



上海—汉堡国际工程学院  
Shanghai-Hamburg College



# Modulhandbuch

## STUDIENGANG

B. Eng. Elektrotechnik (Automatisierungstechnik)  
mit 'Goethe-Zertifikat B2'



### **Kooperativer Studiengang**

der University of Shanghai for Science and  
Technology (USST) und der HAW Hamburg  
am Shanghai-Hamburg College (SHC)

genehmigt vom Fakultätsrat TI am 23. Januar 2020

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## VORBEMERKUNG

Die Modulbeschreibungen sind bis auf wenige Ausnahmen in Englisch erstellt worden, da in den ingenieurwissenschaftlichen Modulen die Kommunikation zwischen den deutschen und chinesischen Lehrkräften mehrheitlich in englischer Sprache erfolgt.

Die Studierenden besitzen zu Beginn des Studiums englische Schulkenntnisse, in der Regel jedoch keine Deutschkenntnisse.

### Prüfungsformen

Prüfungs- und Studien- beziehungsweise Prüfungsvorleistungen werden durch folgende Prüfungsarten erbracht:

a) Klausur (K) (kontrollierte Form der Leistung)

Eine Klausurarbeit ist eine unter Aufsicht anzufertigende Arbeit, in der die Studierenden ohne Hilfsmittel oder unter Benutzung der zugelassenen Hilfsmittel die gestellten Aufgaben allein und selbstständig bearbeiten. Klausuren nach dem Multiple-Choice-Verfahren sind ausgeschlossen.

Die Dauer einer Klausurarbeit beträgt mindestens 90, höchstens 180 Minuten.

b) Mündliche Prüfung (mPr) (kontrollierte Form der Leistung)

Eine mündliche Prüfung ist ein Prüfungsgespräch, in dem die Studierenden darlegen müssen, dass sie den Prüfungsstoff beherrschen.

Die Dauer einer mündlichen Prüfung beträgt mindestens 15, höchstens 45 Minuten.

c) Hausarbeit (H)

Eine Hausarbeit ist eine schriftliche Bearbeitung einer gestellten Aufgabe, die den Stoff der betreffenden Lehrveranstaltung erweitert oder vertieft. Die Bearbeitungszeit beträgt höchstens sechs Wochen.

d) Referat (Ref)

Ein Referat besteht aus einem schriftlichen und einem mündlichen Teil. Im schriftlichen Teil sind die wichtigsten Ergebnisse zusammenzufassen, im mündlichen Teil sind sie auf der Grundlage des schriftlichen Teils frei vorzutragen und in einer anschließenden Diskussion zu vertreten. Der mündliche Vortrag dauert mindestens 15, höchstens 45 Minuten.

e) Laborabschluss (L)

Ein Laborabschluss ist erfolgreich erbracht, wenn die Studierenden die vom Prüfer festgelegten experimentellen Arbeiten erfolgreich durchgeführt haben und ihre Kenntnisse durch versuchsbegleitende Kolloquien und/ oder anhand von Versuchsprotokollen und/ oder durch schriftliche Aufgabenlösungen nachgewiesen haben. Die schriftlichen Ausarbeitungen (Versuchsprotokolle, Aufgabenlösungen) sind innerhalb einer vom Prüfer festgesetzten Frist abzugeben. Diese Frist endet spätestens mit Ablauf des jeweiligen Semesters, in dem die zugeordnete Lehrveranstaltungsart (Laborpraktikum) durchgeführt wird.

f) Laborprüfung (Lp) (kontrollierte Form der Leistung)

Eine Laborprüfung besteht aus einem Laborabschluss und am Ende der Lehrveranstaltung aus einer abschließenden Überprüfung der Leistung. Bei dieser Überprüfung sollen die Studierenden eine experimentelle Aufgabe allein und selbstständig lösen. Die Dauer der Überprüfung beträgt mindestens 90, höchstens 240 Minuten.

g) Sprachprüfung (Sp) (kontrollierte Form der Leistung)

Die Sprachprüfungen werden als externe Prüfungen durch das Goethe Institut (Goethe-Zertifikat B1 und Goethe-Zertifikat B2) nach deren Durchführungsbestimmungen abgenommen.

h) Zwischenprüfung (Zp) (kontrollierte Form der Leistung)

Die Zwischenprüfung ist eine Sprachprüfung (Sp), mit der der erste Studienabschnitt (Erwerb grundlegender Sprachkenntnisse) abgeschlossen wird.

i) Test (kontrollierte Form der Leistung)

Ein Test ist eine unter Aufsicht anzufertigende Arbeit in Form einer Klausur, in der die Studierenden ohne Hilfsmittel oder unter Benutzung der zugelassenen Hilfsmittel die gestellten Aufgaben allein und selbstständig bearbeiten. Tests nach dem Multiple-Choice-Verfahren sind ausgeschlossen.

Die Dauer eines Tests beträgt mindestens 15, höchstens 90 Minuten.

### **Types of examination**

The following types of examination are used to provide preliminary examination and study work:

a) written examination (K) (controlled form of performance)

A written examination is a work to be carried out under supervision in which the students work alone and independently on the tasks set without any aids or using the aids admitted. Exams based on the multiple-choice procedure are excluded.

The duration of a written examination is a minimum of 90 minutes and a maximum of 180 minutes.

b) Oral examination (mPr) (controlled form of performance)

An oral examination is an oral examination in which students must demonstrate that they have mastered the subject matter of the examination.

The duration of an oral examination is a minimum of 15 minutes and a maximum of 45 minutes.

c) Homework (H)

A term paper is a written work on a given task, which extends or deepens the material of the course in question. The maximum processing time is six weeks.

d) Presentation (Presentation)

A presentation consists of a written and an oral part. In the written part the most important results are to be summarised, in the oral part they are to be freely presented on the basis of the written part and to be represented in a subsequent discussion. The oral presentation lasts a minimum of 15 minutes and a maximum of 45 minutes.

e) Laboratory degree (L)

A laboratory degree is successfully obtained if the students have successfully carried out the experimental work specified by the examiner and have demonstrated their knowledge by means of colloquia accompanying the experiments and/or test protocols and/or written task solutions. The written papers (test protocols, task solutions) must be submitted within a period specified by the examiner. This period ends at the latest at the end of the respective semester in which the assigned course type (laboratory internship) is carried out.

f) Laboratory test (Lp) (controlled form of performance)

A laboratory examination consists of a laboratory degree and at the end of the course a final performance review. During this examination the students should solve an experimental task independently and on their own. The duration of the examination is a minimum of 90 and a maximum of 240 minutes.

g) Language examination (Sp) (controlled form of performance)

The language exams are taken as external exams by the Goethe Institute (Goethe-Zertifikat B1 and Goethe-Zertifikat B2) according to its implementing regulations.

h) Intermediate examination (Zp) (controlled form of performance)

The intermediate examination is a language examination (Sp), which completes the first stage of studies (acquisition of basic language skills).

i) Test (controlled form of achievement)

A test is a work to be carried out under supervision in the form of an examination in which the students work alone and independently on the tasks set without any aids or using the aids admitted. Multiple-choice tests are excluded.

The minimum duration of a test is 15 minutes and the maximum 90 minutes.

# SPRACHAUSBILDUNG



## DEUTSCH I

Name of module	<b>Deutsch I German I</b>	Number	E1
Courses	Seminaristischer Unterricht: Deutsch I D1 Übung: Deutsch ÜD1	Semester/ duration	1
Workload	Seminaristischer Unterricht: 340 Std, Selbst- studium 170 Std Übung: 60 Std, Selbststudium 30 Std	Credits	17 CP + 3 CP
Module responsi- bility	Mike Bernd	Attendance hours	340h + 60h
Lecturers	Liu Beibei, Wang Ye, Zheng Yu, Zhuang Li zu- sammen mit muttersprachlichen Dozenten	Language	Deutsch und Chinesisch
Prerequisites	-	Offered	Every academic year
Type of module	Pflichtmodul		
Learning outcomes	<p>Elementare Sprachverwendung auf dem Niveau von A1/A2 (gemäß Stufen des gemeinsamen europäischen Referenzrahmens):</p> <p>Seminaristischer Unterricht</p> <ul style="list-style-type: none"> <li>- Anwendung und Verstehen von einfachen Sätzen, die in der Alltagskom- munikation notwendig sind</li> <li>- Beherrschung von Redemitteln zum Austausch von Informationen (eigene Person und Umgebung)</li> <li>- Erfassen der Hauptunterschiede zwischen Eigen- und Fremdkultur</li> </ul> <p>Übung</p> <ul style="list-style-type: none"> <li>- Festigung des erlernten Stoffes</li> </ul>		
Learning content	<p>Seminaristischer Unterricht</p> <ul style="list-style-type: none"> <li>- Phonetische und intonatorische Regeln der deutschen Standardlautung</li> <li>- Vermittlung eines Grundwortschatzes von 2000 Wörtern</li> <li>- Vermittlung der Grundstruktur der deutschen Sprache</li> <li>- Lesen und Erfassen von kurzen literarischen und feuilletonistischen sowie Sachtexten</li> <li>- Lesen und Beherrschung von Dialogen</li> <li>- Hörverstehen: Abspielen von langsamen Gesprächen Grundlegende Kenntnisse der deutschen Landeskunde und Kultur</li> <li>- Schreiben von kurzen Briefen und Aufsätzen</li> </ul> <p>Übung</p> <ul style="list-style-type: none"> <li>- Studierende können durch verschiedene Lernstationen (Grammatik, Hör- verstehen und Partnerübungen ) und Arbeitsblätter ihre Wissenslücken füllen und den erlernten Stoff wiederholen</li> <li>- Anschließende Besprechung, Erklärungen und Klären von Fragen</li> </ul>		
Type of Media	Seminaristischer Unterricht: Beamer, PC		

Type of Assessment	Seminaristischer Unterricht: Benotete Klausur und benotete mündliche Prüfung (PL) Übung ÜD1: erfolgreiche Bearbeitung aller Aufgaben
Literature	<ul style="list-style-type: none"> <li>- Studio d A1 – Deutsch als Fremdsprache Professor Dr. Hermann Funk, Dr. Oliver Bayerlein, Dr. Silke Demme, Dr. Christina Kuhn, Cornelsen Verlag &amp; Shanghai Foreign Language Press, 2005</li> <li>- Passwort Deutsch, Klett Verlag &amp; Foreign Language Leaching And Research Press, 2002</li> <li>- Stichwort Deutsch, Wang, Liming u.a., Verlag der Tongji-Universität, 2002</li> <li>- Wechselspiel Neu, Michael Dreke &amp; Wolfgang Lind</li> <li>- Langenscheidt Verlag, 2013, Hören &amp; Sprechen A1</li> <li>- Monja Knirsch, Hueber Verlag, 2010</li> </ul>

## DEUTSCH II

Name of module	<b>Deutsch II German II</b>	Number	E6
Courses	Seminaristischer Unterricht: Deutsch D2 Übung: Deutsch ÜD2	Semester/ duration	2
Workload	Seminaristischer Unterricht: 340 Std, Selbststudium 170 Std Übung: 60 Std, Selbststudium 30 Std	Credits	17 CP + 3 CP
Module responsibility	Mike Bernd	Attendance hours	340h + 60h
Lecturers	Liu Beibei, Wang Ye, Zheng Yu, Zhuang Li zusammen mit muttersprachlichen Dozenten	Language	Deutsch und Chinesisch
Prerequisites	Empfohlen: Teilnahme an Deutsch I	Offered	Every academic year
Learning outcomes	Selbständige Sprachverwendung auf dem Niveau von B1  Seminaristischer Unterricht <ul style="list-style-type: none"> <li>- Grundkenntnisse der deutschen Umgangssprache</li> <li>- Beherrschung von Redemittel, die notwendig sind, um Alltagssituationen sprachlich sicher meistern zu können</li> <li>- Sprachlich sicherer Ausdruck bezüglich Erfahrungen und Gefühlen</li> <li>- Interkulturelle Kompetenz</li> </ul> Übung <ul style="list-style-type: none"> <li>- Erfolgreiche Vorbereitung auf das „Zertifikat Deutsch B1“ des Goethe Instituts</li> </ul>		
Learning content	Seminaristischer Unterricht <ul style="list-style-type: none"> <li>- Grundwortschatz von 1500 Wörtern</li> <li>- Hörverstehen</li> <li>- Lesen und Erfassen von längeren literarischen und feuilletonistischen sowie Sachtexten</li> <li>- Mündl. Grundkompetenz: Meinungsäußerung, Beherrschung Diskussions- und Gesprächsredemittel</li> <li>- Beschreibung von Statistiken und Grafiken</li> <li>- Hörverstehen: Interviews, Gespräche und Ansagen in langsamer bis normaler Sprachgeschwindigkeit</li> <li>- Schreiben von Briefen und kurzen Texten</li> <li>- Basiswissen Landeskunde (polit. u. soz. System deutschsprachiger Länder)</li> </ul> Übung <ul style="list-style-type: none"> <li>- Studierende werden durch verschiedene Lernstationen (Grammatik, Hörverstehen und Partnerübungen ) und Arbeitsblätter gezielt auf das Zertifikat Deutsch vorbereitet</li> <li>- Anschließende Besprechung, Erklärungen und Klären von Fragen</li> <li>- Prüfungssimulation</li> </ul>		
Type of Media	Seminaristischer Unterricht: Beamer, PC		

Type of Assessment	Seminaristischer Unterricht: Benotete Klausur und benotete mündliche Prüfung (PL) Übung ÜD2: erfolgreiche Bearbeitung aller Aufgaben
Literature	<ul style="list-style-type: none"> <li>- Studio d A2 – Deutsch als Fremdsprache, Professor Dr. Hermann Funk, Dr. Silke Demme, Dr. Christina Kuhn u.a., Cornelsen Verlag &amp; Shanghai Foreign Language Press, 2006</li> <li>- Studio d B1 – Deutsch als Fremdsprache, Professor Dr. Hermann Funk, Dr. Oliver Bayerlein, Dr. Silke Demme, Dr. Christina Kuhn, Cornelsen Verlag &amp; Shanghai Foreign Language Press, 2005</li> <li>- Passwort Deutsch, Klett und Foreign Language Leaching And Research Press, 2002</li> <li>- Stichwort Deutsch, Wang, Liming u.a., Verlag der Tongji-Universität, 2002</li> <li>- So geht's noch besser zum Goethe-/ÖSD-Zertifikat B1, Claudia Ignatiadou-Schein, David Kapetanidis &amp; Karin Vavatzanidis, Klett Verlag, 2013</li> <li>- Mit Erfolg zum Zertifikat Deutsch, Hubert Eichheim &amp; Günther Storch, Klett Verlag, 2010</li> <li>- Fit fürs Zertifikat B1, Johannes Gerbes &amp; Frauke van der Werff, Hueber Verlag, 2013</li> <li>- Hören &amp; Sprechen A2/B1, Anneli Billina, Hueber Verlag, 2012 &amp; 2013</li> </ul>

## DEUTSCH III

Name of module	<b>Deutsch III German III</b>	Number	E11
Courses	Seminaristischer Unterricht: Deutsch D3	Semester/ duration	3
Workload	Seminaristischer Unterricht 160 Std, Selbststudium 80 Std	Credits	8 CP
Module responsibility	Li Shushan	Attendance hours	160 h
Lecturers	Zhang Bing, Wang Ye, Li Shushan zusammen mit muttersprachlichen Dozenten	Language	Deutsch und Chinesisch
Prerequisites	Empfohlen: Teilnahme an Deutsch I und Deutsch II	Offered	Every academic year
Learning outcomes	<p>Erreichen des Sprachniveaus B2.1 Fachsprache u. Wissenschaftliches Arbeiten auf Sprachniveau B2.1:</p> <p>Seminaristischer Unterricht Die Studierenden lernen</p> <ul style="list-style-type: none"> <li>- sich in für sie fachlich relevanten Alltagssituationen richtig und situationsangemessen auszudrücken,</li> <li>- sich an Gesprächen des täglichen Berufslebens und an einfachen Diskussionen zu beteiligen</li> <li>- gehörten und gelesenen Fachtexten relevante Informationen zu entnehmen</li> <li>- hochschulrelevante Textsorten kennen</li> </ul>		
Learning content	<p>Seminaristischer Unterricht Allgemeinsprache: Hauptkurs em neu (Niveaustufe B2)</p> <p>Fachsprache:</p> <ul style="list-style-type: none"> <li>- Lesen und Verstehen von Fachtexten aus den jeweiligen Fachvorlesungen</li> <li>- Vermittlung fachspezifischer Lexik, Morphologie und Syntax</li> <li>- Fachsprachlich relevante Grammatik</li> <li>- Lernstrategien für Hörverstehen</li> </ul> <p>Kommunikation im Studium I:</p> <ul style="list-style-type: none"> <li>- hochschulrelevante schriftliche Textsorten (u.a. Email, Protokoll, Bericht, Zusammenfassung)</li> <li>- mdl. Hochschulkommunikation (z.B. Sprechstundengespräch)</li> <li>- Grammatik, die häufig in Berichten benutzt wird z.B. indirekte Rede und Passiv</li> <li>- Redemittel zur Beschreibung von Tätigkeiten</li> </ul>		
Type of Media	Seminaristischer Unterricht: Beamer, PC		
Type of Assessment	Seminaristischer Unterricht: Benotete Klausur (PL)		
Literature	- Hauptkurs em neu , Michaela Perlmann-Balme & Susanne Schwalb,		

Hueber Verlag, 2000

- Studienbegleitung für ausländische Studierende an deutschen Hochschulen, Grit Mehlhorn, Iudicium Verlag, 2009
- Deutsch für Ingenieure, Maria Steinmetz & Heiner Dintera, Springer Vieweg Verlag, 2014
- Fachkunde Metall, Jörg Bartenaschlager, Josef Dillinger, Walter Escherich u.a., Europa-Lehrmittel Verlag, 2013
- Fachdeutsch im Fach Elektrotechnik, Shushan Li, Fang Xu, C. Niederhaus, 2008
- Aus moderner Technik und Naturwissenschaft, Erich Zettl, Jörg Janssen & Heidrun Müller, Hueber Verlag, 1999

## DEUTSCH IV

Name of module	<b>Deutsch IV</b> <b>German IV</b>	Number	E19
Courses	Seminaristischer Unterricht: Deutsch D4	Semester/ duration	4
Workload	Seminar. Unterricht 160 Std, Selbsts. 80 Std	Credits	8 CP
Module responsibility	Li Shushan	Attendance hours	160 h
Lecturers	Zhang Bing, Wang Ye, Li Shushan zusammen mit muttersprachlichen Dozenten	Language	Deutsch und Chinesisch
Prerequisites	Empfohlen: Teiln. Deutsch I-III, erfolgreiche Prüfung ZD	Offered	Every academic year
Learning outcomes	Seminaristischer Unterricht Erreichen des Sprachniveaus B2.2 Fachsprache u. Wissenschaftliches Arbeiten auf Sprachniveau B2.2: <ul style="list-style-type: none"> <li>- Vertiefung und erweiterte Anwendung der fachsprachlichen Kenntnisse</li> <li>- Selektives &amp; detailliertes Verstehen fachbezogener Zeitungsartikel</li> <li>- Einführung in die Hochschulkommunikation 2</li> </ul>		
Learning content	Seminaristischer Unterricht Allgemeinsprache: Hauptkurs em neu (Niveaustufe B2) Fachsprache: <ul style="list-style-type: none"> <li>- Lesen und Verstehen von Fachtexten aus den jeweiligen Fachvorlesungen</li> <li>- Vermittlung fachspezifischer Lexik, Morphologie und Syntax</li> <li>- Fachsprachlich relevante Grammatik</li> <li>- Lernstrategien für Hörverstehen</li> </ul> Kommunikation im Studium I: <ul style="list-style-type: none"> <li>- hochschulrelevante schriftl. Textsorten (u.a. Email, Protokoll, Bericht, Zusammenfassung)</li> <li>- mdl. Hochschulkommunikation (z.B. Sprechstundengespräch)</li> <li>- Grammatik, häufig in Berichten benutzt, z.B. indirekte Rede und Passiv</li> <li>- Redemittel zur Beschreibung von Tätigkeiten</li> </ul>		
Type of Media	Seminaristischer Unterricht: Beamer, PC		
Type of Assessment	Seminaristischer Unterricht: Benotete Klausur (PL)		
Literature	<ul style="list-style-type: none"> <li>- Abschlusskurs em neu, Michaela Perlmann-Balme &amp; Susanne Schwalb, Hueber Verlag, 2000</li> <li>- Studienbegleitung für ausl. Studierende an d. Hochschulen, Grit Mehlhorn, Iudicium Verlag, 2009</li> <li>- Deutsch für Ingenieure, M. Steinmetz &amp; H. Dintera, Springer Verlag, 2014</li> <li>- Fachkunde Metall, Jörg Bartenaschlager, Josef Dillinger, Walter Escherich u.a., Europa-Lehrmittel Verlag, 2013</li> <li>- Fachdeutsch im Fach Elektrotechnik, Sh. Li, Fang Xu, C. Niederhaus, 2008</li> <li>- Aus moderner Technik und Naturwissenschaft, Erich Zettl, Jörg Janssen &amp; Heidrun Müller, Hueber Verlag, 1999</li> </ul>		

## DEUTSCH V

Name of module	<b>Deutsch V</b> <b>German V</b>	Number	E29d
Courses	Seminaristischer Unterricht: Deutsch D5	Semester/ duration	5
Workload	Seminaristischer Unterricht 80 Std, Selbststudium 40 Std	Credits	4 CP
Module responsibility	Li Shushan	Attendance hours	80 h
Lecturers	Zhang Bing, Wang Ye, Li Shushan, Dozenten des Deutschkollegs der Tongji Uni	Language	Deutsch und Chinesisch
Prerequisites	Empfohlen: Teilnahme Deutsch I-IV, erfolgreiche Prüfung ZD	Offered	Every academic year
Learning outcomes	Seminaristischer Unterricht Allgemeinsprache: Freie sowie kompetente Sprachverwendung auf Sprachniveau B2 und Vorbereitung auf das Goethe-Zertifikat B2 <ul style="list-style-type: none"> <li>- Verstehen von längeren, anspruchsvolleren Texten</li> <li>- Spontane Sprachproduktion</li> <li>- Flexibler Gebrauch der Sprache im gesellschaftlichen und beruflichen Leben</li> </ul> Anfertigung von Bewerbungsschreiben für Praktika Erfolgreiches Bestehen von Praktikainterviews Fachsprache auf Sprachniveau B2: <ul style="list-style-type: none"> <li>- Vertiefung und erweiterte Anwendung der fachsprachlichen Kenntnisse</li> </ul>		
Learning content	Seminaristischer Unterricht Vorbereitungen auf das Goethe-Zertifikat B2 <ul style="list-style-type: none"> <li>- Training der vier Sprachfertigkeiten: Leseverstehen, Hörverstehen, Schriftlicher Ausdruck und Mündlicher Ausdruck entsprechend dem Prüfungsinhalt beim Goethe-Zertifikat B2</li> <li>- Wortschatzerweiterung aus verschiedenen Themenbereichen der Wissenschaft, Kultur und Alltag</li> <li>- Training von mündlichem Ausdruck in Form von Kurzvorträgen, Diskussionen und Übungen sowie das Verfassen von Texten gemäß dem Prüfungsformat des Goethe-Zertifikats B2</li> <li>- Vermittlung von Lerntechniken im Hinblick auf das Goethe-Zertifikat B2</li> <li>- Prüfungssimulation</li> </ul> Fachsprache: <ul style="list-style-type: none"> <li>- Lesen und Verstehen von Fachtexten entsprechend den jeweiligen Fachvorlesungen</li> <li>- Vermittlung und Anwendung von Fachwortschatz</li> <li>- Arbeit an fachspezifischer Grammatik</li> </ul>		

	Bewerbungstraining: <ul style="list-style-type: none"> <li>- Wie schreibe ich eine Bewerbung? Formale und inhaltliche Kriterien eines Bewerbungsbriefes und eines Lebenslaufes</li> <li>- Gemeinsame Korrektur</li> <li>- Interviewsimulation mit Firmenvertretern und anschließende Bewertung</li> </ul>
Type of Media	Seminaristischer Unterricht: Beamer, PC
Type of Assessment	Seminaristischer Unterricht: Benotete Klausur (PL)
Literature	<ul style="list-style-type: none"> <li>- Abschlusskurs em neu, Michaela Perlmann-Balme &amp; Susanne Schwalb, Max Hueber Verlag, 2000</li> <li>- Studienbegleitung für ausländische Studierende an deutschen Hochschulen, Grit Mehlhorn, Iudicium Verlag, 2009</li> <li>- Deutsch für Ingenieure, Maria Steinmetz &amp; Heiner Dintera, Springer Vieweg Verlag, 2014</li> <li>- Fachkunde Metall, Jörg Bartenaschlager, Josef Dillinger, Walter Escherich u.a., Europa-Lehrmittel Verlag, 2013</li> <li>- Fachdeutsch im Fach Elektrotechnik, Shushan Li, Fang Xu, C. Niederhaus, 2008</li> <li>- Aus moderner Technik und Naturwissenschaft, Erich Zettl, Jörg Janssen &amp; Heidrun Müller, Hueber Verlag, 1999</li> <li>- Fit fürs Goethe-Zertifikat B2, Evelyn Frey, Hueber 2007</li> <li>- So geht's zu B2: Vorbereitungskurs auf das Goethe-/ÖSD-Zertifikat B2, Uta Loumiotis &amp; Adalbert Mazur, Klett Verlag, 2016</li> <li>- Prüfungstraining DaF: B2-Goethe-Zertifikat, Gabi Baier &amp; Roland Dittrich, Cornelsen Verlag, 2007</li> <li>- Mit Erfolg zum Goethe-Zertifikat B2, Andrea Frater &amp; Angélique Thabar, Klett Verlag, 2008</li> </ul>

## DEUTSCH VI

Name of module	<b>Deutsch VI German VI</b>	Number	E36
Courses	Seminaristischer Unterricht: Deutsch D6	Semester/ duration	6
Workload	Seminaristischer Unterricht 80 Std, Selbststudium 40 Std	Credits	4 CP
Module responsibility	Li Shushan	Attendance hours	80 h
Lecturers	Zhang Bing, Wang Ye, Li Shushan zusammen mit muttersprachlichen Lehrkräften	Language	Deutsch und Chinesisch
Prerequisites	Empfohlen: Teilnahme Deutsch I-V	Offered	Every academic year
Learning outcomes	<p>Seminaristischer Unterricht Grundlegendes Arbeiten auf Sprachniveau C1 und Vorbereitung auf das Goethe-Zertifikat B2</p> <ul style="list-style-type: none"> <li>- Verständnis von längeren, anspruchsvolleren Texten mit komplexen sprachlichen Strukturen</li> <li>- Spontane und fließende Sprachproduktion</li> <li>- Flexibler und variabler Gebrauch der Sprache im gesellschaftlichen und beruflichen Kontext</li> </ul> <p>Fachsprache: Vertiefung und erweiterte Anwendung der fachsprachlichen Kenntnisse</p> <ul style="list-style-type: none"> <li>- Befähigung zum fachsprachlichen Handeln</li> <li>- Diskursstrategien</li> <li>- Fachsprachliche Kompetenz</li> </ul> <p>Wissenschaftliches Arbeiten:</p> <ul style="list-style-type: none"> <li>- Wissenschaftliches Arbeiten</li> <li>- Produktion von Berichten</li> </ul>		
Learning content	<p>Seminaristischer Unterricht Vorbereitungen auf das Goethe-Zertifikat B2</p> <ul style="list-style-type: none"> <li>- Training der vier Sprachfertigkeiten: Leseverstehen, Hörverstehen, Schriftlicher Ausdruck und Mündlicher Ausdruck entsprechend dem Prüfungsinhalt beim Goethe-Zertifikat B2</li> <li>- Wortschatzerweiterung aus verschiedenen Themenbereichen der Wissenschaft, Kultur und Alltag</li> <li>- Training von mündlichem Ausdruck in Form von Kurzvorträgen, Diskussionen und Übungen sowie das Verfassen von Texten gemäß dem Prüfungsformat des Goethe-Zertifikats B2</li> <li>- Vermittlung von Lerntechniken im Hinblick auf das Goethe-Zertifikat B2</li> <li>- Prüfungssimulation</li> </ul> <p>Fachsprache:</p> <ul style="list-style-type: none"> <li>- Lesen und Verstehen von Fachtexten entsprechend den jeweiligen Fachvorlesungen</li> </ul>		

	<ul style="list-style-type: none"> <li>- Vermittlung und Anwendung von Fachwortschatz</li> <li>- Arbeit an fachspezifischer Grammatik</li> <li>- Mündliche und schriftliche Reproduktion von eigenen Fachtexten</li> </ul> <p>Wissenschaftliches Schreiben:</p> <ul style="list-style-type: none"> <li>- Textsorten: Seminararbeit und Abschlussarbeit</li> <li>- Kriterien und Bestandteile zu einer wissenschaftlichen Arbeit</li> <li>- Zusammenfassung einer Abschlussarbeit verfassen</li> </ul>
Type of Media	Seminaristischer Unterricht: Beamer, PC
Type of Assessment	Seminaristischer Unterricht: Benotete Klausur (PL)
Literature	<ul style="list-style-type: none"> <li>- Abschlusskurs em neu, Michaela Perlmann-Balme &amp; Susanne Schwalb, Max Hueber Verlag, 2000</li> <li>- Studienbegleitung für ausländische Studierende an deutschen Hochschulen, Grit Mehlhorn, Iudicium Verlag, 2009</li> <li>- Deutsch für Ingenieure, Maria Steinmetz &amp; Heiner Dintera, Springer Vieweg Verlag, 2014</li> <li>- Fachkunde Metall, Jörg Bartenaschlager, Josef Dillinger, Walter Escherich u.a., Europa-Lehrmittel Verlag, 2013</li> <li>- Fachdeutsch im Fach Elektrotechnik, Shushan Li, Fang Xu, C. Niederhaus, 2008</li> <li>- Aus moderner Technik und Naturwissenschaft, Erich Zettl, Jörg Janssen &amp; Heidrun Müller, Hueber Verlag, 1999</li> <li>- Fit fürs Goethe-Zertifikat B2, Evelyn Frey, Hueber 2007</li> <li>- So geht's zu B2: Vorbereitungskurs auf das Goethe-/ÖSD-Zertifikat B2, Uta Loumiotis &amp; Adalbert Mazur, Klett Verlag, 2016</li> <li>- Prüfungstraining DaF: B2-Goethe-Zertifikat, Gabi Baier &amp; Roland Dittrich, Cornelsen Verlag, 2007</li> <li>- Mit Erfolg zum Goethe-Zertifikat B2, Andrea Frater &amp; Angélique Thabar, Klett Verlag, 2008</li> </ul>

## TECHNISCHES ENGLISCH I

Name of module	<b>Technisches Englisch I</b> <b>Technical English I</b>	Number	E12
Courses	Taught seminar: Technical English I TE1	Semester/ duration	3
Workload	40 h attendance, 20 h self-study	Credits	2
Module responsibility	Zou Xuan	Attendance hours	40h
Lecturers	Zou Xuan, Si Chengyong, Chen Qing	Language	English
Prerequisites	Recommended: Knowledge of Mathematics I, Mathematics II, Physics, Electric Circuits I	Offered	Every academic year
Learning outcomes	The students are able to <ul style="list-style-type: none"> <li>- understand EE technical articles written in English</li> <li>- translate EE technical articles from English to Chinese</li> <li>- grasp basic terminology in EE technology</li> </ul>		
Learning content	<ul style="list-style-type: none"> <li>- Taught seminar: What is a Resistance?</li> <li>- What is a capacitor?</li> <li>- Electric basic concept</li> <li>- Introduction to AC</li> <li>- Simple electric circuit</li> <li>- DC parallel circuit</li> <li>- Basic semiconductor crystal structure</li> <li>- The PN junction</li> <li>- Number system</li> <li>- Digital circuit elements</li> </ul>		
Type of Media	Taught seminar: Computer, beamer		
Type of Assessment	Taught seminar: Successful passing in written exam (PL)		
Literature	<ul style="list-style-type: none"> <li>- Specified English for electric engineering practical textbook, Qinghua university Press</li> <li>- Specified English for Automation, Wang Hongwen, Mechanical Industrial Publishing House</li> <li>- Electrical technology dictionary</li> </ul>		

## TECHNISCHES ENGLISCH II

Name of module	<b>Technisches Englisch II</b> <b>Technical English II</b>	Number	E20
Courses	Taught seminar: Technical English II TE2	Semester/ duration	4
Workload	40 h attendance, 20 h self-study	Credits	2
Module responsibility	Zou Xuan	Attendance hours	40h
Lecturers	Zou Xuan, Si Chengyong, Chen Qing	Language	English
Prerequisites	Recommended: Knowledge of Mathematics I, Mathematics II, Electric Circuits I, Technical English I, Analogue Circuits, Electric Circuits II	Offered	Every academic year
Learning outcomes	The students are able to <ul style="list-style-type: none"><li>- understand EE technical articles written in English further</li><li>- translate EE technical articles between English and Chinese</li><li>- grasp expending terminology in EE technology</li><li>- do short presentation on EE topic in English</li></ul>		
Learning content	Taught seminar <ul style="list-style-type: none"><li>- AC motor</li><li>- Basic DC motor operation</li><li>- The basic of control</li><li>- Digital control System</li><li>- PLC</li><li>- Terminology</li><li>- What is CNC</li><li>- The basics of computer numerical control</li><li>- Industrial Bus</li><li>- Serial communication systems</li></ul>		
Type of Media	Taught seminar: beamer	Computer,	
Type of Assessment	Taught seminar: ing in written exam (PL)	Successful pass-	
Literature	<ul style="list-style-type: none"><li>- Specified English for electric engineering practical textbook, Qinghua uni- versity Press</li><li>- Specified English for Automation, Wang Hongwen, Mechanical Industrial Publishing House</li><li>- Electrical technology dictionary</li></ul>		

### TECHNISCHES ENGLISCH III

Name of module	<b>Technisches Englisch III</b> <b>Technical English III</b>	Number	E21
Courses	Taught seminar: Technical English III TE3	Semester/ duration	4
Workload	40 h attendance, 20 h self-study	Credits	2
Module responsibility	Gu Jin	Attendance hours	40 h
Lecturers	Gu Jin, Si Chengyong, Chen Qing	Language	English
Prerequisites	Recommended: Knowledge of Technical English I, English II, Introduction of Programming and Power Electronics	Offered	Every academic year
Learning outcomes	The students are able to <ul style="list-style-type: none"> <li>- understand written technical English</li> <li>- translate texts written in technical English</li> <li>- communicate in English in the academic way</li> </ul>		
Learning content	<ul style="list-style-type: none"> <li>- Taught seminar DC Machines</li> <li>- Induction Motor Drives</li> <li>- Industrial Application of Adjustable-Speed AC Drivers</li> <li>- Input, output and storage devices</li> <li>- Computer hardware</li> <li>- Computer software</li> <li>- Network and communication system</li> </ul>		
Type of Media	Taught seminar: Tuition in seminars, blackboard, slides, computer simulation		
Type of Assessment	Taught seminar: Successful passing in written exam (PL)		
Literature	<ul style="list-style-type: none"> <li>- Wang Hongwen, Specified English for Automation, Mechanical Industrial Publishing House</li> <li>- Qin Zenghuang, Electrical Engineering, Higher Education Press</li> <li>- Timothy J. O'Leary, Linda I. O'Leary (2013): Computing Essentials, Higher Education Press</li> </ul>		

## TECHNISCHES ENGLISCH IV

Name of module	<b>Technisches Englisch IV</b> <b>Technical English IV</b>	Number	E37
Courses	Taught seminar: Technisches Englisch IV TE4	Semester/ duration	6
Workload	40 h attendance, 20 h self-study	Credits	2
Module responsibility	Si Chengyong	Attendance hours	40 h
Lecturers	Si Chengyong, Zou Xuan, Chen Qing	Language	English
Prerequisites	Recommended: Knowledge of Technical English I, II, III, Basic knowledge of control technology	Offered	Every academic year
Learning outcomes	The students are able to <ul style="list-style-type: none"> <li>- possess basic scientific ethics</li> <li>- master basic methods of writing scientific papers</li> <li>- understand the process of scientific research and technological papers</li> <li>- understand the basic specifications of the relevant scientific communications</li> <li>- apply the learned theory and methods to research and writing practice</li> <li>- have the basic ability for the electrical engineering theoretical and practical issues, such as literature collection, paper writing and expression and other aspects</li> </ul>		
Learning content	Taught seminar <ul style="list-style-type: none"> <li>- Preliminaries: Literature search, Ethics in scientific publishing</li> <li>- Preparing the paper: Title, abstract and introduction, materials and methods, results and discussion, acknowledgement and references, tables, graphs</li> <li>- Publishing the paper: Rights and permissions, submit the manuscript, review process, publishing process</li> <li>- Scientific Communication: Conference communication, prepare a curriculum vitae, prepare grant proposals</li> </ul>		
Type of Media	Taught seminar: Tuition in seminars, blackboard, slides		
Type of Assessment	Taught seminar: Successful passing in written exam (PL)		
Literature	<ul style="list-style-type: none"> <li>- Robert, D. &amp; Barbara G. (2007): How to write and publish a scientific paper, sixth edition, Beijing University Press</li> <li>- Shengli R. (2011): How to write and publish scientific papers in English, second edition, Science Press</li> </ul>		

## TECHNISCHE PFLICHTMODULE

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## MATHEMATIK I

Name of module	<b>Mathematik I</b> <b>Mathematics I</b>	Number	E2
Courses	Taught seminar: Mathematics I MA1	Semester/ duration	1
Workload	96 h attendance, 84 h self-study	Credits	6
Module responsibility	Zhang Tiansi	Attendance hours	96 h
Lecturers	Zhang Tiansi, Yu Zhixian	Language	Chinese
Prerequisites	Recommended: Basic knowledge of mathematics and physics	Offered	Every academic year
Learning outcomes	The students are able to <ul style="list-style-type: none"> <li>- have fundamental knowledge of calculus</li> <li>- recognize mathematics-related problems, analyze and solve them</li> <li>- apply mathematical methods in many fields</li> <li>- have abstraction ability and think in a conceptual, analytical and logical manner</li> </ul>		
Learning content	Taught seminar <ul style="list-style-type: none"> <li>- Limits of Sequences and Functions</li> <li>- Derivatives of Functions</li> <li>- Differentiation Rules</li> <li>- The Chain Rule</li> <li>- Mean Value Theorem</li> <li>- L'Hospital's Rule</li> <li>- Monotonicity and Concave-convex of Functions</li> <li>- Maximum and Minimum Values</li> <li>- Indefinite Integrals</li> <li>- Substitution Rule and Integration by Parts</li> <li>- Property of Definite Integrals</li> <li>- Techniques of Definite Integrals</li> <li>- Improper Integrals</li> <li>- Application of Integration</li> <li>- One Order Ordinary Differential Equations</li> <li>- High Order Ordinary Differential Equations</li> </ul>		
Type of Media	Taught seminar: Tuition in seminars, blackboard, slides		
Type of Assessment	Taught seminar: Successful passing in written exam (PL)		
Literature	<ul style="list-style-type: none"> <li>- Tongji University (2014): Higher mathematics 1, Higher education press, seventh edition</li> <li>- James, S. (2008): Calculus, Sixth Edition, McMASTER University</li> </ul>		

## MATHEMATIK II

Name of module	<b>Mathematik II</b> <b>Mathematics II</b>	Number	E8
Courses	Lecture: Mathematics II MA2	Semester/ duration	2
Workload	96 h attendance, 84 h self-study	Credits	6
Module responsibility	Zhang Tiansi	Attendance hours	96 h
Lecturers	Zhang Tiansi, Yu Zhixian	Language	Chinese
Prerequisites	Recommended: Basic knowledge of elementary mathematics and elementary physics, Mathematics 1	Offered	Every academic year
Learning outcomes	The students are able to <ul style="list-style-type: none"> <li>- understand theory and methods of derivative and integral for functions of several variables</li> <li>- compute partial derivatives and multiple integrals</li> <li>- apply theories and skills to practice, e.g. problems in geometry and physics</li> <li>- think in a conceptual, analytical and logical manner</li> </ul>		
Learning content	Taught seminar <ul style="list-style-type: none"> <li>- Vector Algebra</li> <li>- Equations of Lines and planes</li> <li>- Partial Derivatives and Total Differential of Multivariable Functions</li> <li>- Differentiation Rules of Multivariable Composite Functions</li> <li>- Geometric Application and Extreme value of Multivariable Functions</li> <li>- Double Integrals</li> <li>- Triple Integrals</li> <li>- Applications of Integrals</li> <li>- Line Integrals and Green's Theorem</li> <li>- Surface Integrals and Gauss Formula</li> <li>- Constant Series and Convergence</li> <li>- Power Series</li> <li>- Convergence Domain of Power Series</li> <li>- Representations of Functions as Power Series</li> </ul>		
Type of Media	Taught seminar: Tuition in seminars, blackboard, slides		
Type of Assessment	Taught seminar: Successful passing in written exam (PL)		
Literature	<ul style="list-style-type: none"> <li>- Tongji University (2014): Higher mathematics 2, Higher education press, seventh edition</li> <li>- James, S. (2008): Calculus, Sixth Edition, McMASTER University</li> </ul>		

## LINEARE ALGEBRA

Name of module	<b>Lineare Algebra</b> <b>Linear Algebra</b>	Number	E3
Courses	Taught seminar: Linear Algebra LA	Semester/ duration	1
Workload	32 h attendance, 28 h self-study	Credits	2
Module responsibility	Liu Xiping	Attendance hours	32 h
Lecturers	Liu Xiping , He Changxiang, Hu Jianhua	Language	Chinese
Prerequisites	Recommended: Knowledge of Mathematics I	Offered	Every academic year
Learning outcomes	The students are able to <ul style="list-style-type: none"> <li>- master the basic concepts and principles of linear algebra</li> <li>- calculate determinants, operations between matrices, eigenvalues and eigenvectors</li> <li>- solve systems of linear equations and make out the structure of solutions of systems of equations</li> <li>- find a basis of n-dimensional linear space, especially find the normal orthogonal basis</li> <li>- master the method to diagonalization of matrices</li> <li>- transform the quadratic forms into their standard forms</li> <li>- use some models of linear algebra to solve some practical problems</li> </ul>		
Learning content	Taught seminar <ul style="list-style-type: none"> <li>- Determinant</li> <li>- Matrices and their operations</li> <li>- n-dimensional vector</li> <li>- System of linear equations</li> <li>- Eigenvalues and eigenvectors of matrices</li> <li>- Quadratic form</li> </ul>		
Type of Media	Taught seminar: Blackboard, multimedia in the classroom		
Type of Assessment	Taught seminar: Successful passing in written exam (PL)		
Literature	<ul style="list-style-type: none"> <li>- Liu Xiping ,Cao Weili and Yu Zhengsheng(2013): Linear algebras,Science Press</li> <li>- Office of Engineering Mathematics of USST (2014): Learning guidance of Linear Algebras, Science Press</li> <li>- Department of mathematics of Tongji University (2007): Linear Algebras, High education press</li> </ul>		

## KOMPLEXE FUNKTIONEN UND INTEGRALTRANSFORMATIONEN

Name of module	<b>Komplexe Funktionen und Integraltransformationen</b> <b>Complex Functions and Integral Transformations</b>	Number	E22
Courses	Lecture: Komplexe Funktionen und Integraltransformationen KF	Semester/ duration	4
Workload	48 h attendance, 42 h self-study	Credits	3
Module responsibility	Wang Xinli	Attendance hours	48 h
Lecturers	Wang Xinli, Yang Dongchao	Language	Chinese
Prerequisites	Recommended: Knowledge of Mathematics I, II, Partial knowledge of Linear Algebra	Offered	Every academic year
Learning outcomes	The students are able to <ul style="list-style-type: none"><li>- understand the concepts of analytic functions</li><li>- grasp the basic theory of complex functions</li><li>- use the common calculation methods to calculate the integrals of complex functions, especially to use the residue in integration</li><li>- select and utilize integral transformations for practical problems</li></ul>		
Learning content	Taught seminar <ul style="list-style-type: none"><li>- complex numbers and complex functions</li><li>- analytic functions</li><li>- complex integration</li><li>- Laurent series</li><li>- residues</li><li>- Fourier transformation</li><li>- Laplace transformation</li><li>- system model description in time and frequency domain</li></ul>		
Type of Media	Taught seminar:	Tuition in seminars, blackboard, slides, computer simulation	
Type of Assessment	Taught seminar:	Successful passing in written exam (PL)	
Literature	<ul style="list-style-type: none"><li>- Functions of Complex Variables &amp;Integral Transformations, Science Press, 2010</li><li>- Complex Functions and Integral Transformations, Xi'an Electronic Science University Press,1996</li><li>- Complex Functions and Integral Transformations, Higher Education Press, 2013.</li></ul>		

## PHYSIK

Name of module	<b>Physik</b> <b>Physics</b>	Number	E13
Courses	Lecture: Physics PY Laboratory: Physics-Experiment PYP	Semester/ duration	3
Workload	80 h attendance, 70 h self-study	Credits	5
Module responsibility	Gu Zhengtian	Attendance hours	60 h + 20 h
Lecturers	Gu Zhengtian, Shen Jianqi, Chen Jun, Yu Haitao, Zhou Qun, Guo Luofang	Language	Chinese
Prerequisites	Recommended: Basic Knowledge of Mathematics I, II, Linear Algebra	Offered	Every academic year
Learning outcomes	<p>The students are able to</p> <ul style="list-style-type: none"> <li>- master the basic concepts and principles in mechanics, electromagnetism, wave optics and fundamentals of quantum theory</li> <li>- acquire the ability of abstract thinking and improve self-study ability.</li> <li>- acquire the ability to analyze and solve problems. Capable of computing and judging</li> <li>- acquire the ability to use mathematical tools to solve general problems in physics, including calculation and estimation</li> <li>- understand the use of physical instruments in mechanics, electromagnetism, wave optics</li> <li>- measure and understand physical quantities in early quantum theory</li> <li>- establish dialectical materialist world view and scientific attitude to seek truth</li> </ul>		
Learning content	<p>Taught seminar/ Laboratory</p> <ul style="list-style-type: none"> <li>- Kinematics</li> <li>- Newton's Laws of Motion</li> <li>- Momentum and Angular Momentum</li> <li>- Work and Energy</li> <li>- Rotation of a rigid body</li> <li>- Electrostatic Field in Vacuum</li> <li>- Conductors and Dielectrics in Electrostatic Field</li> <li>- Magnetic Field of Steady Current in Vacuum</li> <li>- Magnetic Field in the Medium</li> <li>- Electromagnetic Induction and Electromagnetic Field</li> <li>- Interference of Light</li> <li>- Diffraction of Light</li> <li>- Polarization of Light</li> <li>- Fundamentals of Quantum Mechanics</li> <li>- Laboratory:</li> </ul>		

	<ul style="list-style-type: none"> <li>- Slit width and light intensity distribution measurement of single slit diffraction</li> <li>- Frank Hertz experiment</li> <li>- The adjustment and usage of the spectrometer</li> <li>- Optical lever measuring metal linear expansion coefficient</li> <li>- Millikan oil drop experiment</li> <li>- Measuring moment of inertia by torsional pendulum method</li> <li>- The principle and usage of the oscilloscope</li> <li>- Hall effect</li> <li>- Digital optical fiber communication experiment</li> <li>- Measurement of Planck's constant by photoelectric effect</li> <li>- Measuring R H of H atom by grating spectrometer</li> <li>- Measuring capacitance by ballistic galvanometer</li> <li>- Measurement of low resistance by double bridge</li> <li>- The measurement of metal electron work function</li> <li>- The measurement of the speed of sound</li> <li>- The adjustment of Michelson interferometer</li> </ul>
Type of Media	<p>Taught seminar: Tuition in seminars, blackboard, slides, computer simulation</p> <p>Laboratory: Experiment-practical course</p>
Type of Assessment	<p>Taught seminar: Successful passing in written exam (PL)</p> <p>Laboratory: Successful participation of all tasks (PVL)</p>
Literature	<ul style="list-style-type: none"> <li>- Chen Jun ,Huangfu Quansheng ,Yan Feinan (2017): Fundamental College Physics, Tsinghua University Press</li> <li>- Zhu Feng (2015): College Physics, Tsinghua University Press</li> <li>- Gu Zhengtian, Chen Jun (2016): College Physics Synchronous Tutorship Review and Self-testing, China Machine Press</li> <li>- Wang Xiaoping, Wang Lijun (2015): College Physics Experiment , China Machine Press</li> <li>- Zhou Qun, Yang Xin, Lu Jian (2016): College Physics Creative Design Experiment, XiDian University Press</li> </ul>

## EINFÜHRUNG IN DIE PROZEDURALE PROGRAMMIERUNG

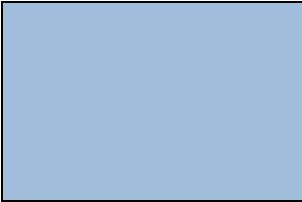
Name of module	<b>Einführung in die prozedurale Programmierung</b> <b>Introduction to Software Construction</b>	Number	E26d
Courses	Taught seminar: Basic Programming in C PR1 Laboratory: Lab for Basic Programming in C PRP1	Semester/ duration	4
Workload	80 h attendance, 70 h self-study	Credits	5
Module responsibility	Robert Heß	Attendance hours	60 h + 20 h
Lecturers	Henning Dierks, Ulrike Herster, Holger Gräßner, Marc Hensel, Robert Heß, Karin Landenfeld, Peter Möller, Annabella Rauscher Scheibe, Rainer Schoenen	Language	German
Prerequisites	Recommended: Mathematics I, basics of computers: editor, file handling	Offered	Every academic year
Learning outcomes	The students ... <ul style="list-style-type: none"> <li>- know and understand the syntax of the programming language C,</li> <li>- can work efficiently with an integrated development environment, IDE (Editor, Compiler, Debugger),</li> <li>- master to structure tasks by using functions and projects with multiple source files,</li> <li>- can synthesise problems and implement the solution in C,</li> <li>- can develop systematic tests for the developed software,</li> <li>- in order to realise software to solve applicational requirements.</li> </ul>		
Learning content	<ul style="list-style-type: none"> <li>- basic concepts of computers (especially PCs) and operating systems</li> <li>- integrated development environments (editor, compiler, debugger)</li> <li>- programming language C: Input via keyboard, output on screen, datatypes, constants, operators, expressions, loops, conditional expressions, arrays, functions, header files, projects and macros</li> <li>- implementation of software from given requirements pointers, arrays and strings</li> <li>- further data types</li> </ul>		
Type of Media	Taught seminar: Lecture, black or white board, beamer Laboratory: PC with IDE software		
Type of Assessment	Taught seminar: Exam (practical and/or theoretical) (PL) Laboratory: Successful participation in lab experiments (PVL)		

## Literature

- B.W. Kernighan, D.M. Ritchie: Programmieren in C, Hanser Fachbuch
- P. Prinz, U. Kirch-Prinz, C-Einführung und professionelle Anwendung, Verlagsgruppe Hüthig-Jehle-Rehm
- H. Erlenkötter, C Programmieren von Anfang an, rororo
- J. Groll, M. Dausmann, C als erste Programmiersprache, Springer Vieweg
- R. Sedgewick, Algorithmen in C, Addison-Wesley
- P. Deitel, H. Deitel, C how to Program, Pearson
- S. Prata, C Primer Plus, Addison Wesley

## FORTGESCHRITTENE PROGRAMMIERUNG IN C

Name of module	<b>Fortgeschrittene Programmierung in C</b> <b>Advanced Software Construction</b>	Number	E33d
Courses	Taught seminar: Fortgeschrittene Programmierung in C PR2 Laboratory: Praktikum Fortgeschrittene Programmierung in C PRP2	Semester/ duration	5
Workload	80 h attendance, 70 h self-study	Credits	5
Module responsibility	Robert Heß	Attendance hours	60 h + 20 h
Lecturers	Henning Dierks, Ulrike Herster, Holger Gräßner, Marc Hensel, Robert Heß, Karin Landenfeld, Peter Möller, Annabella Rauscher Scheibe, Rainer Schoenen	Language	German
Prerequisites	Recommended: Introduction to software construction is recommended	Offered	Every academic year
Learning outcomes	The students ... <ul style="list-style-type: none"><li>- have a profound knowledge on the programming language C</li><li>- can include and use C-libraries</li><li>- master the handling of pointers, files, dynamic memory allocation and data structures</li><li>- can implement recursive programs and linked lists</li><li>- can analyse, synthesize and implement complex problems in C</li><li>- The learning outcomes serve as a basis for further studies and enable the students to develop software in the field of electrical engineering</li></ul>		
Learning content	Extended programming in C: <ul style="list-style-type: none"><li>- pointers, pointers to pointers, field of pointers, pointers to functions, advanced pointer topics</li><li>- C Preprocessor and Macros</li><li>- file handling in C</li><li>- data structures and data type design</li><li>- dynamic memory allocation and its use in dynamic data structures</li><li>- binary trees (including recursion)</li></ul>		
Type of Media	Taught seminar: Laboratory:	Lecture, black or white board, beamer PC with IDE software	
Type of Assessment	Taught seminar: Laboratory:	Exam (practical and/or theoretical) (PL) Successful participation in lab experiments (PVL)	
Literature	<ul style="list-style-type: none"><li>- B.W. Kernighan, D.M. Ritchie: <i>Programmieren in C</i>, Hanser Fachbuch</li><li>- P. Prinz, U. Kirch-Prinz, <i>C-Einführung und professionelle Anwendung</i>, Verlagsgruppe Hüthig-Jehle-Rehm</li><li>- H. Erlenkötter, <i>C Programmieren von Anfang an</i>, rororo</li></ul>		

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- J. Groll, M. Dausmann, *C als erste Programmiersprache*, Springer Vieweg
  - R. Sedgewick, *Algorithmen in C*, Addison-Wesley
  - P. Deitel, H. Deitel, *C how to Program*, Pearson
  - S. Prata, *C Primer Plus*, Addison Wesley

## OBJEKTORIENTIERTE PROGRAMMIERUNG IN DER AUTOMATISIERUNGSTECHNIK

Name of module	<b>Objektorientierte Programmierung in der Automatisierungstechnik</b> <b>Object-Oriented Programming in Automation Technology</b>	Number	E34d
Courses	Taught seminar: Objektorientierte Programmierung in der Automatisierungstechnik PR3  Laboratory: Praktikum Objektorientierte Programmierung in der Automatisierungstechnik PRP3	Semester/ duration	5
Workload	80 h attendance, 70 h self-study	Credits	5
Module responsibility	Marc Hensel	Attendance hours	60 h + 20 h
Lecturers	Henning Dierks, Rainer Sawatzki, Sebastian Rohjans	Language	German
Prerequisites	Recommended: Mathematics I, II, Introduction to Software Construction, Advanced Software Construction	Offered	Every academic year
Learning outcomes	<p>Students develop Java applications with graphical user interfaces (e. g., to process and visualize data) by</p> <ul style="list-style-type: none"> <li>- using the concept of OOP</li> <li>- analyzing class structures and source code,</li> <li>- implementing class structures, and</li> <li>- implementing applications with requested functionality</li> <li>- create Graphical User Interfaces using a current framework</li> </ul> <p>according to given requirements.</p> <ul style="list-style-type: none"> <li>- Students implement object-oriented concepts to increase software quality.</li> </ul>		
Learning content	<p>Taught seminar:</p> <ul style="list-style-type: none"> <li>- Introduction to object-oriented programming in Java</li> <li>- Programming environment and fundamental programming structures in Java</li> <li>- Object-oriented programming fundamentals</li> <li>- Basic usage of classes, associations, inheritance, encapsulation, and other object-oriented subjects</li> <li>- Main libraries of the API (Application Programming Interface)</li> <li>- Java programs using graphical user interfaces and threads</li> </ul> <p>Laboratory:</p> <ul style="list-style-type: none"> <li>- Students practice the transfer of the main parts of the object-oriented Java syntax into applications.</li> </ul>		

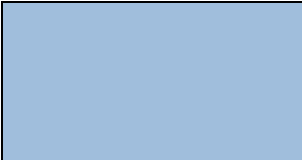
	<ul style="list-style-type: none"> <li>- In focus is the implementation of Java programs, usage of Java classes, and usage of the Java Software Development Kit (SDK).</li> </ul>
Type of Media	Taught seminar: Lecture, black board, beamer Laboratory: PC with IDE and other software
Type of Assessment	Taught seminar: Written exam (PL) (maybe done electronically) Laboratory: Successful participation in lab experiments (PVL)
Literature	<ul style="list-style-type: none"> <li>- D. Abts, Grundkurs JAVA, Springer Vieweg, 2018</li> <li>- H.-P. Habelitz, Programmieren lernen mit Java, Rheinwerk Computing, 2017</li> <li>- J. Goll, C. Heinisch, Java als erste Programmiersprache, Springer Vieweg, 2016</li> <li>- B. Bloch, Effective Java, Addison-Wesley, 2017</li> <li>- R.-G. Urma, M. Fusco, A. Mycroft, Java 8 &amp; 9 in Action, Manning, 2018</li> </ul>

## LABOREINFÜHRUNG I UND II

Name of module	<b>Laboreinführung I und II</b> <b>Labintroduction I and II</b>	Number	E14, E23
Courses	Laboratory: Labintroduction I and II LAE1, LAE2	Semester/ duration	3, 4
Workload	Lab 2 * 8h = 16h total, self-study 14h	Credits	Total 1
Module responsibility	Shen Jianqiang	Attendance hours	16 h
Lecturers	Shen Jianqiang, Zhou Ying	Language	Chinese
Prerequisites	Recommended: Basics of Physics	Offered	Every academic year
Learning outcomes	The students are able to <ul style="list-style-type: none"> <li>- handle and use an oscilloscope</li> <li>- use the adequate equipment for measuring voltage, current, power in AC and DC</li> <li>- write lab reports and evaluate the results</li> <li>- use software tools for documentation and visualisation of results</li> <li>- learn the safety regulations and standards in lab</li> </ul>		
Learning content	Laboratory <ul style="list-style-type: none"> <li>- Safety regulations and standards for lab work</li> <li>- Oscilloscope (block diagram, triggering, ac/dc-coupling, time and frequency measuring, etc.)</li> <li>- Measuring: standards, errors, accuracy, tolerance, error propagation</li> <li>- Measuring devices and connections for current, voltage and power in ac and dc (e.g. moving coil/iron meter, 3 phase system)</li> <li>- Documentation: analysis and evaluation of measured results, visualization, report</li> </ul>		
Type of Media	Laboratory: PC with special software, working in lab with experiments		
Type of Assessment	Laboratory: Lab reports (SL)		
Literature	<ul style="list-style-type: none"> <li>- Schröder: Elektrische Messtechnik, Carl Hanser Verlag</li> <li>- Manuals of equipment</li> </ul>		

## ELEKTROTECHNIK I

Name of module	<b>Elektrotechnik I</b> <b>Electric Circuits I</b>	Number	E9
Courses	Taught seminar: Electric Circuits I EL1 Laboratory: Electric Circuits I Laboratory ELP1	Semester/ duration	2
Workload	32h attendance, 28h self-study	Credits	2
Module responsibility	Li Haiying	Attendance hours	24 h+8 h
Lecturers	Li Haiying, Shen Jianqiang	Language	Chinese
Prerequisites	Recommended: Mathematics I	Offered	Every academic year
Learning outcomes	<p>The students are able to</p> <ul style="list-style-type: none"> <li>- analyze or calculate circuit model and parameters, the basic physical quantities, voltage, current, power, DC and controlled source, Kirchhoff's laws and superposition theorem</li> <li>- make out the way of branch, mesh, nodal and loop analysis</li> <li>- grasp the concepts of Thevenin's and Norton's theorem, equivalent voltage and current source for circuits</li> <li>- operate basic electric instruments and have some knowledge about measurement errors</li> </ul>		
Learning content	<p>Taught seminar</p> <ul style="list-style-type: none"> <li>- Basics: SI units, electric current, voltage, resistance, Ohm's law, power, energy, efficiency factor, polarity, current and voltage direction</li> <li>- DC circuits: Loops, nodes, branches, linear resistances, linear sources, Kirchhoff's voltage and current laws, non linear sources and resistances</li> <li>- Analysis of resistive circuits: Thevenin's and Norton's theorem, superposition theorem</li> <li>- Principles of instrumentation and measurement</li> </ul> <p>Laboratory</p> <ul style="list-style-type: none"> <li>- Voltage/current/resistance measurements with basic/common multi-meters</li> <li>- Simulation analysis of DC circuits with OrCad/Pspice</li> <li>- Basic analysis and validating of DC circuits with hardware</li> <li>- Application of Ohm's and other laws for circuits</li> <li>- Hardware experiments and corresponding computer simulations</li> </ul>		
Type of Media	<p>Taught seminar: blackboard, beamer, PC with simulation software</p> <p>Laboratory: Laboratory and computer practical course</p>		
Type of Assessment	<p>Taught seminar: Successful passing in written exam (PL)</p> <p>Laboratory: Successful participation in 3 measurement labs and 1 computer simulation lab-course with written reports (PVL)</p>		
Literature	<ul style="list-style-type: none"> <li>• Qiu Guanyuan.(2011): Electric Circuit(5th edition), Higher Education Press</li> </ul>		

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- Lu Yuanyuan etc. (2013): Fundamental Theory of Circuit(Second edition), Xi Dian University Press
  - Sun Hao, Yang Yibo. etc. (2013): Circuit Experiment and Simulation, Xi Dian University Press

## ELEKTROTECHNIK II

Name of module	<b>Elektrotechnik II</b> <b>Electric Circuits II</b>	Number	E16d
Courses	Taught seminar: Elektrotechnik II EL2 Laboratory: Praktikum Elektrotechnik II ELP2	Semester/ duration	3
Workload	80 h attendance, 70 h self-study	Credits	5
Module responsibility	Jens Ginzel	Attendance hours	60 h + 20 h
Lecturers	Jens Ginzel, Frerk Haase, Björn Lange	Language	German
Prerequisites	Recommended: Mathematics I, II, Electric Circuits I	Offered	Every aca- demic year
Learning outcomes	<p>The students are able to</p> <ul style="list-style-type: none"> <li>- analyse periodic signals by calculating mean and RMS values</li> <li>- calculate voltage and current in RLC circuits with switched on (and off) DC Voltage source</li> <li>- analyse the frequency behaviour of RLC circuits</li> <li>- read a bode plot</li> <li>- know the equivalent circuit of a transformer and understand the meaning of its elements</li> <li>- calculate the steady-state behaviour of circuits with transformers supplied with AC Voltage source</li> <li>- calculate current, power and voltage in elementary three-phase circuits</li> <li>- handle basic analog and digital measurement instruments</li> <li>- understand systematic deviations due to input resistances of instruments</li> <li>- determine measurement uncertainties</li> <li>- represent/plot their measured data in different scalings (linear/logarithmic)</li> <li>- document their measurements and calculations in the form of lab reports</li> </ul>		
Learning content	<p>Taught seminar</p> <ul style="list-style-type: none"> <li>- Mean and RMS values of periodic functions</li> <li>- Transient circuit analysis:</li> <li>- Definition of capacitance C and self-inductance L</li> <li>- Charging and discharging a capacitor</li> <li>- Charging and discharging a coil</li> <li>- Sinusoidal steady state analysis</li> <li>- Phasor representation of effective values</li> <li>- Impedance and admittance</li> <li>- Complex power</li> <li>- Two-port networks:</li> <li>- R-C and R-L low pass and high pass filters</li> <li>- Bode plots</li> <li>- Resonant circuits</li> </ul>		

	<ul style="list-style-type: none"> <li>- Transformers:</li> <li>- Ideal transformer</li> <li>- Mutual inductance</li> <li>- Transformer equations</li> <li>- Three-phase circuits:</li> <li>- Star connection (symmetrical)</li> <li>- Delta connection</li> <li>- Power in three-phase circuits</li> </ul> <p>Laboratory</p> <ul style="list-style-type: none"> <li>- Hardware experiments and corresponding computer simulations</li> <li>- Voltage/current/resistance measurements with basic/common multimeters</li> <li>- Determination of systematic deviations and measurement uncertainties</li> <li>- Measure characteristics of linear and nonlinear components</li> <li>- Measurements with an oscilloscope: measure frequency, phase-shift, amplitude</li> <li>- Simulate linear and nonlinear networks using a simulating software like PSPICE</li> </ul>
Type of Media	<p>Taught seminar: Lecture, black board, beamer</p> <p>Laboratory: Lab experiments</p>
Type of Assessment	<p>Taught seminar: Written exam (PL)</p> <p>Laboratory: Successful participation in lab experiments (PVL)</p>
Literature	<ul style="list-style-type: none"> <li>- G. Hagmann: Grundlagen der Elektrotechnik, 8. Auflage, AULA-Verlag, Wiebelsheim, 2001</li> <li>- W. Weißgerber: Elektrotechnik für Ingenieure 2, Vieweg+Teubner, Wiesbaden, 2009</li> <li>- D. Zastrow: Elektrotechnik, 17. Auflage, Vieweg+Teubner, Wiesbaden, 2009</li> <li>- F. Moeller: Grundlagen der Elektrotechnik, 22. Auflage, Vieweg+Teubner, Wiesbaden, 2011</li> </ul>

## ANALOGUE SCHALTUNGSTECHNIK

Name of module	<b>Analoge Schaltungstechnik</b> <b>Analogue Circuits</b>	Number	E15
Courses	Taught seminar: Analogue Circuits AS Laboratory: Analogue Circuits Laboratory ASP	Semester/ duration	3
Workload	64h attendance, 56h self-study	Credits	4
Module responsibility	Liu Jian	Attendance hours	48 h+16 h
Lecturers	Liu Jian, Shen Jianqiang	Language	Chinese
Prerequisites	Recommended: Electric Circuits I, Mathematics I	Offered	Every academic year
Learning outcomes	The students are able to <ul style="list-style-type: none"> <li>- master elementary theories, basic knowledge and techniques of analogue electronics</li> <li>- analyze and calculate basic analogue electronic circuits</li> <li>- skillfully use electronic instruments</li> <li>- analyze and understand the behaviors of analogue circuits such as basic amplifier, signal operational and processing circuit, feedback amplifier, power amplifier circuit, signal generator circuit, differential amplifier and integrated operational amplifier</li> </ul>		
Learning content	Taught seminar <ul style="list-style-type: none"> <li>- Analysis and design method of electronic circuits</li> <li>- Passive devices (R, L, C)</li> <li>- Diodes, MOSFET, bipolar transistors</li> <li>- Bipolar junction transistor (BJT) amplifier, FET amplifier</li> <li>- Differential amplifier and power amplifier, integrated operational amplifier</li> <li>- Analysis of feedback amplifier</li> <li>- Operating and handling of signals</li> <li>- Signal generator</li> <li>- Current regulated power supply</li> </ul> Laboratory <ul style="list-style-type: none"> <li>- Use of electronic instruments</li> <li>- Analysis of the characteristics of a single transistor amplifier and of a BJT-differential amplifier</li> <li>- Design and analysis of a feedback amplifier</li> <li>- OP-Amp applications (i.e. no inverting and inverting amplifier, addition-subtraction amplifier, integrator, differentiator, signal generators)</li> <li>- Signal generator(Sine Wave Oscillator)</li> </ul>		
Type of Media	Taught seminar: beamer, blackboard Laboratory: Laboratory course		
Type of Assessment	Taught seminar: Successful passing in written exam (PL)		

	Laboratory: Successful participation in 8 experiments including 2 labs based on PSOC (Programmable System-on-Chip) with written reports (PVL)
Literature	<ul style="list-style-type: none"> <li>- Hua Chengying. (2006): Fundamentals of Analog Electronics, TSINGHUA University Press</li> <li>- Kang Huaguang. (2013): Fundamentals of Electronic Technique, Higher Education Press</li> <li>- He Bing. (2012): The design Guide of PSoC Analog &amp;Digital Circuit, Chemical Industry Press</li> <li>- Robert Boylestan, (1996): Electronic Devices and Circuit Theory, Prentice-Hall ,Inc</li> </ul>

## DIGITALE SYSTEME

Name of module	<b>Digitale Systeme</b> <b>Digital Systems</b>	Number	E17
Courses	Lecture: Digital Systems DI Laboratory: Digital Systems DIP	Semester/ duration	3
Workload	80h attendance, 70 h self-study	Credits	5
Module responsibility	Gu Jin	Attendance hours	60 h + 20 h
Lecturers	Gu Jin, Li Haiying	Language	Chinese
Prerequisites	Recommended: Mathematics I & II, Electric Circuit I	Offered	Every academic year
Learning outcomes	<p>The students are able to</p> <ul style="list-style-type: none"> <li>- analyze and design combinational circuits using suitable minimization techniques</li> <li>- understand the operation of latches and flip-flops</li> <li>- optimize digital logical designs with state minimization and state encoding methods</li> <li>- develop a state diagram from a word description</li> <li>- optimize digital logical designs with state minimization and state encoding methods</li> </ul>		
Learning content	<p>Taught seminar</p> <ul style="list-style-type: none"> <li>- Boolean algebra and minimization techniques for combinational circuits</li> <li>- Basic introduction into logic gate characteristics and design of sequential circuits</li> <li>- Sequential circuits development methods based on Finite State Machine (FSM) descriptions</li> <li>- Digital system design with VHDL based on CPLD/FPGA platform</li> </ul> <p>Laboratory</p> <ul style="list-style-type: none"> <li>- Combination Circuits Design and Test</li> <li>- The design and application of encoder and decoder</li> <li>- Generation of impulse signals using gate circuits</li> <li>- Generation and Application of D/A and A/D converter</li> <li>- Digital System application Design and verification</li> </ul>		
Type of Media	<p>Taught seminar: beamer, blackboard</p> <p>Laboratory: Laboratory course</p>		
Type of Assessment	<p>Taught seminar: Successful passing in written exam (PL)</p> <p>Laboratory: Successful participation in 8 experiments including 2 labs based on PSOC(Programmable System-on-Chip)with written reports (PVL)</p>		
Literature	<ul style="list-style-type: none"> <li>- Yan Shi.(2016) Basic Digital Electronic Technology Sixth Edition. Higher Education Press</li> <li>- Kang Huaguang.(2006) Basic Electronic Technology-Digital Part (IV).Higher Education Press</li> </ul>		

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- JanM Rabaey.(2010 ) Digital Integrated Circuits A Design Perspective Second Edition. Electronic Industry Press
  - Meng Xianyuan, Qian Weikang.(2007) Embedded System Design with FPGA. Publishing House of Electronics Industry.

## LEISTUNGSELEKTRONIK

Name of module	<b>Leistungselektronik</b> <b>Power Electronics</b>	Number	E30d
Courses	Taught seminar: Leistungselektronik LE Laboratory: Praktikum Leistungselektronik LEP	Semester/ duration	5
Workload	80 h attendance, 70 h self-study	Credits	5
Module responsibility	Gustav Vaupel	Attendance hours	60 h + 20 h
Lecturers	Jens Ginzel, Michael Röther, Gustav Vaupel, Frerk Haase	Language	German
Prerequisites	Recommended: Mathematics I, II, Physics, Electrical Circuits I, II, Analogue Circuits	Offered	Every aca- demic year
Learning outcomes	<p>The students are able to</p> <ul style="list-style-type: none"> <li>- understand basics of behavior of DC machines and transformers</li> <li>- understand the special technical terms and definition of power and harmonics</li> <li>- describe the characteristic of simple line-commutated circuits and to design them under idealized conditions</li> <li>- describe the commutation characteristic and understand the influence of it</li> <li>- understand the behavior and characteristics of switch-mode power supplies</li> <li>- safety regulations when dealing with high voltages/currents,</li> <li>- methods and instruments for measuring high voltages/currents,</li> <li>- characteristics and applications of switch-mode components and circuits used in industrial components</li> <li>- steady state behaviour of DC-motor and transformer in applications</li> </ul>		
Learning content	<p>Taught seminar</p> <ul style="list-style-type: none"> <li>- technical terms, terms of power definition</li> <li>- power electronic devices (diode, thyristor, IGBT, MOSFET)</li> <li>- cooling</li> <li>- AC Controller</li> <li>- line-commutated converter, single-phase half-wave, bi-phase half-wave, single-phase bridge, three-phase bridge</li> <li>- rectifier, inverter</li> <li>- harmonics</li> <li>- switch-mode power supply</li> <li>- frequency converter</li> <li>- applications and basics of dc-motor and transformer</li> </ul> <p>Laboratory</p> <ul style="list-style-type: none"> <li>- Behavior of semiconductor components as power switches: Thyristor, Bipolar Transistor (GTR), IGBT, MOSFET</li> <li>- Behavior of simple circuits: Single-phase bridge, 3-phase bridge, switched-mode circuits</li> </ul>		

	<ul style="list-style-type: none"> <li>- Behavior of line-commutated 3-phase bridge</li> <li>- Steady-state characteristics of a f/v-converter</li> <li>- DC motor, transformer</li> </ul>
Type of Media	Taught seminar: Lecture, black board, beamer Laboratory: Lab experiments
Type of Assessment	Taught seminar: Written exam (PL) Laboratory: Successful participation in lab experiments (PVL)
Literature	<ul style="list-style-type: none"> <li>- R. Jäger, E. Stein: Leistungselektronik, VDE Verlag, (2011)</li> <li>- R. Jäger, E. Stein: Übungen zur Leistungselektronik, VDE Verlag, (2012)</li> <li>- K. Heumann: Grundlagen der Leistungselektronik, Springer Vieweg (Teubner), (1996)</li> <li>- U. Schlienz: Schaltnetzteile und ihre Peripherie, Springer Vieweg, (2007)</li> <li>- R. Fischer: Elektrische Maschinen, Hanser Verlag, (2013)</li> </ul>

## ELEKTRISCHE ANTRIEBE

Name of module	<b>Elektrische Antriebe</b> <b>Electrical Drives</b>	Number	E31d
Courses	Taught seminar: Elektrische Antriebe EA Laboratory: Praktikum Elektrische Antriebe EAP	Semester/ duration	5
Workload	80 h attendance, 70 h self-study	Credits	5
Module responsibility	Michael Röther	Attendance hours	60 h + 20 h
Lecturers	Jens Ginzl, Michael Röther, Gustav Vaupel, Frerk Haase	Language	German
Prerequisites	Recommended: Knowledge of Mathematics, Physics, Power Electronics	Offered	Every aca- demic year
Learning outcomes	<p>The students are able to</p> <ul style="list-style-type: none"> <li>- describe the transformer as equivalent circuit diagram and determine its elements</li> <li>- distinguish and describe the basic types of electrical machines regarding construction, function, behaviour, equivalent circuit diagram, characteristic curves and operation modes</li> <li>- distinguish and describe the basic types of converters for electrical machines regarding construction, function, behaviour, equivalent circuit diagram, characteristic curves and operation modes</li> <li>- calculate different operating points of electrical DC and AC drive systems, describe their control behaviour and design their control circuits (current control, speed control)</li> <li>- design DC and AC drive systems for electro-mechanical applications</li> <li>- prove the gained knowledge in laboratory experiments and interpret experimental results</li> </ul>		
Learning content	<p>Taught seminar</p> <ul style="list-style-type: none"> <li>- Transformer: Construction, function, equivalent circuit diagram</li> <li>- Electro-mechanical applications for translational and rotary motion: Gear box, crane and traction applications</li> <li>- Electrical machines: Basics of electro-mechanical energy conversion, DC and asynchronous machine</li> <li>- Converters for electrical DC and AC machines: Reverse power thyristor converter, IGBT converter, control methods</li> <li>- Electrical DC and AC drive systems: 4-quadrant operation, open and closed loop control methods</li> </ul> <p>Laboratory</p> <ul style="list-style-type: none"> <li>- Asynchronous machine fed by frequency converter</li> <li>- Determining the moment of inertia of a DC drive system</li> <li>- Open and closed loop control of a DC drive system</li> <li>- 4-quadrant DC drive system</li> </ul>		

Type of Media	Taught seminar:      Lecture, black board, beamer Laboratory:      Lab experiments
Type of Assessment	Taught seminar:      Written exam (PL) Laboratory:      Successful participation in lab experiments (PVL)
Literature	<ul style="list-style-type: none"> <li>- Fischer, R. (2013): Elektrische Maschinen, Hanser Fachbuchverlag</li> <li>- Schröder, D. (2013): Elektrische Antriebe – Grundlagen, Springer Verlag</li> <li>- Riefenstahl, U. (2010): Elektrische Antriebssysteme, Springer Vieweg Verlag</li> </ul>

## EINFÜHRUNG IN DIE REGELUNGSTECHNIK

Name of module	<b>Einführung in die Regelungstechnik</b> <b>Automatic Control</b>	Number	E32d
Courses	Taught seminar: Einführung in die Regelungstechnik GR Laboratory: Praktikum Einführung in die Regelungstechnik GRP	Semester/ duration	5
Workload	80 h attendance, 70 h self-study	Credits	5
Module responsibility	Ingo Winzenick	Attendance hours	60 h + 20 h
Lecturers	Florian Wenck, Holger Gräßner, Ingo Winzenick	Language	German
Prerequisites	Recommended: Mathematics, Complex functions and Integral Transformations, Electrical Circuits, Analog Circuits	Offered	Every academic year
Learning outcomes	The students are able to <ul style="list-style-type: none"> <li>- to analyze given real world systems and</li> <li>- model specific systems via description by transfer functions as well as</li> <li>- derive the system related time behavior</li> <li>- examine the stability of a given feedback system by different criteria which is usually a necessary condition in Industry-4.0-Applications and</li> <li>- be familiar with the basic types of industrial controllers such as P, PI, PD, PID and their specific characteristics and design rules.</li> </ul>		
Learning content	Taught seminar/ Laboratory <ul style="list-style-type: none"> <li>- Brief introduction to Softwaretools (e. g. MatLab)</li> <li>- System description with transfer functions</li> <li>- Basic state space representations</li> <li>- Open/close loop systems</li> <li>- Stability considerations in time and frequency domain</li> <li>- P-, PI-, PD-, PID-controllers</li> <li>- Linearization of nonlinear systems</li> <li>- Controller design in frequency domain</li> </ul>		
Type of Media	Taught seminar: Lecture, black board, beamer Laboratory: Lab experiments		
Type of Assessment	Taught seminar: Written exam (PL) Laboratory: Successful participation in lab experiments (PVL)		
Literature	<ul style="list-style-type: none"> <li>- Schulz; Graf: Regelungstechnik 1, De Gruyter Oldenbourg Verlag, ISBN 978-3-11-041446-2</li> <li>- Lunze: Regelungstechnik 1, Springer Verlag, ISBN: 978-3-642-13807-2</li> <li>- Lutz, Wendt: Taschenbuch der Regelungstechnik, Harri Deutsch Verlag, ISBN 3-8171-1668-3;</li> <li>- Bode: Matlab-Simulink, Analyse und Simulation dynamischer Systeme, Teubner Verlag, ISBN 978-3-486-73297-9</li> </ul>		

## FORTGESCHRITTENE KONZEPTE UND METHODEN DER AUTOMATISIERUNGSTECHNIK

Name of module	<b>Fortgeschrittene Konzepte und Methoden der Automatisierungstechnik</b> <b>Advanced Concepts and Methods in Automation</b>	Number	E38d
Courses	Lecture: Fortgeschrittene Konzepte und Methoden der Automatisierungstechnik AT  Laboratory: Fortgeschrittene Konzepte und Methoden der Automatisierungstechnik Praktikum ATP	Semester/ duration	6
Workload	80 h attendance (lecture + lab), 70 h self-study	Credits	5
Module responsibility	Florian Wenck	Attendance hours	60 h + 20 h
Lecturers	Florian Wenck, TBD	Language	German
Prerequisites	Recommended:  Knowledge in Automatic Control, PLC Control, Fieldbus Systems, Object-Oriented Programming, Complex Functions and Integral Transformation	Offered	Every academic year
Learning outcomes	<p>The students</p> <ul style="list-style-type: none"> <li>- know the terms and methods used within the context of Smart Factories and Industry 4.0 to understand their added value.</li> <li>- are able to understand and use formal models or descriptions used within this context to analyze and design components of Smart Factories (e.g. digital controllers).</li> <li>- are able to understand and use modern communication standards to enable information/data exchanges within Smart Factories.</li> <li>- can identify use cases and proper technologies for Industry 4.0 within their enterprise to optimize desired targets such like quality, flexibility and costs</li> </ul>		
Learning content	<p>Taught seminar</p> <ul style="list-style-type: none"> <li>- Introduction to Smart Factories and Industry 4.0 (Reference Architecture Model I4.0, RAMI4.0) including use cases (e.g. lot-size 1 flexibility, uptime optimization/predictive maintenance, quality and costs etc.)</li> <li>- Cyber Physical Systems as components of Smart Factories: Basics, structures, machine intelligence, examples</li> <li>- Models for advanced automation concepts (models for digital systems, object-oriented information models, neural network models, virtual twins, management shells)</li> <li>- Analysis and design of digital control subsystems and their implementation (e.g. on embedded microcontroller or PLCs)</li> <li>- Intelligent periphery: Basics in IoT, protocols and RFID</li> <li>- OPC-UA as a communication standard in Industry 4.0</li> </ul>		

	<ul style="list-style-type: none"> <li>- Manufacturing Execution Systems and their relevance for Smart Factories</li> <li>- Data Analytics: From raw machine data to Smart Data (use case: Predictive Maintenance)</li> </ul> <p>Laboratory</p> <ul style="list-style-type: none"> <li>- PC Lab: Introduction to MATLAB/Simulink with respect to the needed functionalities (control system toolbox, predictive maintenance toolbox, neural network toolbox etc.)</li> <li>- PC Lab: Designing digital controllers using MATLAB/Simulink (including simulation)</li> <li>- I4.0 Lab: Implementing digital controllers on CPS/PLCs (either real HW or virtual twins)</li> <li>- I4.0 Lab: Setting-up virtual twins</li> <li>- I4.0 Lab: Realizing machine data communication using OPC-UA</li> <li>- I4.0 Lab: Designing a (simple) predictive maintenance algorithm using neural networks</li> </ul>
Type of Media	<p>Taught seminar: Tuition in seminars, blackboard, slides, computer simulation</p> <p>Laboratory: PC Lab: Computers, I4.0 Lab: Production plant</p>
Type of Assessment	<p>Taught seminar: Successful passing in written exam (PL)</p> <p>Laboratory: Successful participation of all tasks (PVL)</p>
Literature	<ul style="list-style-type: none"> <li>- Own lecture notes (copy template)</li> <li>- Lunze, J. (2016): Regelungstechnik 2: Mehrgrößensysteme, Digitale Regelung; Springer Verlag</li> <li>- T Bauernhansl et.al. (2017): Handbuch Industrie 4.0, Band 1 – 4, Springer Verlag</li> <li>- T Bauernhansl et.al. (2014): Industrie 4.0 in Produktion und Automatisierung, Springer Verlag</li> </ul>

Name of module	<b>Sensortechnik</b> <b>Sensor Technology</b>	Number	E24
Courses	Taught seminar: Sensor Technology SE Laboratory: Sensor Technology Lab SEP	Semester/ duration	4
Workload	48h attendance, 42h self-study	Credits	3
Module responsibility	Shen Jianqiang	Attendance hours	40 h+8 h
Lecturers	Shen Jianqiang, Jiao Xinbing	Language	Chinese
Prerequisites	Recommended: Mathematics I & II, Physics, Circuits, Analogue Circuits	Offered	Every aca- demic year
Learning outcomes	<p>The students will be able to</p> <ul style="list-style-type: none"> <li>- do data processing and error analysis for measurements</li> <li>- know the structure, working principles and main characteristics of sensors used commonly</li> <li>- master the measuring methods of non-electric parameters and have the ability to select sensors and design testing systems</li> <li>- know the application of microprocessor in measurement</li> <li>- construct a fundamental measuring system and adjust measuring circuits</li> <li>- use resistance transducers, inductance transducers and capacitance transducers to measure displacement and rotational speed etc.</li> </ul>		
Learning content	<p>Taught seminar</p> <p>Data processing and analysis of measurement errors:</p> <ul style="list-style-type: none"> <li>- Selection of testing instruments and methods according to required measuring precision</li> <li>- Data processing and calculation of standard deviation, careless errors, estimating value of the true value and believed area</li> </ul> <p>Structures, principles and characteristics of common sensors:</p> <ul style="list-style-type: none"> <li>- Resistance transducers, inductance transducers, capacitance transducers, piezo transducers, thermocouples, eddy-current, photoelectric transducers, Hall transducers, digital displacement transducer</li> <li>- Wireless sensors and WSN (Wireless Sensor Network)</li> </ul> <p>Sensors for non-electric parameters:</p> <ul style="list-style-type: none"> <li>- Force, torque, displacement, velocity, acceleration, temperature, pressure</li> <li>- Selection of sensors and design of measuring</li> </ul> <p>Microprocessors in testing instruments:</p> <ul style="list-style-type: none"> <li>- Introduction of microprocessor-based testing systems</li> <li>- Data sampling and converting by microprocessors</li> <li>- Measured data processing by microprocessors</li> <li>- Image processing and pattern recognition.</li> </ul> <p>Laboratory</p>		

	<ul style="list-style-type: none"> <li>- Measuring circuits and resistance transducer</li> <li>- Inductance and capacitance transducers</li> <li>- Other transducers (e.g. Hall transducer)</li> <li>- Non-electric parameter measurement based on microprocessor</li> </ul>
Type of Media	<p>Taught seminar: blackboard, beamer</p> <p>Laboratory: Laboratory and computer practical course</p>
Type of Assessment	<p>Taught seminar: Successful passing in written exam (PL)</p> <p>Laboratory: Successful participation in 6 measurement labs with written reports (PVL)</p>
Literature	<ul style="list-style-type: none"> <li>- Chen Jie etc. (2010): Sensor and Detection Technology(Second edition), Higher Education Press</li> <li>- Chang Jiansheng (2006): Detection and conversion technology(Third edition), China Machine Press</li> <li>- Yu Chengbo etc.(2014): Sensor and Modern Detection Technology(Sec-ond edition), Tsinghua University Press I</li> <li>- Fang Yanjun etc. (2006): Detection Technology and Systems, China Elec-tric Power Press</li> </ul>

## EMBEDDED SYSTEMS IN DER AUTOMATISIERUNGSTECHNIK

Name of module	<b>Embedded Systems in der Automatisierungstechnik</b> <b>Embedded Systems for Automation</b>	Number	E39
Courses	Lecture: Embedded Systems for Automation ES Laboratory: Embedded Systems Lab ESP	Semester/ duration	6
Workload	80h attendance, 70h self-study	Credits	5
Module responsibility	Shen Jianqiang	Attendance hours	60 h+20 h
Lecturers	Shen Jianqiang, Qin Xiaofei	Language	Chinese
Prerequisites	Recommended: Digital Circuits, Introduction of Programming	Offered	Every academic year
Learning outcomes	<p>The students are be able to</p> <ul style="list-style-type: none"> <li>- understand the working principle of Embedded Systems and relevant conceptions and knowledge</li> <li>- work with integrated development environments (Keil uVision4 and PSOC creator 2.0)</li> <li>- design programs with assembly language or C language based on two kinds of typical embedded processors: MCS-51 (8-bit processor) and ARM Cortex-M3 (32-bit processor)</li> <li>- analyze and design a semi-conductor memory system for an embedded system</li> <li>- design and use basic I/O interface circuits</li> <li>- design applications of Embedded Systems in electrical engineering and automation</li> </ul>		
Learning content	<p>Taught seminar</p> <ul style="list-style-type: none"> <li>- Basic conceptions of embedded system: basic composition, structure, classification of embedded processors and applications in electrical engineering and automation</li> <li>- The structure of MCS-51: basic composition of Micro Controller, pin functions, CPU timing diagram, reset operation and memory allocation and input/output ports</li> <li>- The instruction set of MCS-51 and assemble language programming: instruction functions, addressing modes, address space and basic structure of the assemble language program</li> <li>- Interrupts and timers of MCS-51: interrupt concept, structure and control of interrupt system, procedure of interrupt response, process and return; timer and control mode</li> <li>- Expanding memory and input/output ports for a small MCS-51 system</li> <li>- Programming using C51 (C language assembler for MCS-51): characteristics and program structure of C51, data types and operators of C51, programming using C51 or a combination of C51 and assemble language programming</li> </ul>		

	<ul style="list-style-type: none"> <li>- ARM embedded processors: ARM Architecture, overview of the ARM Cortex-M3, PSOC5 and STM32</li> <li>- Cortex-M3 Basics and programming: instruction set, registers, interfaces, memory systems, exceptions, interrupts and programming with assemble language or C language</li> </ul> <p>Laboratory</p> <ul style="list-style-type: none"> <li>- Work with integrated development environments (Keil uVision4 and PSOC creator 2.0) and learn using the MCU equipment in the lab</li> <li>- Basic programming using assembly language or C51</li> <li>- Programming with input/output ports</li> <li>- Programming for keyboard and LCD display</li> <li>- Experiments using interrupts and timers of MCS-51</li> <li>- Programming for ADC and DAC</li> <li>- Non-electric parameter (e.g. temperature) measurement and display with MCS-51</li> <li>- Programming based on Cortex-M3 (32-bit MCU)</li> </ul>
Type of Media	<p>Taught seminar: blackboard, beamer, PC with simulation software</p> <p>Laboratory: software: Keil uVision4, PSOC creator 2.0 and relevant devices</p>
Type of Assessment	<p>Taught seminar: Successful passing in written exam (PL)</p> <p>Laboratory: Successful participation in 10 labs with written reports (PVL)</p>
Literature	<ul style="list-style-type: none"> <li>- Qiu Chunling etc. (2016): Fundamentals of Single Chip Computer and Embedded System, China Machine Press</li> <li>- Liu Xianrong etc. (2016): The Principle and Technology of Microcomputer and Embedded Interface, Xi Dian University Press</li> <li>- He Bin.(2012) : The Principle and Application of Cortex-M3 Programmable System-on-Chip, Chemical Industry Press</li> <li>- Daniel W. Lewis.(2013): Fundamentals of Embedded Software with the ARM Cortex-M3(Second Edition), Pearson Education ,Inc.</li> </ul>

## PROGRAMMIERBARE INDUSTRIELLE STEUERUNGSTECHNIK UND BUSSYSTEME

Name of module	<b>Programmierbare industrielle Steuerungstechnik und Bussysteme</b> <b>Industry Programmable Automatic Control and Bussystems</b>	Number	E25
Courses	Lecture: Programmierbare industrielle Steuerungstechnik und Bussysteme IS Laboratory: Programmierbare industrielle Steuerungstechnik und Bussysteme ISP	Semester/ duration	4
Workload	80 h attendance, 70 h self-study	Credits	5
Module responsibility	Si Chengyong	Attendance hours	60 h + 20 h
Lecturers	Si Chengyong, Zhang Huilin	Language	Chinese
Prerequisites	Recommended: Digital Systems, Basic knowledge of programming	Offered	Every academic year
Learning outcomes	<p>The students are be able to</p> <ul style="list-style-type: none"> <li>- grasp the elementary knowledge of the programmable controller and field bus</li> <li>- understand and to adjust and maintain PLC in their control system</li> <li>- select right input elements for signals sampling and set up input circuits</li> <li>- select right output elements for driving loads and set up output circuits</li> <li>- select PLC system, function block, interface and net bus system</li> </ul>		
Learning content	<p>Taught seminar</p> <ul style="list-style-type: none"> <li>- Basic structure and working principle of PLC</li> <li>- Programming basics in PLC, including: programming language standard, data type and addressing modes, main logical instructions</li> <li>- Ladder diagram programming method in data control system</li> <li>- Principle of sequence control and its design approach</li> <li>- Design method of ladder diagram in sequence control</li> <li>- Function command in PLC (Siemens S7-300), including the instruction rules, program control instruction, local variable, data process instruction, math operation instruction, interrupt program and instruction, high speed counter and pulse output instruction</li> <li>- Communication of PLC in industry and industrial communication networks, including the international communication standard, serial communication networks of S7-300, communication instructions of S7-300</li> <li>- Application of PLC in closed-loop control</li> <li>- Introduction of STEP7 software</li> </ul> <p>Laboratory</p> <ul style="list-style-type: none"> <li>- Contest responder control system</li> <li>- Automatic control traffic lights</li> <li>- Product quality automatic statistics</li> </ul>		

	- Communications between PLC and computer, or PLCs
Type of Media	Taught seminar: Tuition in seminars, blackboard, slides, computer simulation Laboratory: Laboratory -practical course
Type of Assessment	Taught seminar: Successful passing in written exam (PL) Laboratory: Successful participation of all tasks (PVL)
Literature	<ul style="list-style-type: none"> <li>- Shunping, J. (2011): Principle and application of programmable logic controller, China Machine Press</li> <li>- Xuelin H. (2012): Principle and application of programmable logic controller, Second edition, Publishing House of Electronics Industry</li> <li>- Hanqi, Y., Jian G. (2010): Principle and application of programmable logic controller, Second edition, China Electric Power Press</li> </ul>

## VORTRÄGE AUS DER PRAXIS I + II

Name of module	<b>Vorträge aus der Praxis I + II</b> <b>Reports from Industry I + II</b>	Number	E35, E42
Courses	Lecture: Vorträge aus der Praxis VP1, VP2	Semester/ duration	5, 6
Workload	32 h attendance, 28 h self-study	Credits	2*1
Module responsibility	Si Chengyong	Attendance hours	2*16 h
Lecturers	All lecturers	Language	Chinese
Prerequisites	Recommended: technical courses of second year, Economical knowledge, logistic knowledge	Offered	Every aca- demic year
Learning outcomes	<p>The students are able to</p> <ul style="list-style-type: none"> <li>- get to know what kind academic qualifications industry is interested in, such as major knowledge, or language skills etc.</li> <li>- get to know what kind of social qualifications industry is interested in, such as: active, team working, communication skill etc.</li> <li>- get to know what a good engineer needs to learn.</li> <li>- have the exact aims for language and major learning.</li> <li>- make the good preparation for participating in the internship in the 7th Semester.</li> </ul>		
Learning content	<p>Taught seminar</p> <p>This unit is for students to get training before going into the industry. The students would get answers for questions such as:</p> <ul style="list-style-type: none"> <li>- what an engineer would do in industry</li> <li>- what kind of skill an engineer should have</li> <li>- what kind of staff the industry would like to get</li> <li>- what kind of knowledge the students should have</li> </ul>		
Type of Media	Taught seminar:      Lecture, black board, beamer		
Type of Assessment	<p>Reports from Industry I: homework (SL)</p> <p>Reports from Industry II: written exam (PL)</p>		
Literature	Literature according to the subject		

## GRUNDLAGEN DES MASCHINENBAUS

Name of module	<b>Grundlagen des Maschinenbaus</b> <b>Mechanical Engineering Basics</b>	Number	E40
Courses	Reports from Industry I + II: Mechanical Engineering Basics GM Laboratory: Mechanical Engineering Basics GMP	Semester/ duration	6
Workload	80 h attendance, 70 h self-study	Credits	5
Module responsibility	Cui Jiankun	Attendance hours	60 h + 20 h
Lecturers	Cui Jiankun, Yang Chengsan, Ma Yanyan,	Language	Chinese
Prerequisites	Recommended: Knowledge of Mathematics I, II, Physics	Offered	Every academic year
Learning outcomes	<p>The students are be able to</p> <ul style="list-style-type: none"> <li>- understand GB standards and rules of drawings and master the regular description methods of machine parts</li> <li>- read detail drawings and assembly drawings and make detail drawings and assembly drawings with computer drafting software</li> <li>- understand the working principles of common mechanism, such as planar links, cams and gears, etc.</li> <li>- understand common machine and transmission used in mechanical engineering, mastering features and the application of common parts and components</li> <li>- understand the Principles of industrial robot mechanism</li> </ul>		
Learning content	<p>Reports from Industry I + II</p> <ul style="list-style-type: none"> <li>- Introduction to GB standards and rules of drawings; the fundamentals of projection; six principal views, auxiliary views, sectional and conventional views</li> <li>- Views selection in detail drawings; description methods in assembly drawings</li> <li>- Making 3D solid assembly and conversion to assembly drawings</li> <li>- Motion sketch of mechanisms; freedom of mechanisms</li> <li>- Working principles of common mechanisms including planar links, cams and gears, etc.</li> <li>- Belt drives and chain drives; gear drives; knock-down connection; shafts and bearing</li> <li>- The fundamentals of industrial robot mechanism</li> </ul> <p>Laboratory</p> <ul style="list-style-type: none"> <li>- Making 3D solid modeling and conversion to detail drawings</li> <li>- Mechanism mapping</li> <li>- Gear experiment</li> <li>- Mechanism comprehensive</li> <li>- Industrial robot experiments</li> </ul>		

Type of Media	Reports from Industry I + II: Beamer, PC with simulation software Laboratory: Laboratory equipment
Type of Assessment	Reports from Industry I + II: Successful passing in written exam (PL) Laboratory: Successful participation of all tasks (PVL)
Literature	<ul style="list-style-type: none"> <li>- Qiu wenyan and Qu yuanshang.(2010): Mechanical Drawing, Higher Education Press</li> <li>- Yang Kezhen, Cheng Guangyun.(2013): Fundamentals of Mechanical Design, Higher Education Press</li> <li>- Yang Shuzi, Li Peigen.(2012): Industrial robots, Huazhong university of science and technology press</li> <li>- Experiment instructions</li> </ul>

## PROJEKT

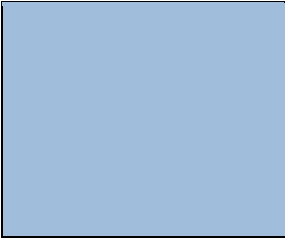
Name of module	<b>Projekt</b> Project	Number	E46
Courses	Laboratory: Project KP in small groups	Semester/ duration	7
Workload	60 h attendance, 120 h self-study	Credits	6
Module responsibility	Shen Jianqiang	Attendance hours	50 h
Lecturers	Shen, Jianqiang, Si Chengyong, Zhou Ying, all other lecturers	Language	Chinese/ German
Prerequisites	Recommended: Knowledge of Mathematics I, II, Embedded Systems for Automation, Sensor Technology, Industry Programmable Automatic Control and Bussystems, Advanced Control	Offered	Every academic year
Learning outcomes	The students are be able to <ul style="list-style-type: none"> <li>- apply the theoretical knowledge gained in the proceeding courses to finish a system in electric engineering &amp; automation field</li> <li>- cooperate with other members in a team work during the designing and realizing the project</li> <li>- raise the capability of finding, analyzing, solving problems in EE project</li> <li>- write the final report and make a presentation for the project</li> </ul>		
Learning content	Laboratory <ul style="list-style-type: none"> <li>- learn to look for the project which comes from lab or industry</li> <li>- learn to work on a technical project in a team</li> <li>- learn to organize a group and divide task for everybody</li> <li>- learn to design a system which can realize some functions in automatic field</li> <li>- learn to do the real system related to automation engineering, control systems, power electronics and drives engineering etc.</li> <li>- learn to do a discussion, a presentation of results, analyzing problems</li> <li>- learn to write a final project report and provide project result with some media</li> </ul>		
Type of Media	Laboratory: Computer, beamer, blackboard, developing hardware platform, and controlled objects depending on different projects. EE Lab can provide the hardware as following: DC motor speed control, water tank liquid height control, and temperature control, music spring control, washing machine control, liquid mixing machine, step motor control, traffic light control, answering machine control etc.		
Type of Assessment	Laboratory: report and presentation (PL)		
Literature	<ul style="list-style-type: none"> <li>- Some relative electrical textbook, handbook, manual</li> <li>- Guide book for realizing the project</li> <li>- Specification of the equipment depending on different project topics</li> </ul>		

## PRAXISAUFBILDUNG UND PRAXIS-KOLLOQUIUM

Name of module	<b>Praxisausbildung und Praxis-Kolloquium</b> <b>Industrial Training with Colloquium</b>	Number	E48
Courses	Praxisausbildung PA Praxiskolloquium PAK	Semester/ duration	7, 8
Workload	Total 720 h attendance, selfstudy 180 h	Credits	27 + 3
Module responsibility	Si Chengyong	Attendance hours	720 h
Lecturers	All lecturers	Language	Chi- nese/Ger- man
Prerequisites	At the beginning of the practical training all achievements of the first two academic years must have been achieved.	Offered	Every aca- demic year
Learning outcomes	<p>The students are able to</p> <ul style="list-style-type: none"> <li>- have certain understanding about the operation, management, culture of enterprises</li> <li>- have certain understanding about the relevant production equipment, process procedures, product testing, logistics warehousing, material procurement, and after-sales service</li> <li>- improve their ability of teamwork and cross-cultural communication</li> <li>- further enhance the abilities of combining theory and practice</li> <li>- give a written report about their internship in Chinese and German language</li> <li>- give an oral presentation regarding their practical education</li> <li>- report frequently about their progress in the internship</li> <li>- apply the principles of technical writing/presentation</li> </ul>		
Learning content	<ul style="list-style-type: none"> <li>- In the practical education, students should apply the theoretical knowledge learned in class to their job realities, solving the actual problems with their job position.</li> <li>- The students develop their own abilities to raise questions, analyze questions and solve practical problems.</li> <li>- With increased familiarity with the work, the students further play subjective initiative to adapt to the company's working mechanism</li> </ul>		
Type of Media			
Type of Assessment	<p>In general, students should submit internship reports in Chinese and German to both Chinese and German teachers every four weeks. Final reports should be submitted at the end of the Practical education.</p> <p>Referat (PL), frequent reports and communication and successful (scored) Colloquium</p>		
Literature			

## BACHELORARBEIT UND BACHELOR-KOLLOQUIUM

Name of module	<b>Bachelorarbeit und Bachelor-Kolloquium</b> <b>Bachelor Thesis and Bachelor Colloquium</b>	Number	E49, E50
Courses	Bachelorarbeit BAR Bachelor-Kolloquium BAK	Semester/ duration	8
Workload	450 h selfstudy	Credits	12+ 3
Module responsibility	Si Chengyong	Attendance hours	
Lecturers	All lecturers	Language	Chinese/German
Prerequisites	Students should have finished all relevant courses for mechanical engineering	Offered	Every academic year
Learning outcomes	<p>The students are able to</p> <ul style="list-style-type: none"> <li>- apply the relevant theoretical knowledge gained in the proceeding bachelor thesis topics to solve a practical or experimental problems in their specific environment</li> <li>- write technology report, drawings or programs after the bachelor thesis is done</li> <li>- improve their ability of expressing the questions and presentation skills in German and in Chinese</li> <li>- improve their ability of applying the relevant theoretical knowledge gained into comprehensive application</li> </ul>		
Learning content	<ul style="list-style-type: none"> <li>- Applying the relevant theoretical knowledge gained into comprehensive application</li> <li>- The main content, process, difficulties and the methods to solve them; the final conclusion and harvest of their bachelor thesis in German and in Chinese</li> <li>- Bachelor thesis is an theoretical, technical and experimental or practical written thesis</li> <li>- Express the main content, process, difficulties and the methods to solve them, and the final conclusion and harvest of their bachelor thesis in German and in Chinese</li> <li>- The time for the presentation is in 15 to 20 minutes in each language</li> <li>- Answer the German or Chinese teachers' questions thoroughly and correctly</li> </ul>		
Type of Media	Self-reliant scientific work		
Type of Assessment	<p>Successful passing in written report, drawings or programs: 12 CP (PL)</p> <p>Successful passing in presentation and Colloquium (Oral Exam): 3 CP (PL)</p>		
Literature	<ul style="list-style-type: none"> <li>- H. Corsten, J. Deppe: Technik des wissenschaftlichen Arbeitens. 3. Auflage. München 2008.</li> <li>- N. Franck, J. Stary: Die Technik wissenschaftlichen Arbeitens. Eine praktische Anleitung, 15. Aufl., Paderborn, 2009.</li> </ul>		

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- M. Kornmeier: Wissenschaftlich schreiben leicht gemacht: für Bachelor, Master und Dissertation, 4. Aufl., UTB (Haupt-Verlag), Bern 2011.
  - A. Brink: Anfertigung wissenschaftlicher Arbeiten. 3. Aufl. München/Wien 2007.
  - T. Plümper: Effizient Schreiben: Leitfaden zum Verfassen von Qualifikationsarbeiten und wissenschaftlichen Texten, Oldenbourg Verlag, 2003

## WAHLPFLICHTMODULE (NICHT-TECHNISCH)

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## MARKFORSCHUNG UND -ANALYSE

Name of module	<b>Markforschung und -analyse</b> <b>Market Research and Analysis</b>	Number	E41.1
Courses	Taught seminar: Market Research and Analysis MRA	Semester/ duration	6
Workload	48h attendance, 42h self-study	Credits	3
Module responsibility	Guo Jianquan	Attendance hours	48 h
Lecturers	Guo Jianquan, Wu Shu	Language	Chinese
Prerequisites	Recommended: Knowledge of Mathematics I, II, Basic knowledge of computer technology, Partial knowledge of Linear Algebra	Offered	Every academic year
Learning outcomes	The students are able to <ul style="list-style-type: none"> <li>- analyze simple market situation and trends</li> <li>- use basic tools to investigate potential consumers' views about products or services</li> <li>- carry out a survey program, as a project leader or a member of a project</li> <li>- make analysis of a market survey project, with the aid of related computer software</li> <li>- make presentation about the analysis report</li> </ul>		
Learning content	Taught seminar <ul style="list-style-type: none"> <li>- Fundamental concepts of market survey and analysis</li> <li>- Methods and steps of market survey and analysis</li> <li>- Sampling survey</li> <li>- Official documents and letters survey</li> <li>- Observational method and access method</li> <li>- Questionnaire survey</li> <li>- Experimentation survey</li> <li>- Attitude observation table</li> <li>- Market forecast and analysis methods and steps</li> </ul>		
Type of Media	Taught seminar: Tuition in seminars, blackboard, slides, computer software		
Type of Assessment	Taught seminar: Successful passing in written exam (PL)		
Literature	<ul style="list-style-type: none"> <li>- Own lecture notes (copy template or digital).</li> <li>- Li lan, Liu. (2012): Market survey and forecast, Beijing, Economy science Publishing.</li> <li>- Qi Jie, Chen. (2014): Market survey and forecast, Shanghai finance and economics Publishing.</li> </ul>		

## ÖKONOMETRIE

Name of module	<b>Ökonometrie Econometrics</b>	Number	E41.4
Courses	Taught seminar: Econometrics EC	Semester/ duration	6
Workload	32h attendance, 28h self-study	Credits	2
Module responsibility	Wu Shu	Attendance hours	32 h
Lecturers	Wu Shu, Guo Jianquan	Language	Chinese
Prerequisites	Recommended: Knowledge of Mathematics I, Mathematics II, Linear Algebra	Offered	Every academic year
Learning outcomes	The students are able to <ul style="list-style-type: none"> <li>- combine qualitative analysis with quantitative analysis to explore the changing rules of various economic phenomena</li> <li>- use large amounts of data related to theory and reality to conduct empirical studies on the inherent law of economic activities, with the help of statistical parameter estimation, hypothesis testing and correlation analysis, regression analysis, by constructing a model,</li> <li>- master basic principles and methods of econometrics, familiar with formula calculation methods and the relevant, and can correctly interpret results</li> </ul>		
Learning content	Taught seminar <ul style="list-style-type: none"> <li>- Mathematical Review</li> <li>- Problems of model settings and data</li> <li>- Unary linear regression models</li> <li>- Multiple linear regression models</li> <li>- large sample OLS</li> <li>- Models whose basic assumptions relaxed</li> <li>- Time series economics models</li> <li>- Economics models of non-classical cross section data</li> <li>- Economics application models of Econometric</li> <li>- Logistics information collection technology</li> <li>- Information guidance technology</li> </ul>		
Type of Media	Taught seminar: Tuition in seminars, blackboard, slides		
Type of Assessment	Taught seminar: Successful passing in written exam (PL)		
Literature	<ul style="list-style-type: none"> <li>- LI Zinai, PAN Wenqing (2015) : Econometrics, Higher Education Press</li> <li>- CHEN Qiang.(2016): Econometrics and the application of Stata, Higher Education Press</li> <li>- PAN Wenqing, LI Zinai (2016):Learning guide and practice in Econometric, Higher Education Press</li> </ul>		

## PROJEKTMANAGEMENT

Name of module	<b>Projektmanagement</b> <b>Project Management</b>	Number	E41.5
Courses	Taught seminar: Projektmanagement PM	Semester/ duration	6
Workload	32h attendance, 28h self-study	Credits	2
Module responsibility	Si Chengyong	Attendance hours	32 h
Lecturers	Si Chengyong, Gu Jin	Language	Chinese
Prerequisites	Recommended: Knowledge of control, incl. Introduction of Control, Advanced Control	Offered	Every academic year
Learning outcomes	The students are able to <ul style="list-style-type: none"><li>- grasp the elementary knowledge of project management</li><li>- grasp the important tool in project management</li><li>- understand and cooperate with team members in project process</li><li>- manage a small project in EE domain</li></ul>		
Learning content	Taught seminar <ul style="list-style-type: none"><li>- Preliminaries: Form and content of the project plan, project planning process, project control principles and types, project control process</li><li>- Project schedule and control: Tools and preparation, critical path method and PERT, progress control</li><li>- Project resource planning and balance: Gantt charts, resource requirements figures and demand table, resource balance, resource allocation</li><li>- Project cost planning and control: Project cost estimation, project budget, project cost control, coordination control for project schedule and cost</li><li>- Quality planning and control: Project quality management system, project quality Plan, project quality assurance, project quality control</li></ul>		
Type of Media	Taught seminar:	Tuition in seminars, blackboard, slides	
Type of Assessment	Taught seminar:	Successful passing in written exam (PL)	
Literature	<ul style="list-style-type: none"><li>- Xiangnan L. (2009): Project Planning and Control, second edition, China Machine Press</li><li>- PMI (2008): A Guide to the Project Management Body of Knowledge, fourth edition, Publishing House of Electronics Industry</li></ul>		

## LOGISTIKMANAGEMENT

Name of module	<b>Logistikmanagement</b> <b>Logistics Management</b>	Number	E41.3
Courses	Taught seminar: Logistics Management LMA	Semester/ duration	6
Workload	32h attendance, 28h self-study	Credits	2
Module responsibility	Wu Shu	Attendance hours	32 h
Lecturers	Wu Shu, Guo Jianquan	Language	Chinese
Prerequisites	Recommended: Knowledge of Mathematics I, Mathematics II	Offered	Every academic year
Learning outcomes	The students are able to <ul style="list-style-type: none"><li>- understand the practical value of logistics and transportation/handling/packaging and storage technology in logistics management</li><li>- understand the basic situation of all kinds of mature technology in modern logistics management process</li><li>- master the application of logistics system planning and logistics distribution technology in practice</li></ul>		
Learning content	Taught seminar <ul style="list-style-type: none"><li>- Logistics system</li><li>- Container unit technology and equipment</li><li>- Transportation technology and equipment</li><li>- Material handling technology and equipment</li><li>- Conveying equipment</li><li>- Sorting technology and equipment</li><li>- Logistics information collection technology</li><li>- Information guidance technology</li></ul>		
Type of Media	Taught seminar:	Tuition in seminars, blackboard, slides	
Type of Assessment	Taught seminar:	Successful passing in written exam (PL)	
Literature	<ul style="list-style-type: none"><li>- Huo hong, LIU Li . (2011): Logistics management, Higher Education Press</li><li>- HUANG Fuhua, ZHOU Min .(2016): Enterprise logistics management, Higher Education Press</li><li>- CHENG Guoquan.(2007): Technology and equipment of logistics, Higher Education Press</li></ul>		

## QUALITÄTSMANAGEMENT

Name of module	<b>Qualitätsmanagement</b> <b>Quality Assurance</b>	Number	E41.2
Courses	Taught seminar: Quality Assurance QM	Semester/ duration	6
Workload	48h attendance, 42h self-study	Credits	3
Module responsibility	Wu Shu	Attendance hours	48 h
Lecturers	Wu Shu, Guo Jianquan	Language	Chinese
Prerequisites	Knowledge of Mathematics I, Mathematics II	Offered	Every academic year
Learning outcomes	The students are able to <ul style="list-style-type: none"> <li>- evaluate product and process quality</li> <li>- use statistical techniques to do quantitative analysis</li> <li>- grasp the quality management system elements and new methods of modern quality management</li> <li>- master the basic concepts, basic principles and various quantitative methods and the compilation of charts</li> </ul>		
Learning content	Taught seminar <ul style="list-style-type: none"> <li>- Basic methods of quality management</li> <li>- System of quality management</li> <li>- Quality management in designing process</li> <li>- Quality inspection and sampling inspection</li> <li>- Quality improvement and 6<math>\sigma</math> management</li> <li>- Quality cost optimization and management</li> <li>- Quality supervision</li> </ul>		
Type of Media	Taught seminar: Tuition in seminars, blackboard, slides		
Type of Assessment	Taught seminar: Successful passing in written exam (PL)		
Literature	<ul style="list-style-type: none"> <li>- SUN Jing (2013): Quality management Science, Higher Education Press</li> <li>- YU Xiao ling, CHEN Shihua (2011): Quality management, Higher Education Press</li> </ul>		

## WAHLPFLICHTMODULE (TECHNISCH)

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## EIN-CHIP-MIKROCOMPUTER

Name of module	<b>Ein-Chip-Mikrocomputer</b> <b>Single Chip Computer</b>	Number	E47.1
Courses	Taught seminar: Single Chip Computer (STM32 ) SCC Laboratory: Single Chip Computer Lab SCCP	Semester/ duration	7
Workload	48h attendance, 42h self-study	Credits	3
Module responsibility	Xia Kun	Attendance hours	32h+16h
Lecturers	Xia Kun, Shen Jianqiang	Language	Chinese
Prerequisites	Recommended: Embedded Systems for Automation, Introduction of Programming, Digital Circuits	Offered	Every academic year
Learning outcomes	<p>The students are able to</p> <ul style="list-style-type: none"> <li>- understand the architecture and working principle of STM32 based on the ARM Cortex-M3(32-bit processor) and relevant conceptions and knowledge</li> <li>- work with an integrated development environment (Keil uVision4)</li> <li>- design programs with assembly language or C language based on the ARM Cortex-M3</li> <li>- analyze and design a semi-conductor memory system for an embedded system</li> <li>- design and use basic I/O interface, ADC &amp; DAC circuits</li> <li>- know the basic functions of Embedded Operating System</li> <li>- design applications of Embedded Systems based on STM32 in electrical engineering and automation</li> </ul>		
Learning content	<p>Taught seminar</p> <ul style="list-style-type: none"> <li>- Basic conceptions related with the ARM Cortex-M3: basic composition, structure , working principle and applications in electrical engineering and automation</li> <li>- The structure of STM32: basic composition of Micro Controller, pin functions, registers, CPU timing diagram, reset operation and memory allocation and GPIO(General Purpose Input Output)</li> <li>- The instruction set of the ARM Cortex-M3 and assemble language programming: instruction functions, addressing modes, address space and basic structure of the assemble language program</li> <li>- Interrupts, exceptions and timers of STM32: interrupt concept, structure and control of interrupt system, programming of exceptions, timers and counters</li> <li>- I/O interface and ADC &amp; DAC programming based on STM32</li> <li>- Programming with C language: data types, operators and programming using C language</li> <li>- The basic functions of Embedded Operating System (e.g. <math>\mu</math>C/OS-III and etc.)</li> </ul> <p>Laboratory</p>		

	<ul style="list-style-type: none"> <li>- Work with the integrated development environment (Keil uVision4) and Learn using the MCU equipment in the lab</li> <li>- Programming with GPIO(General Purpose Input Output) operations</li> <li>- Basic programming using assembly language or C language based on the ARM Cortex-M3</li> <li>- Programming for keyboard and LCD display</li> <li>- Experiments using interrupts and timers of STM32</li> <li>- Programming for ADC and DAC based on STM32</li> <li>- Non-electric parameter (e.g. temperature) measurement and display with STM32</li> <li>- Realization of some functions of <math>\mu</math>C/OS-III</li> </ul>
Type of Media	Taught seminar: blackboard, beamer, PC with simulation software Laboratory: software: Keil uVision4
Type of Assessment	Taught seminar: Successful passing in written exam (PL) Laboratory: Successful participation in labs with written reports (PVL)
Literature	<ul style="list-style-type: none"> <li>- Liu Xianrong etc. (2016): The Principle and Technology of Microcomputer and Embedded Interface, Xi Dian University Press</li> <li>- Daniel W., Lewis (2013): Fundamentals of Embedded Software with the ARM Cortex-M3.Second Edition, Pearson Education,Inc.</li> <li>- Qiu Chunling etc. (2016): Fundamentals of Single Chip Computer and Embedded System, China Machine Press</li> <li>- He Bin.(2012) : The Principle and Application of Cortex-M3 Programmable System-on-Chip, Chemical Industry Press</li> </ul>

## ROBOTERTECHNIK

Name of module	<b>Robotertechnik</b> <b>Robotic technology</b>	Number	E47.3
Courses	Taught seminar: Robotic Technology RT Laboratory: Robotic Technology RTP	Semester/ duration	7
Workload	48 h attendance, 42h self-study	Credits	3
Module responsibility	Gu Jin	Attendance hours	28h + 20 h
Lecturers	Gu Jin, Ma Yanyan	Language	Chinese
Prerequisites	Recommended: Physics, Analogue Circuits, Digital Systems, Intro- duction of Programming, Embedded Systems for Automation, Mathematics I, II	Offered	Every acade- mic year
Learning outcomes	The students are able to <ul style="list-style-type: none"> <li>- master the summary of robotic technology: development, categories and trend</li> <li>- master the methods of concept design, construction design, circuit design and control of intelligent robots</li> <li>- design and control basic intelligent robot</li> <li>- solve problems using robotic technology</li> </ul>		
Learning content	Taught seminar <ul style="list-style-type: none"> <li>- The development and categories of robots.</li> <li>- Basic mechanical design of intelligent robots.</li> <li>- Basic Circuit design of intelligent robots.</li> <li>- Sensors technology</li> <li>- Algorithm and programming</li> <li>- Problem solving --building a simple robot</li> </ul> Laboratory <ul style="list-style-type: none"> <li>- Mechanical design and analysis of robot.</li> <li>- Development environment and basic operations.</li> <li>- The practice of tracking robot Basic</li> <li>- Project—Design your robot</li> </ul>		
Type of Media	Taught seminar: Tuition in seminars, blackboard, slides, computer simulation Laboratory: Computer-practical course		
Type of Assessment	Taught seminar: Successful passing in written exam (PL) Laboratory: Successful participation of all tasks (PVL)		
Literature	<ul style="list-style-type: none"> <li>- Wang Li-quan (2007), Creative Design and Production of Robot. Tsing-hua University Press.</li> <li>- Zhang Yi, Luo Yuan, Xu Xiao-dong.(2013) Mobile Robot Technology Foun- damentals and Practice. Harbin Institute of Technology Press.</li> <li>- Jing Wei-hua. Creative design of robot, Tsinghua University Press</li> </ul>		

## PROGRAMMIEREN MIT VISUAL BASIC

Name of module	<b>Programmieren mit Visual Basic</b> <b>Programming with Visual Basic</b>	Number	E47.2
Courses	Taught seminar: Programming with Visual Basic VB Laboratory: Programming with VB Lab VBP	Semester/ duration	7
Workload	32h attendance, 28h self-study	Credits	2
Module responsibility	Shen Jianqiang	Attendance hours	24h+8h
Lecturers	Shen Jianqiang, Ma Yanyan	Language	Chinese
Prerequisites	Recommended: Introduction of Programming, Mathematics I	Offered	Every acade- mic year
Learning outcomes	The students are able to <ul style="list-style-type: none"> <li>- understand the basic conceptions of object- orientated programming</li> <li>- apply the rules of Visual Basic language in programming</li> <li>- create and use forms and controls</li> <li>- design application programs in database and communication in VB</li> </ul>		
Learning content	Taught seminar <ul style="list-style-type: none"> <li>- Conceptions related with objects and classes: objects, classes, properties of objects, events of objects, methods of objects</li> <li>- Visual Basic language structures, rules, arrays and procedures: sequence structure, branch structure, circular structure and object-oriented programming, arrays, procedures and etc.</li> <li>- Forms and controls: label, textbox, command button, picture box, image, timer, list box, combo box</li> <li>- Apply database and communication technology in Visual Basic</li> </ul> Laboratory <ul style="list-style-type: none"> <li>- Work with an integrated development environment</li> <li>- Programming with arrays and procedures</li> <li>- Programming using Forms and controls(label, textbox, command button, picture box, image , timer, list box, combo box)</li> <li>- Application of database and communication</li> </ul>		
Type of Media	Taught seminar: beamer, blackboard Laboratory: Laboratory course and computers		
Type of Assessment	Taught seminar: Successful passing in written exam (PL) Laboratory: Successful participation of all tasks (PVL)		
Literature	<ul style="list-style-type: none"> <li>- Gong Peizhen etc. (2013): Visual Basic Programming Tutorial (4th ed.), and Visual Basic Experiment Guidance and Test, Higher Education Press</li> <li>- Liu Ruixin etc. (2013): Visual Basic.Net Programming Tutorial, China Machine Press</li> </ul>		

## STRÖMUNGSLEHRE

Name of module	<b>Strömungslehre</b> <b>Fluid Mechanics</b>	Number	E47.7
Courses	Lecture: Fluid Mechanics STR	Semester/ duration	7
Workload	48 h attendance, 42h self-study	Credits	3
Module responsibility	Yang Chengsan	Attendance hours	48h
Lecturers	Yang Chengsan, Ma Yanyan, Cui Jiankun	Language	Chinese
Prerequisites	Recommended: Mathematics I, II, Physics	Offered	Every acade- mic year
Learning outcomes	The students are able to <ul style="list-style-type: none"> <li>- Fluid properties</li> <li>- Hydrostatics</li> <li>- Measurement of pressure</li> <li>- Dynamics of Fluid motion</li> <li>- Bernoulli's equation and momentum equation</li> <li>- Calculation of Laminar and Turbulent Flow</li> <li>- Pipe problems, for example hydraulic shocks</li> </ul>		
Learning content	Taught seminar <ul style="list-style-type: none"> <li>- Fluid properties</li> <li>- Hydrostatics</li> <li>- Measurement of pressure</li> <li>- Bernoulli's equation</li> <li>- flow rate, continuity equation</li> <li>- Kinematics of Fluid Motion</li> <li>- Dynamics of Fluid Motion</li> <li>- Momentum equation</li> <li>- Laminar and Turbulent Flow</li> <li>- Flow conditions in pipes</li> <li>- Boundary Layer, Compressible Flow.</li> </ul>		
Type of Media	Taught seminar: Beamer, PC with simulation software		
Type of Assessment	Taught seminar: Written examination (PL)		
Literature	<ul style="list-style-type: none"> <li>- He Chuan(2013):Fluid Mechanics, China Machine Press</li> </ul>		

## TECHNISCHE THERMODYNAMIK UND WÄRMEÜBERTRAGUNG

Name of module	<b>Technische Thermodynamik und Wärmeübertragung</b> <b>Engineering Thermodynamics and Heat Transfer</b>	Number	E47.5
Courses	Taught seminar: Thermodynamics TH Laboratory: Thermodynamics Lab THP	Semester/ duration	7
Workload	48 h attendance, 42h self-study	Credits	3
Module responsibility	Yang Chengsan	Attendance hours	44h+4h
Lecturers	Yang Chengsan, Ma Yanyan, Cui Jiankun	Language	Chinese
Prerequisites	Recommended: Mathematics I, Mathematics II, basic physics, self-study of the guide book for the experiment	Offered	Every academic year
Learning outcomes	<p>The students are able to</p> <ul style="list-style-type: none"> <li>- understand the first law of thermodynamics</li> <li>- understand the second law of thermodynamics</li> <li>- understand the principle of the heat transfer process in a power plant, boiler furnaces, Internal combustion engine, air compressor and refrigeration cycles</li> <li>- be able to analyze the experiment data of the typical thermal energy components and systems</li> <li>- understand the performance and thermodynamic process of the ideal gases; vapor, air and vapor flowing</li> <li>- understand the working principle and the basic structure of a combustion engine (four strokes and four cylinders);</li> <li>- be able to assemble / disassemble the components of a combustion engine (four strokes and four cylinders)</li> </ul>		
Learning content	<p>Taught seminar</p> <p>Fundamentals of thermal engineering:</p> <ul style="list-style-type: none"> <li>- Introduction of the basic concepts of thermodynamics and heat transfer and the basic knowledge of the thermal equipment</li> <li>- The first law of thermodynamics</li> <li>- Performance and thermodynamic process ideal gases</li> <li>- The second law of thermodynamics</li> <li>- Vapor, air and vapor flowing</li> </ul> <p>Fundamental of heat transfer:</p> <ul style="list-style-type: none"> <li>- Power plant and boiler furnaces</li> <li>- Internal combustion engine</li> <li>- Air compressor and refrigeration cycles</li> </ul> <p>Laboratory</p> <ul style="list-style-type: none"> <li>- Disassembly of the components of a combustion engine</li> <li>- Clean the main components of a combustion engine</li> <li>- Oil the driving or driven parts of a combustion engine</li> <li>- Assembly the components of a combustion engine</li> </ul>		

	- Adjust a combustion engine
Type of Media	Taught seminar: Beamer, PC with simulation software Laboratory: Laboratory equipment
Type of Assessment	Taught seminar: Written examination (PL) Laboratory: Lab Report (PVL)
Literature	<ul style="list-style-type: none"> <li>- Chen yi and Wu weilong.(2014):Thermal Engineering, Higher Education Press</li> <li>- Shen weidao.(2015):Engineering Thermodynamics, Higher Education Press</li> <li>- Experiment instructions</li> </ul>

## TECHNISCHES ZEICHNEN IN 3D

Name of module	<b>Technisches Zeichnen in 3D Engineering Drawing and basic 3D-CAD TZC</b>	Number	E47.4
Courses	Taught seminar: Engineering Drawing and basic 3D-CAD TZC Laboratory: Engineering Drawing and basic 3D-CAD Lab TZCP	Semester/ duration	7
Workload	32h attendance, 28h self-study	Credits	2
Module responsibility	Yang Chengsan	Attendance hours	16h+16h
Lecturers	Yang Chengsan, Ma Yanyan	Language	Chinese
Prerequisites	Recommended: Mechanical Engineering Basics	Offered	Every ademic year
Learning outcomes	<p>The students are able to</p> <ul style="list-style-type: none"> <li>- understand GB standards and rules of drawings</li> <li>- master the basic principles and applications of the orthographic projection</li> <li>- master the regular description methods of machine parts</li> <li>- master the description methods of fasteners, gears, keys etc.</li> <li>- to read detail drawings and assembly drawings</li> <li>- to make detail drawings and assembly drawings</li> <li>- to build 3D solid single part models and convert it into engineering drawings</li> <li>- to build 3D solid assemblies and convert it into engineering drawings</li> <li>- to build 3D solid models</li> <li>- to make detail drawings and assembly drawings with computer drafting software</li> </ul>		
Learning content	<p>Taught seminar</p> <ul style="list-style-type: none"> <li>- Introduction to GB standards and rules of drawings</li> <li>- The fundamentals of projection</li> <li>- The projection of solids</li> <li>- The basic principles and methods of 3D solid modeling</li> <li>- Six principal views, auxiliary views, sectional and conventional views</li> <li>- The description methods of fasteners, gears, keys etc.</li> <li>- Views selection in detail drawings</li> <li>- Dimensioning and writing notes in detail drawings</li> <li>- Brief introduction of technology of parts</li> <li>- 3D solid modeling and conversion to detail drawings</li> <li>- Description methods in assembly drawings</li> <li>- Dimensioning and writing notes in assembly drawings</li> <li>- Brief introduction of technology of assembly</li> <li>- Making 3D solid assembly and conversion to assembly drawings</li> </ul> <p>Laboratory</p> <ul style="list-style-type: none"> <li>- The basic methods of 3D solid modeling</li> <li>- The application of 3D standard parts library</li> </ul>		

	<ul style="list-style-type: none"> <li>- 3D solid modeling and conversion to detail drawings</li> <li>- Making 3D solid assemblies and conversion to assembly drawings</li> </ul>
Type of Media	Taught seminar: Computer, CAD- software Laboratory: Multimedia
Type of Assessment	Taught seminar: Written Examination (PL) Laboratory: Test on computer (PVL)
Literature	<ul style="list-style-type: none"> <li>- Qiu Wenyan and Qu Yuanshang(2010):Mechanical Drawing, Higher Education Press</li> <li>- Solidworks Teaching book,2012;Autocad Teaching book,2013</li> </ul>

## BILDVERARBEITUNG

Name of module	<b>Bildverarbeitung</b> <b>Image Processing</b>	Number	E47.6
Courses	Lecture: Image Processing IP Laboratory: Image Processing Laboratory IPP	Semester/ duration	7
Workload	32h attendance, 28h self-study	Credits	2
Module responsibility	Chen Qing	Attendance hours	26h+6h
Lecturers	Chen Qing, Shen Jianqiang	Language	Chinese
Prerequisites	Recommended: Introduction of Programming, Mathematics I	Offered	Every acade- mic year
Learning outcomes	<p>The students are able to</p> <ul style="list-style-type: none"> <li>- understand necessary background, basic principles and concepts, the typical algorithms, and applications of digital image processing</li> <li>- understand how computers can process digital images</li> <li>- master some of the basic operations (their basis, implementation and consequences) in image processing</li> <li>- know some common image-processing applications.</li> </ul>		
Learning content	<p>Taught seminar</p> <ul style="list-style-type: none"> <li>- Introduction: overview of image processing and its applications</li> <li>- Digital Image Fundamentals: image digitization, basic relationships between pixels, linear and nonlinear operations</li> <li>- Image Enhancement in the Spatial Domain: gray-level mapping, histogram, spatial-domain filter, edge detection.</li> <li>- Image Enhancement in the Frequency Domain: Fourier transformation, frequency domain filtering.</li> <li>- Color Image Processing: color fundamentals, color models, color image smoothing and sharpening.</li> <li>- Image Compression: image compression models, lossless compression versus lossy compression, image compression standards.</li> <li>- Pattern Recognition: classification and estimation based on image processing</li> </ul> <p>Laboratory</p> <ul style="list-style-type: none"> <li>- Basic operations on images using Matlab or C/C++</li> <li>- Spatial and frequency filtering</li> <li>- Implementation of image compression</li> </ul>		
Type of Media	<p>Taught seminar: beamer, blackboard</p> <p>Laboratory: Laboratory course, PC</p>		
Type of Assessment	<p>Taught seminar: Successful passing in written exam (PL)</p> <p>Laboratory: Successful participation of all tasks (PVL)</p>		
Literature	<ul style="list-style-type: none"> <li>- Rafael C. Gonzalez, Richard E. Woods, &amp; Steve L. (2006): Digital Image Processing using Matlab, Publishing House of Electronics Industry</li> </ul>		

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|  | <ul style="list-style-type: none"><li>- K. Castleman. (2000): Digital Image Processing, Qinghua University Press</li><li>- R. C. Gonzalaz .(2002): Digital Image Processing(Second Edition), Publishing House of Electronics Industry</li></ul> |
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## NICHT-TECHNISCHE MODULE

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## SPORT I-IV

Name of module	<b>Sport I-IV</b> <b>Physical Education I-IV</b>	Number	E4,10,18,28
Courses	Exercise: Physical Education I-IV SP1-SP4	Semester/ duration	1,2,3,4
Workload	32 h attendance	Credits	0,5CP
Module responsibility	Ni Wei	Attendance hours	32 h
Lecturers	Ni Wei, Yuan Yong, Zhu Xiaoling	Language	Chinese
Prerequisites		Offered	Academic year
Learning outcomes			
Learning content	<p>Sport course is required to be hold at every Chinese university, according to the regulation of the central government of Beijing: Sport Regulation from 29,08.1995; effective since 01.10.1995</p> <p>Second Part: Sport at education institutions Art. 17: Sport is one part of education. The goal of education is to stimulate the development of students in all dimensions, especially in morality, intelligence and health.</p> <p>Art. 18: Education institutions must provide sport course. Sport course is part of the curriculum, which is to be evaluated. Education institutions should provide students with disabilities with occasion of doing sport, considering their disabilities.</p> <p>Education law since 18.03.1995, effective since 01.09.1995 Art. 5: The goal of education is to educate the new forces for the purpose of modernization of socialism in close relation to production and work. In this case it is to stimulate the development of students in all dimensions, especially in morality, intelligence and health.</p>		
Type of Media			
Type of Assessment	Laboratory test		
Literature			

## POLITIK UND SOZIALES I

Name of module	<b>Politik und Soziales I</b> <b>Politics and socialism I (obligatory courses according to the education law of March, 2005)</b>	Number	E27
Courses	Lecture: Politics and socialism I PS1	Semester/ duration	4
Workload	32 h attendance including examination	Credits	1 CP
Module responsibility	Xu Shuihua	Attendance hours	32 h
Lecturers	Xu Shuihua, Zhang Yu	Language	Chinese
Prerequisites		Offered	Academic year
Learning outcomes	The students are able to <ul style="list-style-type: none"> <li>- explain the main features of the more current pragmatic reforms of the People's Republic of China</li> <li>- describe the political measures, which are taken since Deng Xiaoping's term of office in the economic, social and cultural revolution</li> <li>- illustrate the systematic and political coordination between planned and market-oriented economy</li> <li>- relate the improvement of living standards in the People's Republic of China to the development of productivity since 1978</li> </ul>		
Learning content	Taught seminar <ul style="list-style-type: none"> <li>- Opening and reform of the Chinese Socialism</li> <li>- Socialist economic, politics and culture with Chinese characteristics</li> <li>- To build a harmonious socialist society</li> <li>- Economic development and measures to stimulate the per capita income: focus on the development of productivity</li> <li>- International strategy and diplomatic policy</li> </ul>		
Type of Media	Taught seminar: Examination		
Type of Assessment	Taught seminar: Course, Presentation		
Literature	<ul style="list-style-type: none"> <li>- Wang, Ronghua.(2003): Theorie von Deng Xiaoping, Shanghai Education Publishing House</li> <li>- Wang, Ronghua.(2003): Einleitung zu Drei Repräsentanten, Shanghai People Publishing House</li> </ul>		

## POLITIK UND SOZIALES II

Name of module	<b>Politik und Soziales II</b> <b>Politics and socialism II (obligatory courses according to the education law of March, 2005)</b>	Number	E44
Courses	Taught seminar: Politics and socialism II PS2	Semester/ duration	6
Workload	64 h attendance including examination	Credits	2 CP
Module responsibility	Xu Shuihua	Attendance hours	64 h
Lecturers	Xu Shuihua, Zhang Yu	Language	Chinese
Prerequisites		Offered	Academic year
Learning outcomes	The students are able to <ul style="list-style-type: none"> <li>- explain the main features of the “political economy”</li> <li>- based on the theoretical knowledge to analyze modern market economy</li> <li>- to reflect the concrete working conditions, considering the background of political economy</li> </ul>		
Learning content	Taught seminar <ul style="list-style-type: none"> <li>- The origin and the emergence of the “political economy”</li> <li>- Currency and money</li> <li>- The transformation of money into capital</li> <li>- Production of absolute surplus value</li> <li>- Production of relative surplus value</li> <li>- Production of absolute and relative surplus value</li> <li>- Work income</li> <li>- The process of accumulation of capital</li> </ul>		
Type of Media	Taught seminar:	Examination	
Type of Assessment	Taught seminar:	written exam (PL)	
Literature	<ul style="list-style-type: none"> <li>- Feng, Jingju.(2008): Einführung in die Grundlagen marxistischer Theorie, Higher Education Press.</li> <li>- Gu, Hailiang.(2007): Grundsätze maxisischer politischer Ökonomie, Higher Education Press.</li> </ul>		

## CHINESISCHE GESCHICHTE

Name of module	<b>Chinesische Geschichte</b> <b>Chinese history of 19<sup>th</sup> and 20<sup>th</sup> century (obligatory courses according to the education law of March, 2005)</b>	Number	E5
Courses	Taught seminar: Chinese history of 19 <sup>th</sup> and 20 <sup>th</sup> century CG	Semester/ duration	1
Workload	32 h attendance including examination	Credits	1 CP
Module responsibility	Liu Ke	Attendance hours	32 h
Lecturers	Liu Ke, Song Qinghong	Language	Chinese
Prerequisites		Offered	Academic year
Learning outcomes	The students are able to <ul style="list-style-type: none"> <li>- distinguish the western phase of historical development of China in 19th and 20th century</li> <li>- relate the individual phase of historical development to the respective social and economic conditions</li> <li>- describe the political, social and economic factors leading to historical transformation</li> <li>- reflect the newest development and modernization of the People's Republic of China under the background of modern Chinese history</li> </ul>		
Learning content	Taught seminar <ul style="list-style-type: none"> <li>- Outline</li> <li>- From the first opium war to the May 4th Movement</li> <li>- From the May 4th Movement to the founding of the People's Republic of China</li> <li>- The founding and the period of socialistic development of the People's Republic of China</li> <li>- Opening and new period of development of modernization</li> </ul>		
Type of Media	Taught seminar: Examination		
Type of Assessment	Taught seminar: written exam (PL)		
Literature	<ul style="list-style-type: none"> <li>- Leitfaden der modernen Geschichte, High Education Publishing House. 2007</li> </ul>		

## GRUNDZÜGE DER CHINESISCHEN RECHTSORDNUNG

Name of module	<b>Grundzüge der chinesischen Rechtsordnung Moral Education and Law Fundamentals (obligatory courses according to the education law of March, 2005)</b>	Number	E43
Courses	Taught seminar: Moral Education and Law Fundamentals GCRO	Semester/ duration	6
Workload	32 h attendance including examination	Credits	1 CP
Module responsibility	Liu Ke	Attendance hours	32 h
Lecturers	Liu Ke, Song Qinghong	Language	Chinese
Prerequisites		Offered	Academic year
Learning outcomes	The students are able to <ul style="list-style-type: none"> <li>- distinguish between moral and legal questions and know about the principle of moral standards</li> <li>- illustrate the basic concept and the relationship of public law and private law</li> <li>- demonstrate the importance of private law and criminal law for commercial trade</li> <li>- analyze simple and practical cases</li> <li>- consider alternative dispute resolution in practice</li> </ul>		
Learning content	Taught seminar <ul style="list-style-type: none"> <li>- Introduction: law and moral</li> <li>- Moral basics</li> <li>- Basis of public law</li> <li>- Basis of criminal law</li> <li>- Civil- and criminal procedural law</li> </ul>		
Type of Media	Taught seminar: Examination		
Type of Assessment	Taught seminar: written exam (PL)		
Literature	<ul style="list-style-type: none"> <li>- Chen Dawen, Die Grundlagen des Rechts, Fudan University Press</li> <li>- Moralische Grundsätze und Grundzüge der chinesischen Rechtsordnung, Higher Education Publishing House, 2007</li> </ul>		