



JACOBS
UNIVERSITY



Study Program Handbook

Industrial Engineering & Management

Bachelor of Science

Subject-specific Examination Regulations for Industrial Engineering and Management (Fachspezifische Prüfungsordnung)

The subject-specific examination regulations for Industrial Engineering and Management are defined by this program handbook and are valid only in combination with the General Examination Regulations for Undergraduate degree programs (General Examination Regulations = Rahmenprüfungsordnung). This handbook also contains the program-specific Mandatory Module and Examination Plans (Appendix 1a / 1b).

Upon graduation, students in this program will receive a Bachelor of Science (BSc) degree with a scope of 180 ECTS (for specifics see chapter 3 of this handbook).

Version	Valid as of	Decision	Details
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1 The Industrial Engineering & Management (IEM) Study Program

1.1 Concept

Industrial Engineering is one of the most versatile and flexible branches of engineering. It has been said that engineers make things, whereas industrial engineers make things better.

The B.Sc. Industrial Engineering & Management (IEM) program deals with both the creation and the management of systems that integrate people, materials and energy in productive ways. It covers topics such as process engineering, operations research, supply chain management, engineering design, logistics, project management, and others. During their studies at Jacobs University, students are equipped with the essentials of both the management and the engineering business functions and thus they are prepared for successful careers in industry.

Contents

While the first year of the IEM program provides an overview of the fundamentals of management and engineering together with basic knowledge in formal methods (mathematics and statistics), students will be introduced to more specialized matters from the fields of Design, Management, Production Systems and Manufacturing from the second year onwards. Therefore, they take a certain number of specialized courses on Production, Engineering, Process Engineering, Finance and Project Management in order to gain deeper knowledge and to complete their competence profiles. In addition, all Industrial Engineering & Management students spend their fifth semester doing a guided industrial project (an internship lasting at least 4 months), which enables them to acquire valuable practical experience. Throughout all three years, students acquire valuable business, communication, programming and language skills. Moreover, they are also introduced to real-world problem solving skills through collaborative case study projects with chosen companies from Bremen.

Inputs from Industry: The Advisory Board

The Industrial Engineering & Management program is supported by an advisory board, whose members are representatives of different industrial companies and institutions. The Advisory Board provides advice to the faculty in designing and further developing the study program. In addition, each year the board awards one student from the graduating class for outstanding academic achievement. The members of the Advisory Board include:

- Chair: Hans-Ludger Körner, Chief Financial Officer of Röhlig & Co. Holding GmbH & Co. KG
- Jens Bieniek, Head of Finance M&A BLG Logistics Group AG & Co. KG
- Christian-Hans Bültemeier, CFO Hansa-Flex AB
- Robert Hempel, Managing Partner Hanseatische Waren Handelsgesellschaft MBH & CO KG
- Svenja Hösel, Director of the Board of the Kieserling-Foundation
- Dirk O. Rogge, Managing Director D. Oltmann Reederei GmbH & Co. KG
- Jurn Schmidt, Managing Director Hansa Meyer Global Transport GmbH & Co. KG
- Christian Vollers, Managing Director of Berthold Vollers GmbH

- Prof. Dr.-Ing. Thomas Wimmer, Chairman of the Board of the German Logistics Association (Bundesvereinigung Logistik (BVL) e. V.)

1.2 Specific Advantages of the IEM Program at Jacobs University

The Jacobs B.Sc. program in Industrial Engineering & Management prepares young talents for careers at the border of management and engineering business functions and teaches them to adapt naturally to interdisciplinary and intercultural surroundings. Of the many reasons to enroll in the IEM program at Jacobs University, six stand out:

- **High-quality Teaching and Excellent Supervision** For Jacobs University, highest standards in teaching mean strong professor-student interaction, and challenging curricula. Our excellent IEM faculty, with great research exposure, teaches students about current trends in industrial engineering and management with a transdisciplinary approach. Smaller class sizes, tutorials and feedback sessions allow effective learning and ensure understanding of theoretical concepts learnt in class. During their studies, students also receive individual academic support and career advising.
- **Lecturers from Renowned Industrial Companies** IEM program incorporates a number of courses taught by lecturers from renowned German corporations such as Porsche, Daimler and 4flow. In their courses, lecturers teach theoretical concepts coupled with practical applications and examples from the industry sector they are working in. Thus, students get to learn about best practices of different industries directly from the experts.
- **Practical Experience through Internship Project** All students spend their fifth semester doing an internship lasting between four to six months, which enables them to acquire valuable practical experience and is thus an essential part of the IEM program. We have established close connections with numerous companies and organizations in Germany. Our students also go on international internships all over Europe, Australia, China, Chile, Mexico, Singapore, Thailand, USA, or elsewhere.
- **Hands-on Learning** The Jacobs classes provide hands-on learning through interactive business games, case studies and creative group work. Another advantageous quality is the close cooperation with industries in the Bremen area and beyond. A great amount of real-world projects with companies, field trips, guest lectures and events on campus offer students the opportunities not only to gain the insights into industrial processes and to understand the theory learnt in class on a practical case scenario, but also to establish first industry contacts. In addition, the Jacobs international campus is the perfect environment for the IEM program as our students are exposed to an intercultural setting that prepares them for a career in global industrial corporations.
- **Involvement in Research and Industrial Projects** Within the study program, students of Industrial Engineering and Management have the opportunity to be actively involved in industrial and research projects of the faculty. The IEM Jacobs has performed diverse consulting projects with number of renowned industrial companies. Moreover, the IEM Jacobs research activities are focused on specific fields of industrial engineering, aiming at optimizing production systems in an increasingly globalized market.
- **A Plethora of Networking Opportunities** Several explicit networking occasions are built in to the program. They are provided in the form of multiple career events and initiatives such as "IEM Internship Day", Mini-Career Fairs, company site visits, case study com-

petitions with local companies, the series of guest lecturers, cooperation with the German Logistics Association (Bundesverband Logistik - BVL), and the "Logistics meets Experts", "Logistics Ambassadors" program organized in cooperation with VIA BREMEN.

1.3 Program-Specific Qualification Aims

At the time of graduation, IEM students will be able to:

- apply knowledge of mathematics, science, and engineering to identify, formulate, and solve problems in the field of industrial engineering
- use current academic techniques, skills, and modern engineering tools necessary for engineering practice
- design and conduct experiments, as well as to analyze and interpret data
- design a system or process to meet desired needs within realistic constraints such as economic, environmental, social, health and safety, manufacturability, and sustainability
- critically analyze industrial problems and make operational and strategic decisions involving complex or conflicting objectives.
- discuss about financial issues of a project and provide structured management reports about project progress
- function on and lead a diverse and multidisciplinary team consisting of both technical and management professionals
- professionally communicate their conclusions and recommendations, the underlying information and their reasons to specialists and non-specialists both clearly and unambiguously on the basis of the state of research and application
- acquire knowledge rapidly, gather, evaluate and interpret relevant information and evaluate new concepts critically to derive scientifically funded judgements
- apply their knowledge, understanding and methodological competences to their activity or profession to solve problems;
- present themselves and their ideas effectively and to negotiate successfully
- demonstrate understanding and knowledge of business principles and processes and to manage projects efficiently and independently.

1.4 The Jacobs University Employability and Personal Development Concept

Jacobs University's educational concept aims at fostering employability which refers to skills, capacities, and competencies which transcend disciplinary knowledge and allow graduates to quickly adapt to professional contexts. Jacobs University defines employability as encompassing not just technical skills and understanding but also personal attributes, competencies and qualities enabling students to become responsible members of their professional and academic fields as well as of the societies they live in. Graduates of JU will be equipped with the ability to find employment and to pursue a successful professional career, which means that graduates will be able to:

- acquire knowledge rapidly, gather, evaluate and interpret relevant information and evaluate new concepts critically to derive scientifically funded judgements;
- apply their knowledge, understanding and methodological competences to their activity or profession to solve problems;
- present themselves and their ideas effectively and to negotiate successfully;
- demonstrate understanding and knowledge of business principles and processes and to manage projects efficiently and independently;
- take responsibility for their and their team's learning and development.

Graduates of JU will also be equipped with a foundation to become globally responsible citizens, which includes the following attributes and qualities:

- graduates have gained intercultural competence; they are aware of intercultural differences and possess skills to deal with intercultural challenges; they are familiar with the concept of tolerance;
- graduates can apply problem-solving skills to negotiate and mediate between different points of view and to manage conflicts;
- graduates can rely on basic civic knowledge; they are able to analyse global issues of economic, political, scientific, social or technological nature; they are able to evaluate situations and take decisions based on ethical considerations;
- graduates are able and prepared to take on responsibility for their professional community and society.

1.5 Career Options

The profiles of the B.Sc. Industrial Engineering & Management graduates are of great interest to national and international, medium and large-sized, trade and service industry companies. Graduates especially qualify for tasks in the fields of Logistics, Supply Chain Management (SCM), Procurement, Manufacturing and Automation, Process Optimization and Information Technology (IT), but also for tasks from other disciplines. The career paths that open up for the graduates are equally as versatile as the major's theme. They range from specializations as experts in the production logistics areas, through project management careers in different fields, to strategic and corporate management positions. After graduation the students will excel at fulfilling various project responsibilities by applying the gained knowledge in the areas of manufacturing, transportation systems, supply chain management, project management, leadership, and team management. A close cooperation and contacts are established with numerous companies, including Airbus, Arcelor Mittal, Daimler, Barry Callebaut, Mondelez, Röhlig, Porsche, Deutsche Bahn, KPMG and more.

The Career Services Center as well as the Jacobs Alumni Association help students in their career development. The Career Services Center provides students high quality training and coaching in CV and cover letter formulation, interview preparation, effective presenting, business etiquette and employer research as well as in many other aspects thus helping students identify and follow up rewarding careers after their time at Jacobs University. Furthermore, the Alumni Association helps students to establish a long-lasting and worldwide network which

comes in handy when exploring job options in academia, industry, and elsewhere.

1.6 More Information and Contact

For more information please contact the study program chair:

Dr. Stanislav Chankov
University Lecturer in Supply Chain Management
Email: s.chankov@jacobs-university.de
Telephone: +49 421 200-3437

or visit our program website: <http://iem-program.user.jacobs-university.de/>

2 The Curricular Structure

2.1 General

The undergraduate education at Jacobs University equips students with the key qualifications necessary for a successful academic, as well as professional career. By combining disciplinary depth and transdisciplinary breadth, supplemented by skills education and extracurricular elements, students are prepared to be responsible and successful citizens within the societies they work and live in.

The curricular structure provides multiple elements enhancing employability, transdisciplinarity, and internationality. The unique Jacobs Track, offered across all study programs, provides a broad range of tailor-made courses designed to foster career competencies. These include courses which promote communication, technology, business, (German) language, and management skills. The World Track, included in the third year of study, provides extended company internships or study abroad options. Thus students gain training on the job and intercultural experiences. All undergraduate programs at Jacobs University are based on a coherently modularized structure, which provides students with a broad and flexible choice of study plans to meet their major as well as minor study interests.

The policies and procedures regulating undergraduate study programs at Jacobs University in general can be found on the website.

2.2 The Jacobs University 3C-Model

Jacobs University offers study programs according to the regulations of the European Higher Education Area. All study programs are structured along the European Credit Transfer System (ECTS), which facilitates credit transfer between academic institutions. The three-year undergraduate program involves six semesters of study with a total of 180 ECTS credits. The curricular structure follows an innovative and student-centered modularization scheme - the 3C-Model - which groups the disciplinary content of the three study years according to overarching themes:

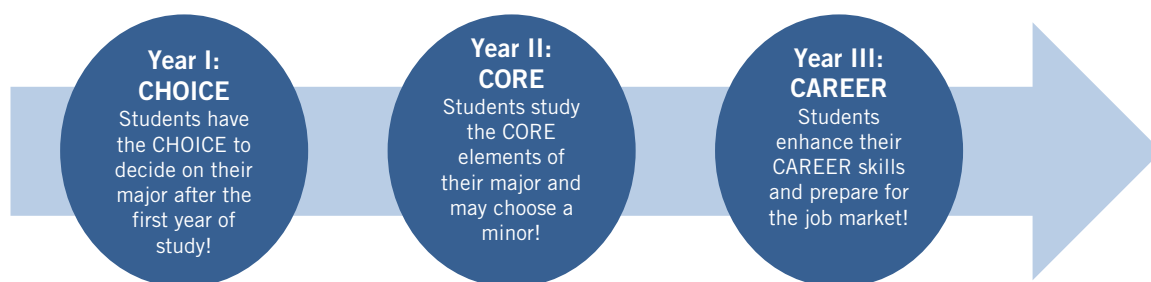


Figure 1: The Jacobs University 3C-Model

2.2.1 YEAR 1 - CHOICE

The first study year is characterized by a broad offer in disciplinary and interdisciplinary education. Students select three CHOICE modules from a variety of study programs. As a unique asset, our curricula allow students to select their study program freely from among the three selected CHOICE modules during their first year of study.

2.2.2 YEAR 2 - CORE

In the second year, students take three in-depth, discipline-specific CORE modules. One CORE module can also be taken from a second, complementary discipline, which allows students to incorporate a minor study track into their undergraduate education. Students will generally qualify for a minor if they have successfully taken at least one CHOICE module and one CORE module in a second field, and this extra qualification will be highlighted in the transcript.

2.2.3 YEAR 3 - CAREER

During their third year, students must decide on their career after graduation. In order to facilitate this decision, the fifth semester introduces two separate tracks. By default students are registered for the World Track.

1. The World Track

In this track there are two mandatory elective options:

- **Internship**

The internship program is a core element of Jacobs University's employability approach. It includes a mandatory semester-long internship off-campus (minimum 16 weeks in full-time) which provides insight into the labor market as well as practical work experience related to the respective area of study. Successful internships may initiate career opportunities for students.

As an alternative to the regular internship, a limited number of students have the opportunity to prepare in a structured manner the formation of their own start-up in the 5th semester, and can attain 20 ECTS for this study-related achievement. Jacobs University cooperates with the City Accelerator Bremen (CAB) to which students can be admitted. There are several requirements which must be fulfilled before the 5th semester in order to be admitted to the CAB, i.e. attendance of specific seminars and workshops and the successful presentation of the business idea within the framework of a competition (pitch). The module is successfully completed, when the student / team of students have submitted the business plan to CAB.

For further information, please contact the Career Services Center (<http://www.jacobs-university.de/career-services/contact>).

- **Study Abroad**

Students can take the opportunity to study abroad at one of our partner universities.

Courses recognized as study abroad credits need to be pre-approved according to the Jacobs University study abroad procedures and carry minimum of 20 ECTS credits in total. Several exchange programs allow you to be directly enrolled at prestigious partner institutions worldwide. Jacobs University’s participation in Erasmus+, the European Unions exchange program, provides an exchange semester at a number of European universities including Erasmus study abroad funding.

For more information, please contact the International Office (<http://intoffice.user.jacobs-university.de/outgoing/>).

2. The Campus Track

Alternatively, students may also opt to follow the Campus Track by continuing their undergraduate education at Jacobs, namely by selecting an additional CORE module during their third year and redistributing the remaining courses and modules across the

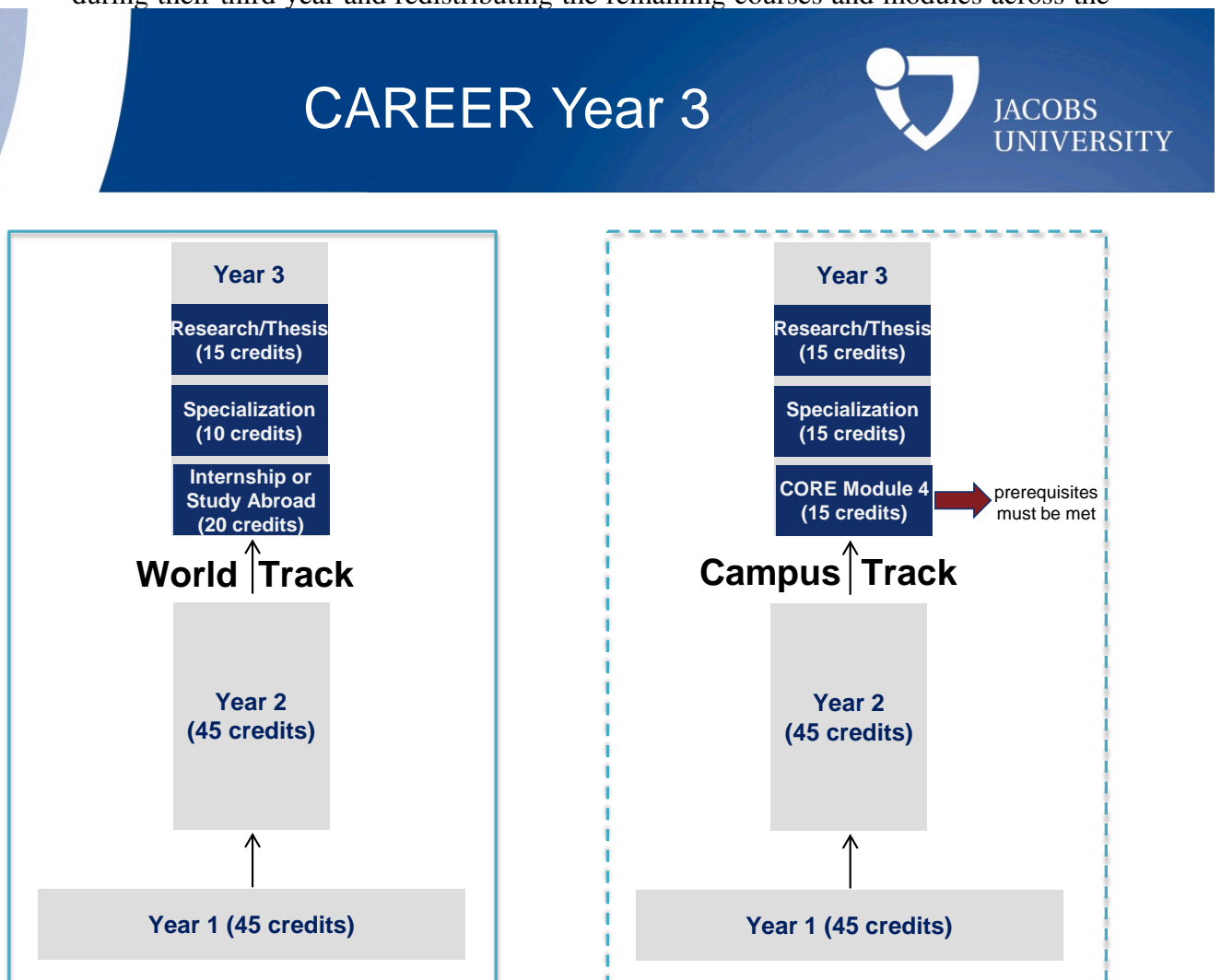


Figure 2: World Track versus Campus Track

Career Advising

Is a mandatory component of the Jacobs University’s Advising and Counseling Scheme. Further components are ”Academic Advising” and ”Psychological Counseling and Intercultural Services”. Throughout their studies all students attend a mandatory set of career skills events. The mandatory ”Career Skills Advising” prepares all undergraduate students at Jacobs University for the transition from student life to working life as well as for their future career. Skills, knowledge and information which are fundamental for participation in an internship or a semester abroad will be conveyed concurrently. Essential components include information sessions, compulsory workshops on various career-relevant topics as well as participation in the annual Jacobs Career Fair.

All undergraduate students will be automatically registered for ”Career Skills Advising”. However, every student has to keep track of his/her individual fulfillment of requirements and has to register on CampusNet for all workshops and sessions during the official registration period at the beginning of each semester. An overview of the sequence in which events should be attended is shown in the table below.

CAREER ADVISING For Undergraduate Students matriculated Fall 2018

SEMESTER	1	2	3	4	5	6
MANDATORY BASICS	CSC-INFO Session: "CSC Services" CA01-990000		CSC-INFO Session: "World Track" CA01-990026			
MANDATORY SEMINARS	Both seminars have to be attended in your first or second semester. CSC-APPLICATION TRAINING CA01-990001 CSC-SUCCESS IN STUDIES, CAREER AND LIFE CA01-990031					
MANDATORY ELECTIVE SEMINARS (seminar program subject to availability)			Attend 2 out of several career skills seminars and workshops in your third or fourth semester, i.e. <ul style="list-style-type: none"> ▪ Research & Contacting Employers ▪ Business Etiquette ▪ Presentation Skills ▪ Communication Skills ▪ Grad School Application Training ▪ Self-Management ▪ Time-Management ▪ Decision Making ▪ Preparing for an Interview ▪ Introduction to Project Management ▪ Career Orientation ▪ Working in Germany ▪ Stress Management 			
OTHER MANDATORY COMPONENTS				CSC-JACOBS CAREER FAIR in February, on campus CA01-990003		
CAREER RELATED STUDY PROGRAM COMPONENTS					INTERNSHIP (World Track) or STUDY ABROAD (World Track) or CAMPUS TRACK (exceptional)	INTERNSHIP & STUDY ABROAD EVENT

Figure 3: Career Advising

2.3 The Jacobs Track

The Jacobs Track, another stand-alone feature of Jacobs University, runs parallel to the disciplinary CHOICE, CORE, and CAREER modules across all study years and is an integral part of all study programs. It reflects our commitment to an in-depth methodological education, it fosters our transdisciplinary approach, it enhances employability, and equips students with extra skills desirable in your general field of study. Additionally, it integrates essential language courses.

Mathematics, statistics, and other methods courses are offered to all students within a comprehensive Methods Module. This module provides students with general foundations and transferable techniques which are invaluable to follow the study content not only in the study program itself but also in related fields.

The Skills Module equips students with general academic skills which are indispensable for their chosen area of study. These could be, for example, programming, data handling, presentation skills, and academic writing, scientific and experimental skills.

The transdisciplinary Triangle Module offers courses with a focus on at least one of the areas of business, technology and innovation, and societal context. The offerings comprise essential knowledge of these fields for students from other majors as well as problem-based courses that tackle global challenges from different disciplinary backgrounds. Working together with students from different disciplines and cultural backgrounds in these courses broadens the students horizon by crossing the boundaries of traditional disciplines.

Foreign languages are integrated within the Language Module. Communicative skills and foreign language competence foster students intercultural awareness and enhance their employability in a globalized and interconnected world. Jacobs University supports its students in acquiring and improving these skills by offering a variety of language courses at all proficiency levels. Emphasis is put on fostering German language skills, as they are an important prerequisite for students to learn about, explore, and eventually integrate into their host country. Hence, acquiring 10 ECTS credits in German is a requirement for all students. Students who meet the requirements of the German proficiency level (e.g. native speakers) are required to select courses in any other language program offered.

2.4 Modularization of the Industrial Engineering & Management (IEM) Program

Year 1

Take the mandatory module listed below and select two further CHOICE modules from a different study area.

General Industrial Engineering and Management (CH11-GenIEM)

General IEM is an introductory module designed to provide an overview of processes in industrial systems, logistics and supply chains. Students will learn the fundamentals of industrial engineering, industrial management, manufacturing technology, and logistics systems. Practical sessions will offer a number of exercises and activities to demonstrate and substantiate the technical concepts taught in lectures. The module provides a solid basis for further development in the Industrial Engineering and Management field, equipping the students with tools and concepts that are highly relevant for the further modules.

Year 2

Take two mandatory CORE modules and a third CORE module from a different study program.

Process Engineering (CO29-ProcessEng)

The Process Engineering Module is an advanced module building on the knowledge acquired from the General IEM courses. The students will learn to model business processes, to apply various quantitative techniques for optimizing logistics processes in networks and for assessing the involved risks, as well as to employ advanced lean methods for the elimination of waste in the manufacturing processes. The module is heavily focused on the applicability of all the tools learned, enabling the students to apply theory in practice by solving case studies, homework assignments and game-based activities.

Production and Engineering (CO30-ProductEng)

The Production and Engineering module is an advanced module building on the knowledge acquired from the General IEM courses. This module takes an in-depth look into production systems, providing the students with understanding product development and design activities, production planning and control methods, as well as the co-ordination of the entire manufacturing processes. Hands-on experience in the practical sessions will ensure an understanding of the complexity and challenges of the various production systems. In addition, the module focuses on the practical application of the taught theoretical concepts in industrial companies.

Some CORE Modules require students to have taken a specific CHOICE Module. Please see the Module Handbook for details regarding pre-requisites.

Year 3

In the 3rd year students follow the World Track by default:

1. World Track

5th Semester

- Internship / study abroad

6th Semester

- IEM Project / Thesis Module
- Program-specific Specialization Module
Exemplary course offering:
 - Industry 4.0 Technologies
 - Nonlinear Dynamics for Industrial Engineering
 - Distribution and E-Commerce
 - Integrated Decision Making in Supply Chain Management
 - Supply Chain Design

2. Campus Track

Students who do not enter the World Track follow the Campus Track.
5th and 6th Semester

- Program-specific Project / Thesis Module
- Program-specific Specialization Module
(please see World Track for exemplary course offering)
- Additional CORE Module

2.5 The Bachelor Thesis / Project

This module is a mandatory graduation requirement for all undergraduate students. It consists of two components in the major study program guided by a Jacobs Faculty member:

1. **A Research Project** (5 ECTS)
and
2. **The Bachelor Thesis** (10 ECTS)

The workload for the project component is about 125 hours and for the thesis component about 250 hours. The title of the thesis will be shown on the transcript.

2.5.1 Aims

Within this module, students apply knowledge they have acquired about their major discipline, skills, and methods to become acquainted with actual research topics, ranging from the identification of suitable (short-term) research projects, preparatory literature searches, the realization of discipline-specific research, and the documentation, discussion, and interpretation of the results. Research results obtained from the Research Project can be embedded in the Bachelor Thesis.

2.5.2 Intended Learning Outcomes

1. Research Project

This module component consists of a guided research project in the major study program. The well-defined research task must be completed and documented according to the scientific standards in the respective discipline. It involves a high degree of independence, supported by individualized instructor feedback and guidance.

2. Bachelor Thesis

With their Bachelor Thesis students should demonstrate mastery of the contents and methods of the major specific research field. Furthermore, students should show the ability to analyze and solve a well-defined problem with scientific approaches, a critical reflection of the status quo in scientific literature, and an original development of their own ideas.

Both, the Research Project and the Bachelor Thesis, can also have an inter- or transdisciplinary nature - with the explicit permission of the supervisor.

2.5.3 Supervision

Both module components can be performed with the same Jacobs faculty member, or different ones, the latter in order to allow a broader research experience. Students are required to choose a supervisor, at the latest, by the end of the drop-add period of the semester in which the module component is taken. **The selected supervisor(s) must approve the Project topic and Bachelor Thesis topic before the student starts to work towards the module component.** The respective study program chairs will assist in the search for prospective supervisor(s).

2.5.4 Registration

World Track students register for both components, at the earliest, in their 6th semester.

Campus Track students register for the Project component in the 5th and for the Bachelor Thesis component, at the earliest, in their 6th semester.

The registrations must be made before the end of the respective drop/add periods.

Later enrolment is possible for those students pursuing a second major or those who graduate late for other reasons. These students perform their (second) thesis earliest in the 7th semester of their studies. They have to contact the Student Records Office for individual registration.

Students are allowed to extend their thesis related work into the intersession or summer break upon approval of the thesis supervisor and Student Records. Students are not allowed to register for different Bachelor Thesis courses in the same semester.

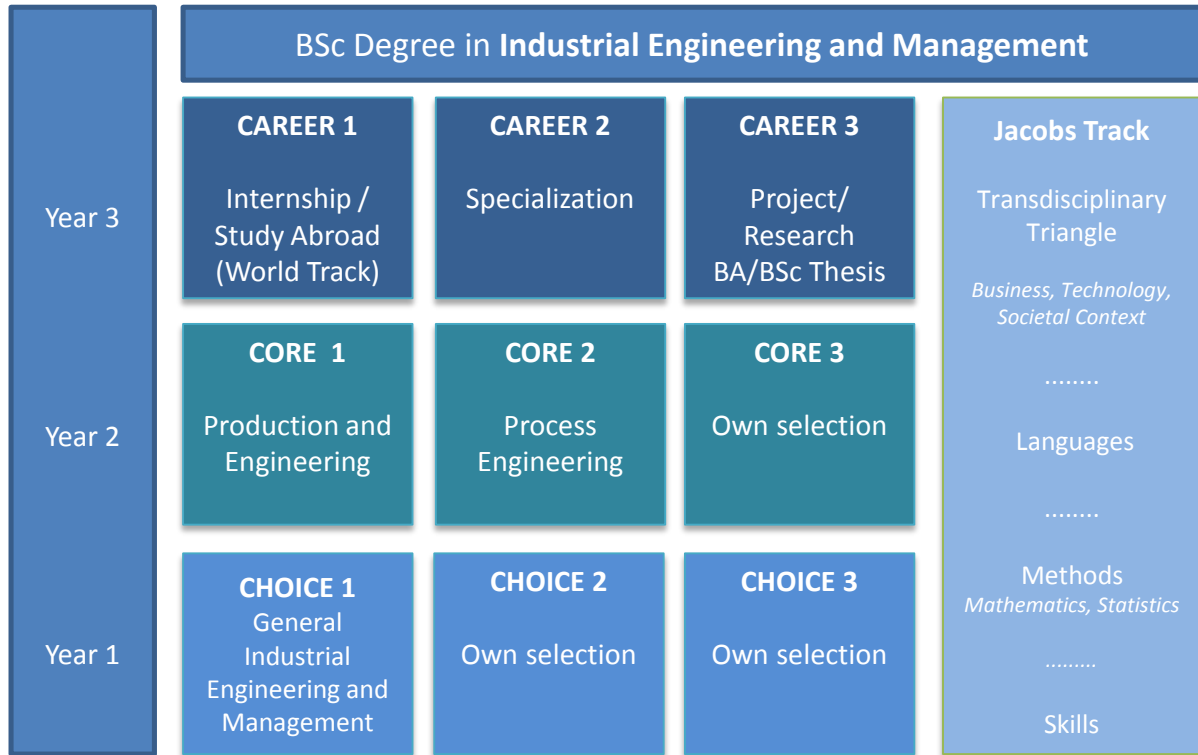
2.5.5 Formal Regulations for the Bachelor Thesis

- **Timing**
The Thesis work has to be generated within the semester of registration. The semester period has 14 weeks.
- **Extent**
The document must be between 15-25 pages in length, including references, but excluding appendices or supporting information. Deviations in length and format can be determined within individual study programs and should be communicated to all registered students by the study program chair.
- **Cover page**
The cover page must show the title of the Bachelor Thesis, the university's name, the month and year of submission, the name of the student and the name of the supervisor.
- **Statutory Declaration**
Each Bachelor Thesis must include a statutory declaration signed by the student confirming it is their own independent work and that it has not been submitted elsewhere. The respective form can be found on the Student Records Office website.
- **Submission**
The Bachelor Thesis must be submitted as a hard copy (pdf-file) to the supervisor and additionally to the Student Records Office via online form on the Student Records Office website.

Deadline for submission of the Bachelor Thesis is May 15 (unless specified otherwise by the Student Records Office).

2.6 Structure

Undergraduate Modularization Structure



YEAR 1 Take three CHOICE modules, two free selection

YEAR 2 Take two mandatory CORE modules and one CORE module from a different study program

YEAR 3 Alternatively Campus Track with a 4th CORE module instead of internship/study abroad module

Figure 4: Industrial Engineering and Management Module Structure

3 Appendix 1a/1b: Mandatory Module and Examination Plans for World Track and Campus Track

Jacobs University Bremen reserves the right to substitute courses by replacements and/or reduce the number of mandatory/mandatory elective courses offered.

4 Appendix 2: Course Data for Program-Specific CHOICE and CORE Courses

All course data stated in the appendix is based on the previous study year and subject to change.

Appendix 1a - Mandatory Module and Examination Plan for World Track

Industrial Engineering and Management – World Track											
Matriculation Fall 2018											
Program-Specific Modules					Jacobs Track Modules (General Education)						
Type	Status ¹	Semester	Credits		Type	Status ¹	Semester	Credits			
Year 1 - CHOICE					Year 1 - CHOICE					20	
<i>Take the mandatory CHOICE module listed below, this is a requirement for the IEM program.</i>											
CH11-GenIEM	Module: General Industrial Engineering and Management		m	15	JT-ME-MethodsMath	Module: Methods / Mathematics		m	7,5		
CH11-050103	Industrial Engineering	Lecture	m	1	5	JT-ME-120106	Applied Calculus I	Lecture	m	1	2,5
CH11-050111	Industrial Engineering Lab	Lab	m	1	2,5	JT-ME-120107	Applied Calculus II	Lecture	m	1	2,5
CH11-050262	Basics of Manufacturing Technology (Intersession)	Seminar	m	1	2,5	JT-ME-990113	Data Analysis and Statistical Inference with R	Lecture	m	2	2,5
CH11-050101	Introduction to Logistics & SCM	Lecture	m	2	5	JT-SK-Skills	Module: Skills		m	5	
Module: CHOICE (own selection)			e	1/2	30	JT-SK-350111	Programming in Python	Lecture	m	1	2,5
<i>Students take two further CHOICE modules from those offered for all other study programs. ²</i>					JT-SK-350112	Advanced Programming in Python	Lecture	m	2	2,5	
					JT-TA-TriArea	Module: Triangle Area		m	2,5		
					Take one course from the triangle (BUSINESS, TECHNOLOGY & INNOVATION, SOCIETAL CONTEXT) area. Each counts 2,5 ECTS ³			me	1/2	2,5	
					JT-LA-Language	Module: Language		m	5		
Take two German courses (2,5 ECTS each). Native German speakers take courses in another offered language		Seminar	me	1/2	5						
					CA01-CarAdv	Career Advising⁴		m			
Year 2 - CORE					Year 2 - CORE					20	
<i>Take the <u>two</u> mandatory modules listed below and one CORE module from a different study program. ²</i>											
CO30-ProductEng	Module: Production & Engineering		me	15	JT-ME-MethodsMath	Module: Methods / Mathematics		m	7,5		
CO30-050232	Production Planning & Control	Lecture	m	3	5	JT-ME-990203	Statistical Modeling with R	Lecture	m	3	2,5
CO30-050131	Fundamentals of Engineering Design	Lab	m	3	2,5	JT-ME-120201	Elements of Probability	Lecture	m	3	2,5
CO30-052102	Production & Technology Management	Lecture	m	4	5	JT-ME-120213	Matrix Algebra	Lecture	m	4	2,5
CO30-050222	Advanced Production System Design	Seminar	m	4	2,5	JT-TA-TriArea	Module: Triangle Area		m	7,5	
CO29-ProcessEng	Module: Process Engineering		me	15	Take three courses from the triangle (BUSINESS, TECHNOLOGY & INNOVATION, SOCIETAL CONTEXT) area. Each counts 2,5 ECTS ³			me	3/4	7,5	
CO29-080202	Operations Research	Lecture	m	3	5	JT-LA-Language	Module: Language		m	5	
CO29-050332	Advanced Lean Methods	Seminar	m	3	2,5	Take two German courses (2,5 ECTS each). Native German speakers take courses in another offered language		Seminar	me	3/4	5
CO29-050212	Process Modelling & Simulation	Lab	m	4	5	CA01-CarAdv Career Advising⁴					
CO29-050252	Supply Chain Management	Seminar	m	4	2,5						
Module: CORE (own selection)											
<i>Students take one further CORE module from those offered for all other study programs. ^{2, 5}</i>											
Year 3 - CAREER					Year 3 - CAREER					5	
CA02 / CA03	Module: Internship / Study Abroad		m	5	20	JT-TA-TriArea	Module: Triangle Area		m	5	
					Take two courses from the triangle (BUSINESS, TECHNOLOGY & INNOVATION, SOCIETAL CONTEXT) area. Each counts 2,5 ECTS ³			me	6	5	
					CA17-IEM	Module: Project/Thesis IEM		m	15	CA01-CarAdv Career Advising⁴	
CA17-050303	Project IEM		m	6	5						
CA17-050304	Thesis IEM		m	6	10						
CA-S-IEM	Module: Specialization Area IEM		m	10							
Take 10 ECTS of specialization courses ²				me	5/6	10					
Total ECTS									180		

¹ Status (m = mandatory, e = elective, me = mandatory elective)

² For a full listing of all CHOICE / CORE / CAREER / Jacobs Track modules please consult the **CampusNet online catalogue** and / or the module handbook (on our website).

³ You are required to take six Triangle Area courses in total. Select two from each of the three triangle areas (BUSINESS, TECHNOLOGY & INNOVATION, SOCIETAL CONTEXT).

⁴ Mandatory component of the Jacobs University's Counseling and Advising Scheme. ⁵ Some CORE modules have CHOICE modules as prerequisites. The selection of modules in the 1st year therefore determines your accessible choices of CORE modules.

Appendix 1b - Mandatory Module and Examination Plan for Campus Track

Industrial Engineering and Management – Campus Track											
Matriculation Fall 2018											
Program-Specific Modules					Jacobs Track Modules (General Education)						
Type	Status ¹	Semester	Credits		Type	Status ¹	Semester	Credits			
Year 1 - CHOICE					45					20	
<i>Take the mandatory CHOICE module listed below, this is a requirement for the IEM program.</i>											
CH11-GenIEM	Module: General Industrial Engineering and Management		m	15	JT-ME-MethodsMath	Module: Methods / Mathematics		m	7,5		
CH11-050103	Industrial Engineering	Lecture	m	1	5	JT-ME-120106	Applied Calculus I	Lecture	m	1	2,5
CH11-050111	Industrial Engineering Lab	Lab	m	1	2,5	JT-ME-120107	Applied Calculus II	Lecture	m	1	2,5
CH11-050262	Basics of Manufacturing Technology (Intersession)	Seminar	m	1	2,5	JT-ME-990113	Data Analysis and Statistical Inference with R	Lecture	m	2	2,5
CH11-050101	Introduction to Logistics & SCM	Lecture	m	2	5	JT-SK-Skills	Module: Skills		m	5	
	Module: CHOICE (own selection)		e	1/2	30	JT-SK-350111	Programming in Python	Lecture	m	1	2,5
<i>Students take two further CHOICE modules from those offered for all other study programs. ²</i>					JT-SK-350112	Advanced Programming in Python	Lecture	m	2	2,5	
					JT-TA-TriArea	Module: Triangle Area		m	2,5		
						Take one course from the triangle (BUSINESS, TECHNOLOGY & INNOVATION, SOCIETAL CONTEXT) area. Each counts 2,5 ECTS ³		me	1/2	2,5	
					JT-LA-Language	Module: Language		m	5		
						Take two German courses (2,5 ECTS each). Native German speakers take courses in another offered language	Seminar	me	1/2	5	
					CA01-CarAdv	Career Advising⁴		m			
Year 2 - CORE					45					20	
<i>Take the <u>two</u> mandatory modules listed below and one CORE module from a different study program. ²</i>											
CO30-ProductEng	Module: Production & Engineering		me	15	JT-ME-MethodsMath	Module: Methods / Mathematics		m	7,5		
CO30-050232	Production Planning & Control	Lecture	m	3	5	JT-ME-990203	Statistical Modeling with R	Lecture	m	3	2,5
CO30-050131	Fundamentals of Engineering Design	Lab	m	3	2,5	JT-ME-120201	Elements of Probability	Lecture	m	3	2,5
CO30-052102	Production & Technology Management	Lecture	m	4	5	JT-ME-120213	Matrix Algebra	Lecture	m	4	2,5
CO30-050222	Advanced Production System Design	Seminar	m	4	2,5	JT-TA-TriArea	Module: Triangle Area		m	7,5	
CO29-ProcessEng	Module: Process Engineering		me	15		Take three courses from the triangle (BUSINESS, TECHNOLOGY & INNOVATION, SOCIETAL CONTEXT) area. Each counts 2,5 ECTS ³		me	3/4	7,5	
CO29-080202	Operations Research	Lecture	m	3	5	JT-LA-Language	Module: Language		m	5	
CO29-050332	Advanced Lean Methods	Seminar	m	3	2,5		Take two German courses (2,5 ECTS each). Native German speakers take courses in another offered language	Seminar	me	3/4	5
CO29-050212	Process Modelling & Simulation	Lab	m	4	5	CA01-CarAdv	Career Advising⁴		m		
CO29-050252	Supply Chain Management	Seminar	m	4	2,5						
	Module: CORE (own selection)										
<i>Students take one further CORE module from those offered for all other study programs. ^{2, 5}</i>											
Year 3 - CAREER					45					5	
COXX	Module: Additional (4th) CORE module		m	5/6	15	JT-TA-TriArea	Module: Triangle Area		m	5	
							Take two courses from the triangle (BUSINESS, TECHNOLOGY & INNOVATION, SOCIETAL CONTEXT) area. Each counts 2,5 ECTS ³		me	5	5
CA17-IEM	Module: Project/Thesis IEM		m		15	CA01-CarAdv	Career Advising⁴		m		
CA17-050303	Project IEM		m	6	5						
CA17-050304	Thesis IEM		m	6	10						
CA-S-IEM	Module: Specialization Area IEM		m		15						
	Take 15 ECTS of specialization courses ²		me	5/6	15						
Total ECTS									180		

¹ Status (m = mandatory, e = elective, me = mandatory elective)

² For a full listing of all CHOICE / CORE / CAREER / Jacobs Track modules please consult the **CampusNet online catalogue** and / or the module handbook (on our website).

³ You are required to take six Triangle Area courses in total. Select two from each of the three triangle areas (BUSINESS, TECHNOLOGY & INNOVATION, SOCIETAL CONTEXT).

⁴ Mandatory component of the Jacobs University's Counseling and Advising Scheme. ⁵ Some CORE modules have CHOICE modules as prerequisites. The selection of modules in the 1st year therefore determines your accessible choices of CORE modules.

Appendix 2 - Course Data



Course Name Introduction to Logistics and SCM	Course No CH11-050101	ECTS 5
Module Affiliation CH11-GenIEM General Industrial Engineering and Management	Workload (hrs / sem) Contact Time: 35,00 Private Study: 90,00	Level Bachelor 1st Year CHOICE
Course Description / Content / Aims Students will be introduced to the scope of Logistics and Supply Chain Management (SCM). They will get to understand the main logistics goals and functions as well as the recent and future challenges in logistics and supply chain management. Subsequently, the following subjects will be covered: overview of operative procurement, strategic sourcing, production planning and control, distribution logistics, inventory management, supply chain network design, and management of logistics service providers. The students are also given a project task on a specific topic, aiming at improving students' team-working, project management and presentation skills.		
Methods of Assessment		
Name		Weighting
Final Exam		50%
Group Project		25%
Home Work / Quizzes		25%
Course Name Industrial Engineering	Course No CH11-050103	ECTS 5
Module Affiliation CH11-GenIEM General Industrial Engineering and Management	Workload (hrs / sem) Contact Time: 35,00 Private Study: 90,00	Level Bachelor 1st Year CHOICE
Course Description / Content / Aims The course gives a broad introduction in the Industrial Engineering field. Industrial Engineering is an application-oriented scientific discipline that deals with the creation and management of systems that integrate people and materials and energy in productive ways. The Industrial Engineering course establishes a foundation in four areas: human factors engineering, manufacturing systems engineering, operations research, and management systems engineering. The course covers topics such as production systems, production design, factory planning, industrial management and decision making. The students will gain an understanding of both the theoretical and practical aspects of industrial engineering.		
Methods of Assessment		
Name		Weighting
Final Exam		50%
Group Case Study		30%
Unannounced Quizz(es)		20%

Appendix 2 - Course Data

Course Name Industrial Engineering Lab	Course No CH11-050111	ECTS 2,5
Module Affiliation CH11-GenIEM General Industrial Engineering and Management	Workload (hrs / sem) Contact Time: 25,50 Private Study: 37,00	Level Bachelor 1st Year CHOICE
Course Description / Content / Aims The Industrial Engineering Lab substantiates and amends the technical concepts taught in the lectures by exercises, experiments and/or simulations. These include exercises to demonstrate the principles of industrial engineering methods (e.g. business process modeling, computer simulation of a production process, production planning, and linear programming). In addition, students will also gain practical knowledge by means of two business games. The Presto business game will help students understand how important the organization of production processes is. Furthermore, the Beer Distribution Game (a computer based business game) will address the bullwhip effect in supply chains and improve students' understanding of logistics and supply chain management.		
Methods of Assessment		
Name	Weighting	
Final Exam	80%	
HW Assignments	20%	
Course Name Basics of Manufacturing Technology (Intersession)	Course No CH11-050262	ECTS 2,5
Module Affiliation CH11-GenIEM General Industrial Engineering and Management	Workload (hrs / sem) Contact Time: 17,50 Private Study: 45,00	Level Bachelor 1st Year CHOICE
Course Description / Content / Aims This course aims to cover the fundamental skills in engineering and to provide students with a broad view of operations within the factory. The students will understand the most common production technologies and the possibilities of the machinery used in the production processes in the engineering industry. After briefly introducing basics of manufacturing technology and processes such as casting, milling and welding, the course will move on to topics in operations management including manufacturing process flow, production planning, bill of materials, factory layouts and others. The students will be given a project or a case study to work in groups.		
Methods of Assessment		
Name	Weighting	
Group Project	100%	

Appendix 2 - Course Data



Course Name Process Modelling and Simulation	Course No CO29-050212	ECTS 5								
Module Affiliation CO29-ProcessEng Process Engineering	Workload (hrs / sem) Contact Time: 51,00 Private Study: 74,00	Level Bachelor 2nd Year CORE								
<p>Course Description / Content / Aims Process understanding is highly important in the field of industrial engineering and management. Without knowing processes, there is no opportunity to improve them. In the course Process Modeling and Simulation, various concepts of process modeling will be introduced as well as modeling methods and modeling languages. One method of process modeling will be treated in details to demonstrate how process modeling can support industrial engineers to implement optimization initiatives. Various exercises and simulation examples will be practiced both in class and as homework with real process modeling and simulation tools (e.g., Vensim, PlantDesign, ARIS Express, Plant Simulation).</p>										
<p>Methods of Assessment</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 80%;">Name</th> <th style="width: 20%;">Weighting</th> </tr> </thead> <tbody> <tr> <td>Active Participation</td> <td style="text-align: right;">20%</td> </tr> <tr> <td>Final Group Project</td> <td style="text-align: right;">80%</td> </tr> </tbody> </table>			Name	Weighting	Active Participation	20%	Final Group Project	80%		
Name	Weighting									
Active Participation	20%									
Final Group Project	80%									
Course Name Supply Chain Management	Course No CO29-050252	ECTS 2,5								
Module Affiliation CO29-ProcessEng Process Engineering	Workload (hrs / sem) Contact Time: 17,50 Private Study: 45,00	Level Bachelor 2nd Year CORE								
<p>Course Description / Content / Aims This course will particularly bundle theoretical methods for solving logistics problems in networks with practical examples from industry. The tasks and goals of supply chain design, together with methods and instruments for the design of logistics networks will be presented. Students work intensively in groups on several case studies; thus they are able to apply the knowledge, which they acquired in their courses and internships, on real cases. At the end of the course students write an essay in groups, investigating a specific supply chain related problem that companies are facing nowadays. They also present the findings in group presentations.</p>										
<p>Methods of Assessment</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 80%;">Name</th> <th style="width: 20%;">Weighting</th> </tr> </thead> <tbody> <tr> <td>Final Exam</td> <td style="text-align: right;">65%</td> </tr> <tr> <td>Literature Study</td> <td style="text-align: right;">25%</td> </tr> <tr> <td>Pooling of the demand challenge</td> <td style="text-align: right;">10%</td> </tr> </tbody> </table>			Name	Weighting	Final Exam	65%	Literature Study	25%	Pooling of the demand challenge	10%
Name	Weighting									
Final Exam	65%									
Literature Study	25%									
Pooling of the demand challenge	10%									

Appendix 2 - Course Data



Course Name Advanced Lean Methods	Course No CO29-050332	ECTS 2,5								
Module Affiliation CO29-ProcessEng Process Engineering	Workload (hrs / sem) Contact Time: 17,50 Private Study: 45,00	Level Bachelor 2nd Year CORE								
<p>Course Description / Content / Aims This course deals with the implementation and application of the 20th century lean methods in modern manufacturing processes. These include: change management process, elimination of waste, one piece flow, pull principle, value stream mapping, 6 sigma and zero defects. The course provides a theoretical overview of these methods as well as enables students to apply them in practice by participating in game-based activities in class. The course is heavily focused on the applicability of lean methods, providing numerous examples from the industry. Specifically, students apply the value stream mapping method to a real-world case study.</p>										
Course Name Operations Research	Course No CO29-080202	ECTS 5								
Module Affiliation CO29-ProcessEng Process Engineering CO24-PlanOpt Planning and Optimization	Workload (hrs / sem) Contact Time: 35,00 Private Study: 90,00	Level Bachelor 2nd Year CORE								
<p>Course Description / Content / Aims Operations research is an interdisciplinary mathematical science that focuses on the effective use of technology by organizations. By employing techniques such as mathematical modeling, statistical analysis, and mathematical optimization, operations research finds optimal or near-optimal solutions to complex decision-making problems. Operations Research is concerned with determining the maximum (of profit, performance, or yield) or the minimum (of loss, risk, or cost) of some real-world objective. This course introduces students to modelling of decision problems and the use of quantitative methods and techniques for effective decision-making. Familiarity with a programming language (e.g., Python, C++, etc.) is desirable for this course.</p>										
<p>Methods of Assessment</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Name</th> <th style="text-align: right;">Weighting</th> </tr> </thead> <tbody> <tr> <td>Final Exam</td> <td style="text-align: right;">40%</td> </tr> <tr> <td>Home Work</td> <td style="text-align: right;">30%</td> </tr> <tr> <td>Midterm Exam</td> <td style="text-align: right;">30%</td> </tr> </tbody> </table>			Name	Weighting	Final Exam	40%	Home Work	30%	Midterm Exam	30%
Name	Weighting									
Final Exam	40%									
Home Work	30%									
Midterm Exam	30%									

Appendix 2 - Course Data



Course Name Fundamentals of Engineering Design	Course No CO30-050131	ECTS 2,5
Module Affiliation CO30-ProductEng Production & Engineering	Workload (hrs / sem) Contact Time: 25,50 Private Study: 37,00	Level Bachelor 2nd Year CORE
Course Description / Content / Aims The course provides the students with an overview of the technically-oriented methodical advancement of the engineering field. The focus will not only be on the purely theoretical transfer of knowledge, but the theory will be presented in the context of practical examples and exercises with the purpose of highlighting the interaction between Knowledge, Creativity and Experience. The learned concepts shall be put into practice within the framework of a "Product Development": from the clarification of the requirements, through the development of the product, to the manufacturing with a 3D Printer. The course has three main focal points covered in three sections, the first being the methodical product development. This section will convey exemplary methods that will aid the goal-oriented development of a technical product. Further, the second section will present the possibilities that modern CAx systems are offering as well as the potential of a thorough process chain within the product creation. The third section will focus on the various aspects of the construction procedure. The course will entail a teamwork project, within which a simple product will be developed based on the given requirements and restrictions, and further constructed using an open-source CAD system.		
Methods of Assessment		
Name	Weighting	
Final Exam	20%	
Individual work in coaching session	60%	
Peer Review	20%	
Course Name Advanced Production System Design		
Course No CO30-050222		
ECTS 2,5		
Module Affiliation CO30-ProductEng Production & Engineering	Workload (hrs / sem) Contact Time: 17,50 Private Study: 45,00	Level Bachelor 2nd Year CORE
Course Description / Content / Aims This course will introduce students into the advanced methods of production system design. The course combines theoretical knowledge and hands-on exercises. Students will be introduced to different production organization forms in different industries. Students learn to analyze products, calculate the required number of machines, cluster those to machine groups, determine their space requirements, and laying them out. Beyond that students will learn a well-known technique for the optimization of production systems, namely value stream mapping.		
Methods of Assessment		
Name	Weighting	
Active Participation	20%	
Final Exam	80%	

Appendix 2 - Course Data



Course Name Production Planning and Control	Course No CO30-050232	ECTS 5
Module Affiliation CO30-ProductEng Production & Engineering	Workload (hrs / sem) Contact Time: 35,00 Private Study: 90,00	Level Bachelor 2nd Year CORE
Course Description / Content / Aims A thorough introduction of the planning and control basics and their coherences with the essential processes of the order management within production companies as well as the co-ordination of the entire manufacturing processes will be given in the course Production Planning and Control. The course presents the problems that production companies are confronted with. Further, students gain a profound understanding of the targets and key figures of production logistics, the modeling methods of production systems, the production planning and control (PPC) tasks and the different types of production. Various production planning and control methods are integrated in this course. Furthermore, the importance of monitoring and controlling systems will be shown. Planning games will ensure an understanding of the complexity of production planning and control.		
Methods of Assessment		
Name		Weighting
Final Exam		60%
Home Work		20%
Home Work 2		20%
Course Name Production and Technology Management	Course No CO30-052102	ECTS 5
Module Affiliation CO30-ProductEng Production & Engineering	Workload (hrs / sem) Contact Time: 35,00 Private Study: 90,00	Level Bachelor 2nd Year CORE
Course Description / Content / Aims The course discusses the current challenges and context faced by companies in providing products and services including production and logistics. Then, the course focuses on the trends of production and logistics and how the disruptive technologies, such as internet of things, cloud computing, big data, etc., provide new contexts of production logistics. The trends include factory of the future, additive manufacturing, and mass customization, and future working systems. In order to prepare themselves for the competition due to the new contexts, companies need to be innovative in providing products and services. This course also gives insights how innovations and technologies are managed and implemented into new products and services. Knowledge, which is the key enabler of innovation in an organization, has to be also managed. This course introduces the methods and tools for knowledge management. Furthermore, business process model development which leads the product and services to market will be also discussed. The project work will cover case studies in modern companies. The case studies discuss why and how they introduce new technologies in their production and logistics processes, how they manage their innovation and technologies, how they manage knowledge, and what kind of new products or services that they can provide, etc.		
Methods of Assessment		
Name		Weighting
Attendance		10%
Final Exam		60%
Project Work		30%