JACOBS UNIVERSITY

Study Program Handbook

Industrial Engineering & Management

Bachelor of Science

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

The subject-specific examination regulations for Industrial Engineering and Managment 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
Fall 2016 - V1	01.09.16	AB August 2016	Master Version
Fall 2016 - V2	01.09.17	AB August 2017	2.2 revised, 2.5 added
Fall 2016 - V3	01.09.18	Academic Senate August 29, 2018	Figure 3 updated

Contents

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

The major B.Sc. Industrial Engineering & Management at Jacobs University provides students with theoretical knowledge as well as practical experience in both the management and the engineering business functions. This fundamental groundwork can be the foundation for a subsequent career in industrial and trade enterprises, consulting, IT, Logistics service provider companies, as well as in research and education. Previous graduates of this major have found employment at renowned international companies with ease, and they have been accepted to top-ranking universities all throughout the world for further studies. Company and university representatives stress that the graduates not only convinced them of their expertise, but also have extraordinarily strong development in their intercultural and communication abilities.

The IEM program at Jacobs University allows students to specialize without missing out on content from other disciplines. Companies' attitudes towards this kind of education are very open, as the graduates with this educational background fit into interface positions in which they can prove their special abilities very early in their professional development. IEM graduates will be able to work with engineering designs, discuss about financial issues of a project with controllers, make operational and strategic decisions involving complex or conflicting objectives and provide structured management reports about project progress. This ability to be on one level with both technical and management professionals clearly elevates B.Sc. Industrial Engineering & Management graduates above other young talent for example those from purely Business, Economics, or Engineering backgrounds.

As students of an international university, the graduates are used to performing in an English speaking and intercultural environment. Their already developed strong communication abilities and other ”soft skills” are also strengthened throughout their studies. The students are slowly introduced to working within companies and very quickly develop personally and professionally through frequent, individual feedback sessions and personal attention. This facilitates and speeds up their subsequent careers and helps them to quickly become valuable company assets.

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 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 possess the ability to acquire knowledge rapidly, to assess information and to evaluate new concepts critically;
- graduates have communicative competences which allow them to present themselves and their ideas and to negotiate successfully;
- graduates are familiar with business-related processes and management skills and are able to manage projects efficiently and independently.

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 in negotiating and mediating between different points of view;
- graduates can rely on basic civic knowledge and have an understanding for ethical reasoning; students are familiar with the requirements for taking on responsibility.

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, Rhlig, 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 coordinator:

Dr. Yilmaz Uygun
Professor of Logistics Engineering, Technologies, and Processes
Email: y.uygun@jacobs-university.de
Telephone: +49 421 200-3478

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:

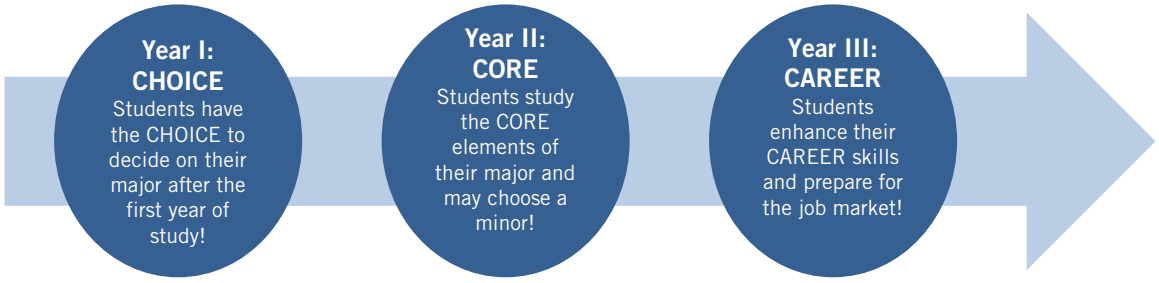


Figure 1: The Jacobs University 3C-Model

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 Universitys 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. For more 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

third year. This opportunity can be used by students to more intensively focus on their major or to fulfill the minor requirements for a second field of interest.

In the sixth semester, all students select from a range of specialization courses within their study program and concentrate on their Bachelor thesis in the context of a Project/Thesis Module.

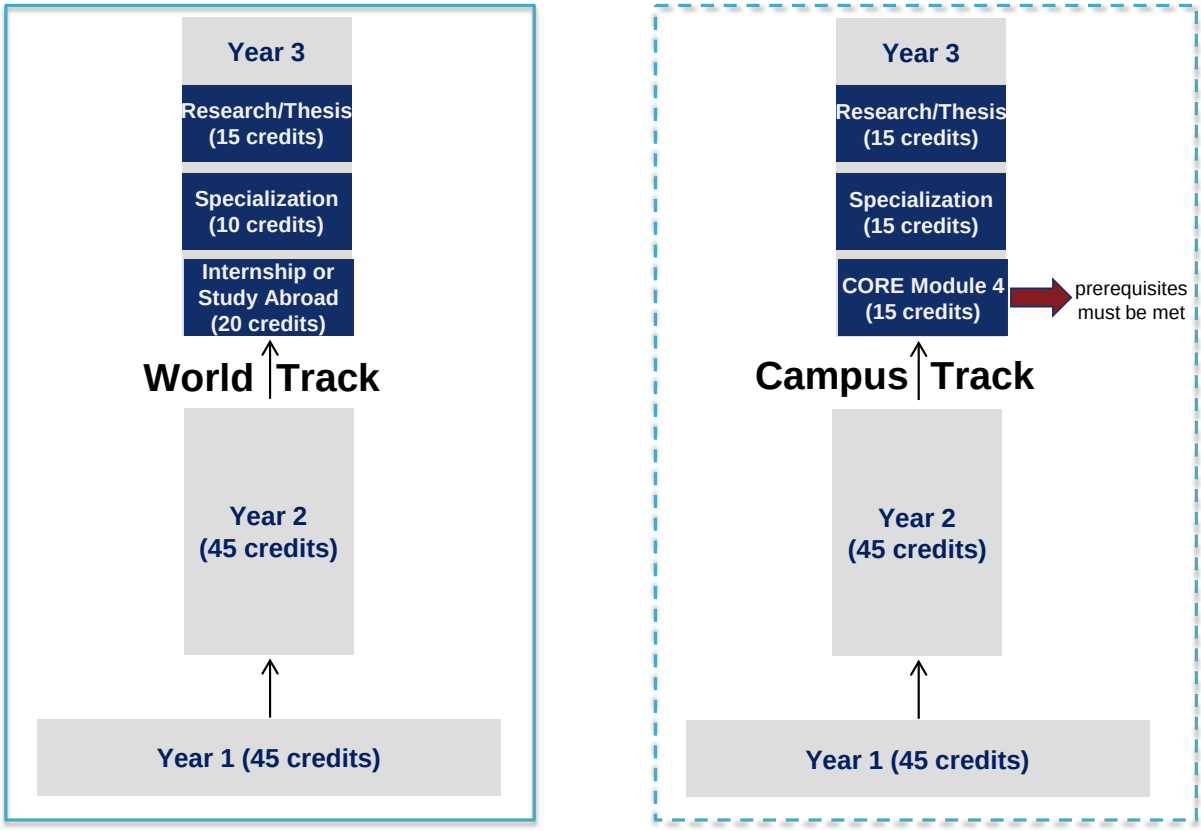


Figure 2: World Track versus Campus Track

Career Skills

Throughout their studies all students attend a mandatory set of career skills courses and events.

The mandatory Career Skills module 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 of the module include information sessions, compulsory seminars on various career-relevant topics as well as participation in the annual Jacobs Career Fair.

The successful completion of the Career Skills Module and the encompassed single seminars are graded with Pass/Fail for all students. ECTS credits are not awarded. All undergraduate students will be automatically registered for the Career Skills Module. However, every student has to keep track of his/her individual fulfillment of requirements and has to register on Campusnet for all seminars and sessions during the official registration period at the beginning of each semester. An overview of the sequence in which components should be completed is shown in the table below:

CAREER SKILLS MODULE For Undergraduate Students matriculated Fall 2015 and Fall 2016

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-RESEARCHING & CONTACTING EMPLOYERS CA01-990004					
MANDATORY ELECTIVE SEMINARS (seminar program subject to availability)			Attend 2 out of several career skills seminars and workshops. i.e. ▪ Business Etiquette ▪ Presentation Skills ▪ Communication Skills ▪ Grad School Application Training ▪ Self-Management ▪ Time-Management ▪ Decision Making ▪ Preparing for an Interview ▪ Introduction to Project Management			
OTHER MANDATORY COMPONENTS				CSC-JACOBS CAREER FAIR in February, on campus CA01-990003	INTERNSHIP or STUDY ABROAD or CAMPUS TRACK	INTERNSHIP & STUDY ABROAD EVENT Online CSC-CAREER SURVEY CA01-990002

Figure 3: The Career Skills Module

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

2.4.1 Content

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:
     - Modelling Dynamics in Industrial Systems
     - IT Applications in Production and Logistics
     - Quality and Risk Management Methods
     - Ethics and Sustainability in Production and Logistics
     - Procurement and Purchasing
     - Distribution and E-Commerce

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 coordinators 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.

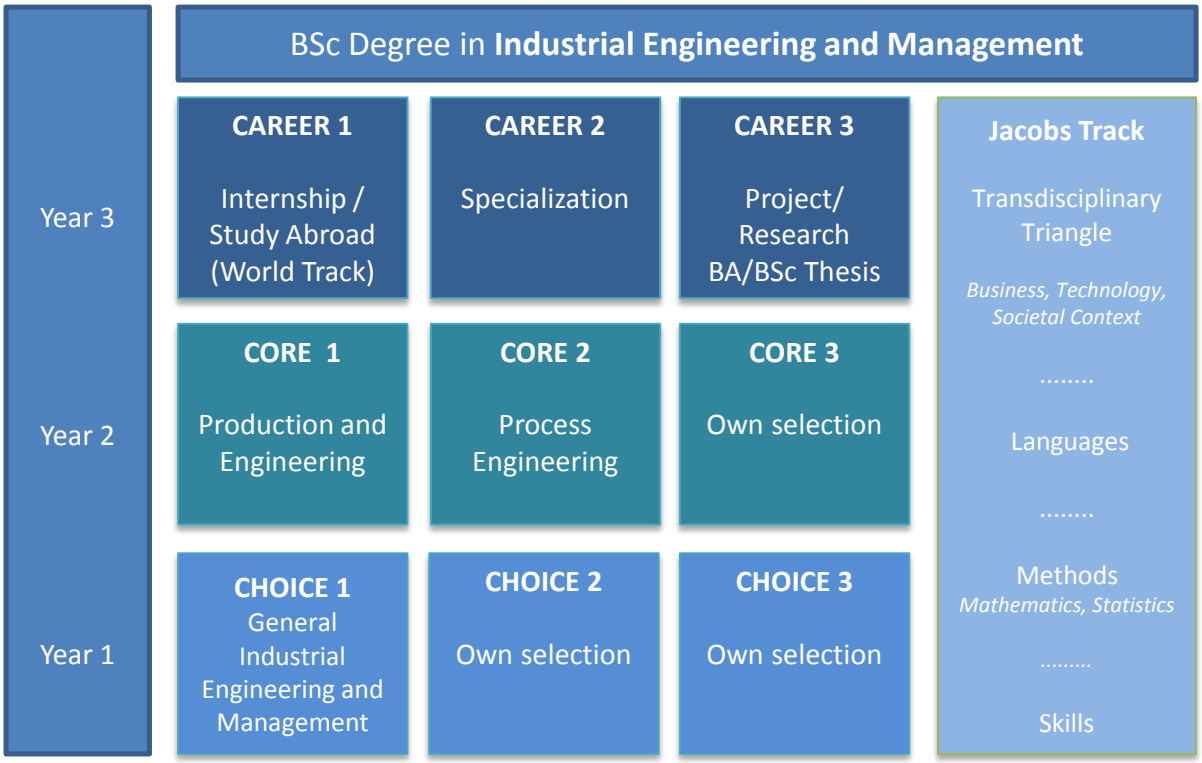
Students are allowed to extend their thesis related work into the intersession or summer break upon approval of the thesis supervisor and Student Records. Students are not allowed to register for different Bachelor Thesis courses in the same semester.

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 coordinator.
- 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).

2.5.6 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

JACOBS UNIVERSITY

Industrial Engineering and Management – World Track

Matriculation Fall 2016

	Program-Specific Modules	Type	Status[1]	Semester	Credits		Jacobs Track Modules (General Education)	Type	Status[1]	Semester	Credits
Year 1 - CHOICE					**45**						**20**
Take the mandatory CHOICE module listed below, this is a requirement for the IEM program.											
CH11-GenIEM	**Module: General Industrial Engineering and Managment**		**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
Students take two further CHOICE modules from those offered for all other study programs. [2]							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
Year 2 - CORE					**45**						**20**
Take the <u>two</u> mandatory modules listed below and one CORE module from a different study program. [2]											
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							
CO29-ProcessEng	**Module: Process Engineering**		**me**		**15**		**JT-TA-TriArea**	**Module: Triangle Area**		**m**		**7,5**
CO29-080202	Operations Research	Lecture	m	3	5			Take three courses from the triangle (BUSINESS, TECHNOLOGY & INNOVATION, SOCIETAL CONTEXT) area. Each counts 2,5 ECTS [3]		me	3/4	7,5
CO29-050332	Advanced Lean Methods	Seminar	m	3	2,5							
CO29-050212	Process Modelling & Simulation	Lab	m	4	5							
CO29-050252	Supply Chain Management	Seminar	m	4	2,5							
	Module: CORE (own selection)						**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	3/4	5
Year 3 - CAREER					**45**						**5**
CA02 / CA03	**Module: Internship / Study Abroad**		**m**	**5**	**20**		**JT-TA-TriArea**	**Module: Triangle Area**		**m**		**5**
CA01-CarSkills	**Module: Career Skills**		**m**					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**							
CA17-050303	Project IEM		m	6	5							
CA17-050304	Thesis IEM		m	6	10							
CAS-WT-IEM	**Module: Specialization Area IEM**		**m**		**10**							
	Take four specialization courses (2.5 ECTS each) [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).

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

Industrial Engineering and Management – Campus Track

Matriculation Fall 2016

	Program-Specific Modules	Type	Status[1]	Semester	Credits		Jacobs Track Modules (General Education)	Type	Status[1]	Semester	Credits
Year 1 - CHOICE					**45**						**20**
Take the mandatory CHOICE module listed below, this is a requirement for the IEM program.											
CH11-GenIEM	**Module: General Industrial Engineering and Managment**		**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
Students take two further CHOICE modules from those offered for all other study programs. [2]							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
Year 2 - CORE					**45**						**20**
Take the <u>two</u> mandatory modules listed below and one CORE module from a different study program. [2]											
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							
CO29-ProcessEng	**Module: Process Engineering**		**me**		**15**		**JT-TA-TriArea**	**Module: Triangle Area**		**m**		**7,5**
CO29-080202	Operations Research	Lecture	m	3	5			Take three courses from the triangle (BUSINESS, TECHNOLOGY & INNOVATION, SOCIETAL CONTEXT) area. Each counts 2,5 ECTS [3]		me	3/4	7,5
CO29-050332	Advanced Lean Methods	Seminar	m	3	2,5							
CO29-050212	Process Modelling & Simulation	Lab	m	4	5							
CO29-050252	Supply Chain Management	Seminar	m	4	2,5							
	Module: CORE (own selection)						**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	3/4	5
Year 3 - CAREER					**45**						**5**
COXX	**Module: Addtional (4th) CORE module**		**m**	**5/6**	**15**		**JT-TA-TriArea**	**Module: Triangle Area**		**m**		**5**
CA01-CarSkills	**Module: Career Skills**		**m**					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**							
CA17-050303	Project IEM		m	5	5							
CA17-050304	Thesis IEM		m	6	10							
CAS-CT-IEM	**Module: Specialization Area IEM**		**m**		**15**							
	Take **six** specialization courses (2.5 ECTS each) [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).

Appendix 2 - Course Data

Course Name	***Course No***	***ECTS***
Industrial Engineering	CH11-050103	5
Module Affiliation CH11-GenIEM General Industrial Engineering and Management	***Workload (hrs / sem)*** 125	***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
Attendance	10%
Final Exam	50%
Group Project	25%
Quizz(es)	15%

Course Name	***Course No***	***ECTS***
Industrial Engineering Lab	CH11-050111	2,5
Module Affiliation CH11-GenIEM General Industrial Engineering and Management	***Workload (hrs / sem)*** 62,5	***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, distribution planning, safety stock calculation, 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 Game (a computer based business game) will address the bullwhip effect in supply chains and improve students' understanding of logistics and supply chain management. Finally, an excursion to a manufacturing company in Bremen will be offered within one lab session in order to show how production systems works in the industry world.

Methods of Assessment

Name	Weighting
Final Exam	100%

Appendix 2 - Course Data

Course Name	***Course No***	***ECTS***
Basics of Manufacturing Technology (Intersession)	CH11-050262	2,5
Module Affiliation CH11-GenIEM General Industrial Engineering and Management	***Workload (hrs / sem)*** 62,5	***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 brie?y 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 ?ow, 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%

Course Name	***Course No***	***ECTS***
Introduction to Logistics and SCM	CH11-050101	5
Module Affiliation CH11-GenIEM General Industrial Engineering and Management	***Workload (hrs / sem)*** 125	***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 procurement, production, distribution and transport logistics, supply chain strategy, supply chain integration, inventory and warehouse management, management of logistics service providers, IT systems in logistics and SCM, lean logistics methods, supply chain network design, modelling and optimization of logistic systems. The students are also given a project task on a specific topic, aiming at improving students' team-working, project management and presentation skills.

Appendix 2 - Course Data

Course Name	***Course No***	***ECTS***
Operations Research	CO29-080202	5
Module Affiliation	***Workload (hrs / sem)***	***Level***
CO29-ProcessEng Process Engineering	125	Bachelor 2nd Year CORE

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.

Methods of Assessment

Name	Weighting
Final Exam	40 %
Homework	30 %
Midterm Exam	30 %

Course Name	***Course No***	***ECTS***
Advanced Lean Methods	CO29-050332	2,5
Module Affiliation	***Workload (hrs / sem)***	***Level***
CO29-ProcessEng Process Engineering	62,5	Bachelor 2nd Year CORE

Course Description / Content / Aims

This course deals with the implementation and amplification 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.

Appendix 2 - Course Data

Course Name Process Modelling & Simulation	***Course No*** CO29-050212	***ECTS*** 5
Module Affiliation CO29-ProcessEng Process Engineering	***Workload (hrs / sem)*** 125	***Level*** Bachelor 2nd Year CORE
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).		

Course Name Supply Chain Management	***Course No*** CO29-050252	***ECTS*** 2,5
Module Affiliation CO29-ProcessEng Process Engineering	***Workload (hrs / sem)*** 62,5	***Level*** Bachelor 2nd Year CORE
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.		

Appendix 2 - Course Data

Course Name	***Course No***	***ECTS***
Production Planning & Control	CO30-050232	5
Module Affiliation	***Workload (hrs / sem)***	***Level***
CO30-ProductEng Production & Engineering	125	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
Examination	60%
Homeworks and Assignments	30%
Active Participation	10%

Course Name	***Course No***	***ECTS***
Fundamentals of Engineering Design	CO30-050131	2,5
Module Affiliation	***Workload (hrs / sem)***	***Level***
CO30-ProductEng Production & Engineering	62,5	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 Presentation & Interview	50%
Practical exercises	25%
Product development	25%

Appendix 2 - Course Data

Course Name Production & Technology Management	***Course No*** CO30-052102	***ECTS*** 5
Module Affiliation CO30-ProductEng Production & Engineering	***Workload (hrs / sem)*** 125	***Level*** Bachelor 2nd Year CORE
Course Description / Content / Aims This course will introduce the participants into how companies produce goods and services. As the operative component of the corporate strategy, the production management highly contributes to the success of companies. The resources of a company must be used effectively, producing goods and services in a way that satisfies the customers. Effective production management gives the potential to increase revenues and to reduce costs of production. Furthermore, the course introduces the meaning of technology management as a central way to create competitive advantage by means of the design, planning and application of technological products, processes and services.		
Course Name Advanced Production System Design	***Course No*** CO30-050222	***ECTS*** 2,5
Module Affiliation CO30-ProductEng Production & Engineering	***Workload (hrs / sem)*** 62,5	***Level*** Bachelor 2nd Year CORE
Course Description / Content / Aims This course will introduce the participants into the advanced methods of production and assembly design. The course combines theoretical and practical knowledge by alternating lectures and company visits. Students will be introduced to different production and assembly organization forms in different industries. Students learn to choose the optimal production planning and control method as well as to decide on automation and digitalization levels. Beyond that students learn different techniques and methods for the optimization of production and assembly systems, such as value stream mapping und lean management principles.		