises are given which have to be done as homework.

The homework is mandatory and is corrected by the tutors. A successful elaboration of the homework is necessary to take part in the final exam.

Literature
Hibbeler: Technische Mechanik 3, Dynamik, München, 2006

Gross, Hauger, Schnell: Technische Mechanik Bd. 3, Heidelberg, 1983

Lehmann: Elemente der Mechanik III, Kinetik, Braunschweig, 1975

Göldner, Holzweissig: Leitfaden der Technischen Mechanik.

Hagedorn: Technische Mechanik III.

V Engineering Mechanics III (Tutorial)

3161013, WS 22/23, 2 SWS, Language: English, Open in study portal

Practice (Ü)
On-Site

Content
Exercises related to the lecture

T 10.58 Course: Tutorial Engineering Mechanics IV [T-MACH-105203]

Responsible: Prof. Dr.-Ing. Wolfgang Seemann
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102572 - Engineering Mechanics

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

Events					
ST 2022	2162232	Engineering Mechanics IV (Tutorial)	2 SWS	Practice /	Proppe, Keller
ST 2022	3162013	Engineering Mechanics 4 (Tutorial)	2 SWS	Practice /	Proppe, Keller
Exams					
ST 2022	76-T-MACH-105203	Tutorial Engineering Mechanics IV			Seemann

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

Competence Certificate
Attestations, succesful accomplishment of exercise sheets

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

V Engineering Mechanics IV (Tutorial)

2162232, SS 2022, 2 SWS, Language: German, Open in study portal

Practice (Ü)
Blended (On-Site/Online)

Content
In the Tutorial excercises for the corresponding subjects of the lecture are presented. During the tutorial part of the excercises are presented and instructions are given for those excercises which have to be done as homework.

The homework is mandatory and is corrected by the tutors. A successful elaboration of the homework is necessary to take part in the final exam.

Literature
Hibbeler: Technische Mechanik 3, Dynamik, München, 2006
Marguerre: Technische Mechanik III, Heidelberger Taschenbücher, 1968
Magnus: Kreisel, Theorie und Anwendung, Springer-Verlag, Berlin,
1971 Klotter: Technische Schwingungslehre, 1. Bd. Teil A, Heidelberg

T 10.59 Course: Urban transformations: exploring the circles of sustainability [T-ZAK-112566]

Organisation:

Part of: M-MACH-103322 - International Project Management and Interdisciplinary Qualifications

Type	Credits	Grading scale	Version
Completed coursework	2	pass/fail	1

Events					
WT 22/23	1130427	Urban transformations: Exploring the Circles of Sustainability	2 SWS	Seminar /	Tamm
Exams					
WT 22/23	1200008	Urban transformations: exploring the circles of sustainability			

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

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

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

V Urban transformations: Exploring the Circles of Sustainability

1130427, WS 22/23, 2 SWS, Open in study portal

Seminar (S)
Online

Content
It is clear that urban development has a major role in the success or failure of sustainable development. However, it is less clear which processes influence sustainable urban development exactly and how they do it.

In this course we will take a multi-level perspective on sustainability transformations and explore the ecological, economic, cultural, social and political dimensions of urban development using case studies and the circles of sustainability approach to identify crucial points for success or failure.

Organizational issues
Registration required via:

T 10.60 Course: Vehicle Comfort and Acoustics I [T-MACH-105154]

Responsible: Prof. Dr. Frank Gauterin
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103349 - MF C: Automotive Engineering

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

Events					
ST 2022	2114856	Vehicle Ride Comfort & Acoustics I	2 SWS	Lecture /	Gauterin
WT 22/23	2113806	Vehicle Comfort and Acoustics I	2 SWS	Lecture /	Gauterin
Exams					
ST 2022	76-T-MACH-105154	Vehicle Comfort and Acoustics I			Gauterin
ST 2022	76T-MACH-105154_Wiederholer_2	Vehicle Comfort and Acoustics I			Gauterin
ST 2022	76T-MACH-105154_Wiederholung	Vehicle Comfort and Acoustics I			Gauterin

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

Competence Certificate
Oral Examination

Duration: approx. 30 to 40 minutes

Auxiliary means: none

Prerequisites
Can not be combined with lecture T-MACH-102206

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

V Vehicle Ride Comfort & Acoustics I

2114856, SS 2022, 2 SWS, Language: English, Open in study portal

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

Content
1. Perception of noise and vibrations

3. Fundamentals of acoustics and vibrations

3. Tools and methods for measurement, computing, simulation and analysis of noise and vibrations

4. The relevance of tire and chasis for the acoustic and mechanical driving comfort:
phenomena, influencing parameters, types of construction, optimization of components and systems, conflict of goals, methods of development

An excursion will give insights in the development practice of a car manufacturer or a system supplier.

Learning Objectives:

The students know what noises and vibrations mean, how they are generated, and how they are perceived by human beings. They have knowledge about the requirements given by users and the public. They know which components of the vehicle are participating in which way on noise and vibration phenomenon and how they could be improved. They are ready to apply different tools and methods to analyze relations and to judge them. They are able to develop the chasis regarding driving comfort and acoustic under consideration of goal conflicts.

Organizational issues
Kann nicht mit der Veranstaltung [2113806] kombiniert werden.

Can not be combined with lecture [2113806]

Genaue Termine entnehmen Sie bitte der Institushomepage.

Scheduled dates:

see homepage of the institute.

Classroom attendence depends on the development of the pandemic situation.

Literature
1. Michael Möser, Technische Akustik, Springer, Berlin, 2005

2. Russel C. Hibbeler, Technische Mechanik 3, Dynamik, Pearson Studium, München, 2006

3. Manfred Mitschke, Dynamik der Kraftfahrzeuge, Band B: Schwingungen, Springer, Berlin, 1997

Das Skript wird zu jeder Vorlesung zur Verfügung gestellt

V

Vehicle Comfort and Acoustics I

2113806, WS 22/23, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
1. Perception of noise and vibrations
3. Fundamentals of acoustics and vibrations
3. Tools and methods for measurement, computing, simulation and analysis of noise and vibrations
4. The relevance of tire and chasis for the acoustic and mechanical driving comfort:
phenomena, influencing parameters, types of construction, optimization of components and systems, conflict of goals, methods of development

An excursion will give insights in the development practice of a car manufacturer or a system supplier.

Learning Objectives:

The students know what noises and vibrations mean, how they are generated, and how they are perceived by human beings. They have knowledge about the requirements given by users and the public. They know which components of the vehicle are participating in which way on noise and vibration phenomenon and how they could be improved. They are ready to apply different tools and methods to analyze relations and to judge them. They are able to develop the chasis regarding driving comfort and acoustic under consideration of goal conflicts.

Organizational issues
Kann nicht mit der Veranstaltung [2114856] kombiniert werden.

Can not be combined with lecture [2114856]

Literature
1. Michael Möser, Technische Akustik, Springer, Berlin, 2005

2. Russel C. Hibbeler, Technische Mechanik 3, Dynamik, Pearson Studium, München, 2006

3. Manfred Mitschke, Dynamik der Kraftfahrzeuge, Band B: Schwingungen, Springer, Berlin, 1997

Das Skript wird zu jeder Vorlesung zur Verfügung gestellt

T 10.61 Course: Vehicle Comfort and Acoustics II [T-MACH-105155]

Responsible: Prof. Dr. Frank Gauterin
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103349 - MF C: Automotive Engineering

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

Events					
ST 2022	2114825	Vehicle Comfort and Acoustics II	2 SWS	Lecture /	Gauterin
ST 2022	2114857	Vehicle Ride Comfort & Acoustics II	2 SWS	Lecture /	Gauterin
Exams					
ST 2022	76-T-MACH-105155	Vehicle Comfort and Acoustics II			Gauterin
ST 2022	76-T-MACH-105155_Wiederholung	Vehicle Comfort and Acoustics II			Gauterin

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

Competence Certificate
Oral Examination

Duration: approx. 30 to 40 minutes

Auxiliary means: none

Prerequisites
Can not be combined with lecture T-MACH-102205

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

V Vehicle Comfort and Acoustics II

2114825, SS 2022, 2 SWS, Language: German, Open in study portal

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

Content
1. Summary of the fundamentals of acoustics and vibrations

2. The relevance of road surface, wheel imperfections, springs, dampers, brakes, bearings and bushings, suspensions, engines and drive train for the acoustic and mechanical driving comfort:
- phenomena
- influencing parameters
- types of construction
- optimization of components and systems
- conflicts of goals
- methods of development

3. Noise emission of motor vehicles
- noise stress
- sound sources and influencing parameters
- legal restraints
- optimization of components and systems
- conflict of goals
- methods of development

Learning Objectives:

The students have knowledge about the noise and vibration properties of the chassis components and the drive train. They know what kind of noise and vibration phenomena do exist, what are the generation mechanisms behind, which components of the vehicle participate in which way and how could they be improved. They have knowledge in the subject area of noise emission of automobiles: Noise impact, legal requirements, sources and influencing parameters, component and system optimization, target conflicts and development methods. They are ready to analyze, to judge and to optimize the vehicle with its single components regarding acoustic and vibration phenomena. They are also able to contribute competently to the development of a vehicle regarding the noise emission.

Organizational issues
Kann nicht mit der Veranstaltung [2114857] kombiniert werden.

Can not be combined with lecture [2114857]

Je nach Pandemie Lage wird evtl. kurzfristig auf "Online Veranstaltung" geändert.

Literature
Das Skript wird zu jeder Vorlesung zur Verfügung gestellt.

V Vehicle Ride Comfort & Acoustics II

2114857, SS 2022, 2 SWS, Language: English, Open in study portal

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

Content
1. Summary of the fundamentals of acoustics and vibrations

2. The relevance of road surface, wheel imperfections, springs, dampers, brakes, bearings and bushings, suspensions, engines and drive train for the acoustic and mechanical driving comfort:
- phenomena
- influencing parameters
- types of construction
- optimization of components and systems
- conflicts of goals
- methods of development

3. Noise emission of motor vehicles
- noise stress
- sound sources and influencing parameters
- legal restraints
- optimization of components and systems
- conflict of goals
- methods of development

Learning Objectives:

The students have knowledge about the noise and vibration properties of the chassis components and the drive train. They know what kind of noise and vibration phenomena do exist, what are the generation mechanisms behind, which components of the vehicle participate in which way and how could they be improved. They have knowledge in the subject area of noise emission of automobiles: Noise impact, legal requirements, sources and influencing parameters, component and system optimization, target conflicts and development methods. They are ready to analyze, to judge and to optimize the vehicle with its single components regarding acoustic and vibration phenomena. They are also able to contribute competently to the development of a vehicle regarding the noise emission.

Organizational issues
Genaue Termine entnehmen Sie bitte der Institushomepage.

Kann nicht mit der Veranstaltung [2114825] kombiniert werden.

Scheduled dates:

see homepage of the institute.

Can not be combined with lecture [2114825].

Classroom attendence depends on the development of the pandemic situation

Literature
Das Skript wird zu jeder Vorlesung zur Verfügung gestellt.

The script will be supplied in the lectures.

T 10.62 Course: Virtual Engineering (Specific Topics) [T-MACH-105381]

Responsible: Prof. Dr.-Ing. Jivka Ovtcharova
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103351 - MF A: Global Production Management

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

Events					
ST 2022	3122031	Virtual Engineering (Specific Topics)	2 SWS	Lecture /	Ovtcharova, Maier
Exams					
ST 2022	76-T-MACH-105381	Virtual Engineering (Specific Topics)			Ovtcharova

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

Competence Certificate
oral exam, approx. 20 min.

Prerequisites
none

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

V Virtual Engineering (Specific Topics)

3122031, SS 2022, 2 SWS, Language: English, Open in study portal

Lecture (V)
Online

Content
Students can

- explain the basics of virtual engineering and name exemplary modeling tools and assign them to the corresponding methods and processes
- Formulate validation questions in the product development process and name obvious solution methods
- explain the basics of systems engineering and establish the connection to the product development process
- explain individual methods of the digital factory and present the functions of the digital factory in the context of the product creation process
  explain the theoretical and technical basics of Virtual Reality technology and show the connection to Virtual Engineering

Organizational issues
Vorlesungszeiten siehe ILIAS / Lecture times see ILIAS

Literature
Lecture slides / Vorlesungsfolien

T 10.63 Course: Wave and Quantum Physics [T-PHYS-108322]

Responsible: apl. Prof. Dr. Gernot Goll
apl. Prof. Dr. Bernd Pilawa
Organisation: KIT Department of Physics
Part of: M-PHYS-104030 - Physics

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

Events					
ST 2022	4040411	Wellen und Quantenphysik	2 SWS	Lecture / 🗣	Pilawa
ST 2022	4040412	Übungen zu Wellen und Quantenphysik	1 SWS	Practice / 🗣	Pilawa, Bieling
ST 2022	4040431	Wave and Quantum Physics	2 SWS	Lecture / 🗣	Goll
ST 2022	4040432	Exercises to Wave and Quantum Physics	1 SWS	Practice / 🗣	Goll, Palkhivala
Exams					
ST 2022	7800123	Wellen und Quantenphysik (Exam in German)			Pilawa
ST 2022	7800124	Wave and Quantum Physics (Exam in English)			Goll

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

Competence Certificate
Written exam (usually about 180 min)

Prerequisites
none

T 10.64 Course: Working Methods in Mechanical Engineering [T-MACH-105296]

Responsible: Prof. Dr.-Ing. Barbara Deml
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-103322 - International Project Management and Interdisciplinary Qualifications

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	4	pass/fail	Each summer term	1

Events					
ST 2022	2110969	Working Methods in Mechanical Engineering	1 SWS	Course (/ ⛐	Deml
ST 2022	2142975	Workshop 'Working Methods in Mechanical Engineering' (IMT)	1 SWS	Others (sons / ⛐	Worgull
ST 2022	2174970	Working Methods in Mechanical Engineering	1 SWS	Course (/ ⛐	Deml
Exams					
ST 2022	76-T-MACH-105296	Working Techniques for Mechanical Engineering			Deml
ST 2022	76-T-MACH-105296-englisch	Working Methods in Mechanical Engineering			Deml

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

Competence Certificate
e-larning module certificates, group exercises, submission of a scientific thesis of at least 30 pages and submisson and execution of a maximal 30 minutes scientific presentation.

Prerequisites
none

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

V Working Methods in Mechanical Engineering

2110969, SS 2022, 1 SWS, Language: English, Open in study portal

Course (Ku)
Blended (On-Site/Online)

Organizational issues
The course addresses students in the Bachelor program Mechanical Engineering in the **fourth** semester. Students in the Bachelor program Mechanical Engineering in the second semester, as well as students in the Master program Mechanical Engineering or other programs, may participate in case of vacancies. The lecture consists of an e-learning course, combined with an online exam and accompanying self-study over the entire lecture period.

V Workshop 'Working Methods in Mechanical Engineering' (IMT)

2142975, SS 2022, 1 SWS, Language: German, Open in study portal

Others (sonst.)
Blended (On-Site/Online)

Content
Within the frame of a scientific conference the contents from the corresponding lesson will be implemented in a practical way.

The students have to organise a scientific conference by themself. The contributions have to prepared by the students and will be presented within the frame of abstracts, conference articles, posters, and presentations.

1. part of the workshop - Organisation of a conference

- Structure of a conference
- Generation of workgroups - Committees
- Exchange of Informations between workgroups
- Decision-making based on the information available
- Decision-making based under limitation of time
- Gerartion of technical progam, budget, flyer etc. of the conference
- Definition of critera for abstracts - communication of criteria

2. partl of the workshop - Investigation and writing of abstracts

- Investigation in Literatur / Patent Database
- Citation of scientific literature
- Writing of abstracts
- Evaluation of abstracts

3. part of the workshop - Writing of scientific conference contributions

- Structure of a scientific article
- Rules for scientific writing - style
- Citation - Sources and their citation
- Design of scientifi posters
- Design of a scientific presentation

4. part of the workshop - Moderation and presentation

- Presentation of the results of the workshop - oral presentations
- Presentation of posters
- Moderation of the confernce

Organizational issues
Ort/Termin s. Institutshomepage

Für Studierende des Bachelorstudiengangs Maschinenbau. Informationen und zentrale Anmeldung unter www.mach.kit.edu/atm. Anmeldeschluss: siehe ATM-Vorlesung (2174970)

Literature
Übungsskript - Wichtige Punkte über wissenschaftliches Schreiben, Zitieren, Postergestaltung, Moderation und Präsentation werden zusammengefasst und bilden einen kleinen Leitfaden für den Workshop