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Appendices to the Teaching and Examination Regulations (TER) of the Bachelor's degree programme in Industrial Engineering and Management (2018-2019)

General remark

Due to upcoming changes in the IEM Bachelor curriculum, only the first year of the programme in this TER is applicable to cohort 2018-2019. The second and third year of the bachelor for cohort 2018-2019 will be included in the TER of 2019-2020 and 2020-2021 respectively.



Appendix I: Learning outcomes in the Bachelor's degree programme (art. 1.3.a)

Holders of a Bachelor's degree in Industrial Engineering and Management have:

1. The required knowledge to describe elementary technological products and processes within a business context.
2. The required understanding to determine and assess the functionality and performance of these products and processes in a multidisciplinary way (e.g. from technological and business perspectives as well as those of a variety of stakeholders).
3. The required skills to design, redesign, implement and subsequently validate these products and processes.
4. The required knowledge, understanding and skills for 'Life-Long Learning' (including finding information and using IT applications) to function largely autonomously.
5. The required knowledge and understanding of technology, business studies, mathematics and natural sciences to successfully complete a Master's degree programme in Industrial Engineering.
6. An academic attitude, i.e. the required knowledge, understanding and skills to conduct elementary academic research.
7. The required skills to communicate effectively about ideas and solutions with both engineers and managers.
8. Basic knowledge in the field of leadership, socially and ethically responsible behaviour in order to apply technology.



Appendix II: Majors and Minors of the degree programme Article 2.1.4

The degree programme comprises a Major with two tracks:

- PTL - Production Technology and Logistics
- PPT - Process and Product Technology



Appendix III Course units in the propaedeutic phase

- List of course units; Article 3.1.1
- Course units with one or more practicals; Article 3.2
- Compulsory order of examinations; Article 8.2

<i>Course unit name</i>	<i>ECTS</i>	<i>Practical</i>	<i>Entry requirements</i>
Global Supply Chain	5	Yes	
Programming, Modelling and Simulation	5	Yes	
Calculus 1	5	Yes	
Organizational Behaviour and Group Dynamics	5	Yes	
System Dynamics	5	Yes	
Linear Algebra	5	Yes	
Management Accounting	5	Yes	
Materials and Molecules	5	Yes	
Calculus 2	5	Yes	
B2B Marketing	5	Yes	
Dynamics of Engineering Systems	5	Yes	
Statistics and Data Handling	5	Yes	



Appendix IV Course units in the post-propaedeutic phase

- List of course units; Article 6.1.1
- Course units with one or more practicals; Article 6.2.1
- Compulsory order of examinations; Article 8.2

Course unit name	ECTS	Practical	Entry requirements
2nd year: joint programme	30		
Nederlands Bedrijfsrecht (voor IEM) Or International Business Law (for IEM)	5		
Operations Research	5	Yes	
Outlining & Implementing Innovation Strategy	5	Yes	
Marketing for E&BE	5		
Physical Transport Phenomena (IEM)	5		
Production Planning and Quality Control	5		
2nd year: PTL track	30		
Mechanics (for IEM)	5		
Materials Science and Engineering	5	Yes	
Production Techniques	5	Yes	
Modelling and Analysis of Complex Networks	5	Yes	
Applied Manufacturing Research	5	Yes	
Signals and Systems (for IEM and BMT)	5	Yes	
2nd year: PPT track	30		
Technical Thermodynamics (IEM)	5		
Industrial Polymers	5	Yes	
Single-Phase Reactors	5	Yes	
Biological Systems	5	Yes	
Structures and Molecules	5	Yes	
Industrial Biotechnology	5	Yes	
3rd year: joint programme	25		
Research and Design Methodology	5	Yes	Propaedeutic exam
Design Science	5	Yes	140 ECTS of Bachelor's IEM programme (including propaedeutic phase and Business System Design (until cohort 2014/2015) or Research Design Methodology (from cohort 2015/2016) must have been completed).
Integration Project	15	Yes	140 ECTS of Bachelor's IEM programme (including propaedeutic phase and Business System Design (until cohort 2014/2015) or



			Research Design Methodology (from cohort 2015/2016) must have been completed). From Cohort 2016-2017 Design Science must be completed.
3rd year: PTL track	35		
Control Engineering	5	Yes	Propaedeutic exam
Numerical Methods	5	Yes	Propaedeutic exam
Mechatronics	5	Yes	Propaedeutic exam
Computer Aided Design & Manufacturing	5	Yes	Propaedeutic exam
Digital and Hybrid Control Systems	5		Propaedeutic exam
Design and Construction (IEM)	5	Yes	Propaedeutic exam
Elective	5	Var.	
3rd year: PPT track	30		
General Process Equipment	5	Yes	Propaedeutic exam
Special Process Equipment	5	Yes	Propaedeutic exam
Product Technology (IEM)	5	Yes	Propaedeutic exam
Mass Transfer and Reactions in Gas-liquid Reactors	5		Propaedeutic exam
Electives	15	Var.	

PTL electives list

Course code	Course name	Practical	ECTS
NAPMS-12	Principles of Measurement Systems		5
NAGO-11	Waves and Optics		5
NAGE-10	Geo-Energy		5
NAEUG-12	Energy from Gas		5
EBB117A05	Entrepreneurial Marketing*		5
EBB119A05	Technology-based Offerings*		5
EBB118B10	Entrepreneurship Project*		10
EBB124A05	Introduction to Entrepreneurship*		5
WBEC15000	Onderwijs en communicatie		5

For information on the electives of other degree programmes see the teaching and examination regulations of the corresponding programme.

PPT electives list

Course code	Course name	Practical	ECTS
CHEVM1-11	Physical properties of Materials 1		5
WBIE18006	Capita Selecta PPT		
WBIE13003	Molecular Biotechnology	Yes	5
NAGE-10**	Geo-Energy		5
NAEUG-12**	Energy from Gas		5
EBB117A05	Entrepreneurial Marketing*		5
EBB119A05	Technology-based Offerings*		5
EBB118B10	Entrepreneurship Project*		10
EBB124A05	Introduction to Entrepreneurship*		5
WBEC15000	Onderwijs en Communicatie		5



WBCH17002	Chemical Process Development and Design		5
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For information on the electives of other degree programmes see the teaching and examination regulations of the corresponding programme.

*Only as part of the (shortened) Minor Innovation & Entrepreneurship. The (shortened) Minor Innovation & Entrepreneurship is organized by the Faculty of Economics and Business (FEB) and the University of Groningen Centre of Entrepreneurship (UGCE) and is open for BSc IEM students who completed their first year. The minor has a limited number of places and students have to apply for these places. The shortened Minor consists of Entrepreneurial marketing (5 ECTS), Technology-based offerings (5 ECTS), Introduction to Entrepreneurship (5 ECTS) and Entrepreneurship Project (10 ECTS). Together with Outlining and Implementing Innovation Strategy students have then followed the complete Minor. There is a limited number of ECTS available for electives dependent of the track. The other ECTS of this Minor will be extra-curricular.

** It is only allowed to choose one of the Energy-courses.



Appendix V Entry requirements (Article 10.2.1)

A. Deficient VWO-diploma

- The following requirements apply to the entrance examination as defined in Article 7.28.3 of the Act:

Bacheloropleiding <i>Bachelor's degree programme</i>	N+T	N+G	E+M	C+M
Biologie <i>Biology</i>	Biologie	Natuurkunde	Wiskunde A of B Natuurkunde Scheikunde Biologie	Wiskunde A of B Natuurkunde Scheikunde Biologie
Farmacie <i>Pharmacy</i>	V	Natuurkunde	Natuurkunde Scheikunde	Wiskunde A of B Natuurkunde Scheikunde
Life Science and Technology Scheikunde <i>Chemistry</i> Scheikundige Technologie <i>Chemical Engineering</i>	V	Wiskunde B Natuurkunde	Wiskunde B Natuurkunde Scheikunde	Wiskunde B Natuurkunde Scheikunde
Informatica <i>Computing Science</i> Technische Bedrijfskunde <i>Industrial Engineering and Management</i> (Technische) Wiskunde <i>(Applied) Mathematics</i>	V	Wiskunde B	Wiskunde B	Wiskunde B
Kunstmatige Intelligentie <i>Artificial Intelligence</i>	V	V	V	Wiskunde A of B
(Technische) Natuurkunde <i>(Applied) Physics</i> Sterrenkunde <i>Astronomy</i>	V	Wiskunde B Natuurkunde	Wiskunde B Natuurkunde	Wiskunde B Natuurkunde

- The Admissions Board Bachelor's programmes FSE will determine whether deficiencies have been compensated satisfactorily.



B. HBO (university of applied science) propaedeutic certificate, other universities

1. The following requirements apply to the entrance examination as defined in Article 7.28.3 of the Act:

Bachelor's degree programme	Subjects at VWO (pre-university) level	Requirement: Dutch as a Second Language (programme II) for non-native speakers of Dutch
B Biology	wia or wib + na+sk+bio	Yes
B Pharmacy	wia or wib + na+sk	Yes
B Life Science and Technology	wib+na+sk	Yes
B Computing Science	wib	
B Artificial Intelligence	wia or wib	
B Physics	wib+na	
B Chemistry	wib+na+sk	
B Astronomy	wib+na	
B Mathematics	wib	
B Chemical Engineering	wib+na+sk	
B Industrial Engineering and Management Science	wib	
B Applied Physics	wib+na	
B Applied Mathematics	wib	

wia = Mathematics A; wib = Mathematics B; na = Physics; sk = Chemistry; bio = Biology

2. In addition, candidates are required to be competent in English:

IELTS (Academic)	6.5 - no less than 6.0 on each section
TOEFL IBT (internet-based test)	92 - no less than 21 on each section
TOEFL CBT (computer-based test)	237 - no less than 21 on each section
TOEFL PBT (paper-based test)	580 - no less than 55 on each section
Cambridge English	CAE or CPE Certificate
English language test - University of Groningen Language Centre	Minimum section scores C2 or C1 (one B2 allowed)

3. The Admissions Board Bachelor's programmes FSE will determine whether deficiencies have been compensated satisfactorily.



C. Foreign qualifications (EEA)

1. Any certificate that grants access to a university in a European country will also grant access to Dutch universities.
2. In the entrance examination, as referred to in art. 7.28, paragraph 3 of the Act, per country and educational institution specific training conditions are mentioned. These are standardized. The entrance examination is, in accordance with the Admissions Board Bachelor's programmes FSE, carried out by the Admissions Office. If for a specific diploma no standardisation has taken place then the requirements as formulated for candidates with a HBO (university of applied science) propaedeutic certificate will apply to these candidates in the entrance examination as defined in Article 7.28.3 of the Act (see A).
3. In addition, candidates are required to be competent in English:

IELTS (Academic)	6.5 - no less than 6.0 on each section
TOEFL IBT (internet-based test)	92 - no less than 21 on each section
TOEFL CBT (computer-based test)	237 - no less than 21 on each section
TOEFL PBT (paper-based test)	580 - no less than 55 on each section
Cambridge English	CAE or CPE Certificate
English language test - University of Groningen Language Centre	Minimum section scores C2 or C1 (one B2 allowed)

4. The Admissions Board Bachelor's programmes FSE will determine whether deficiencies have been compensated satisfactorily.

D. Foreign qualifications (non-EEA)

1. A non-European certificate that according to NUFFIC and/or NARIC standards is equivalent to a Dutch VWO certificate will grant access to university in the Netherlands.
2. In the entrance examination, as referred to in art. 7.28, paragraph 3 of the Act, per country and educational institution specific training conditions are mentioned. These are standardized. The entrance examination is, in accordance with the Admissions Board Bachelor's programmes FSE, carried out by the Admissions Office. If for a specific diploma no standardisation has taken place then the requirements as formulated for candidates with a HBO (university of applied science) propaedeutic certificate will apply to these candidates in the entrance examination as defined in Article 7.28.3 of the Act (see A).
3. In addition, candidates are required to be competent in English:

IELTS (Academic)	6.5 - no less than 6.0 on each section
TOEFL IBT (internet-based test)	92 - no less than 21 on each section
TOEFL CBT (computer-based test)	237 - no less than 21 on each section
TOEFL PBT (paper-based test)	580 - no less than 55 on each section
Cambridge English	CAE or CPE Certificate
English language test - University of Groningen Language Centre	Minimum section scores C2 or C1 (one B2 allowed)



4. The Admissions Board Bachelor's programmes FSE will determine whether deficiencies have been compensated satisfactorily.

E. Entrance examination (Colloquium Doctum)

1. The following requirements apply to the entrance examination as defined in Article 7.29 of the Act:

Degree programme	Nature and Health VWO level	or	Nature and Technology VWO level
B Biology	en, wia or b, sk, bio, na		en, wib, na, sk, bio
B Pharmacy	en, wia or b, sk, bio, na		en, wib, na, sk
B Life Science and Technology	en, wib, sk, bio, na		en, wib, na, sk
B Computing Science	en, wib, sk, bio		en, wib, na, sk
B Artificial Intelligence	en, wia or b, sk, bio		en, wib, na, sk
B Physics	en, wib, sk, bio, na		en, wib, na, sk
B Chemistry	en, wib, sk, bio, na		en, wib, na, sk
B Astronomy	en, wib, sk, bio, na		en, wib, na, sk
B Mathematics	en, wib, sk, bio		en, wib, na, sk
B Chemical Engineering	en, wib, sk, bio, na		en, wib, na, sk
B Industrial Engineering and Management Science	en, wib, sk, bio		en, wib, na, sk
B Applied Physics	en, wib, sk, bio, na		en, wib, na, sk
B Applied Mathematics	en, wib, sk, bio		en, wib, na, sk

en = English; wia = Mathematics A; wib = Mathematics B; na = Physics; sk = Chemistry; bio = Biology

2. In addition, candidates are required to be competent in English:

IELTS (Academic)	6.5 - no less than 6.0 on each section
TOEFL IBT (internet-based test)	92 - no less than 21 on each section
TOEFL CBT (computer-based test)	237 - no less than 21 on each section
TOEFL PBT (paper-based test)	580 - no less than 55 on each section
Cambridge English	CAE or CPE Certificate
English language test - University of Groningen Language Centre	Minimum section scores C2 or C1 (one B2 allowed)

3. The Admissions Board Bachelor's programmes FSE will determine whether deficiencies have been compensated satisfactorily.



Appendix VI Clustering of Bachelor's degree programmes Article 4.3.4, Article 4.6.1

Degree programme CROHO code	Name of degree programme	Clustered with CROHO code	Name of degree programme
56286	B Life Science and Technology	56860 56157	B Biology B Pharmacy
56860	B Biology	56286 56157	B Life Science and Technology B Pharmacy
56157	B Pharmacy	56860 56286	B Biology B Life Science and Technology
56980	B Mathematics	56965 50206 56962 50205	B Applied Mathematics B Physics B Applied Physics B Astronomy
56965	B Applied Mathematics	56980 50206 56962 50205	B Mathematics B Physics B Applied Physics B Astronomy
50206	B Physics	56962 50205 56965 56980	B Applied Physics B Astronomy B Applied Mathematics B Mathematics
56962	B Applied Physics	50206 50205 56965 56980	B Physics B Astronomy B Applied Mathematics B Mathematics
50205	B Astronomy	56962 56965 50206 56980	B Applied Physics B Applied Mathematics B Physics B Mathematics
56857	B Chemistry	56960	B Chemical Engineering
56960	B Chemical Engineering	56857	B Chemistry



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Appendix VII Admission to the post-propaedeutic phase Article 5.1.1

The following candidates will be admitted to the post-propaedeutic phase:

Students who have been issued a positive study advice from the degree programme in question



Appendix VIII Contact hours propaedeutic phase Article 2.4

Degree programme year 1	
Structure contact hours	Contact hours per year
Lectures	310
Tutorial	180
Tutoring	12
Supervision during an internship	
Examinations	210
Practicals	50



Appendix IX University Minors of the faculty of Science and Engineering (Article 7.5.1)

1. Neurosciences Minor (taught in English):
 - Neuroscience (15 ECTS)
 - Behavioural Neuroscience (15 ECTS)

Future Planet Innovation (taught in English):

- Global Challenges (10 ECTS)
- Sustainability in perspective (5 ECTS)
- Sustainable contributions to society (15 ECTS)

Astronomy through Space and Time Minor (taught in English):

- The Evolving Universe (5 ECTS)
- Cosmic Origins (5 ECTS)
- Astrobiology (5 ECTS)

Einstein's physics: Space-time and parallel worlds (taught in English):

- Einstein's Universe (5 ECTS)
- Quantum World (5 ECTS)
- Building blocks of matter (5 ECTS)

2. The Programme Committee for the Bachelor's degree programmes in Biology and Life Science and Technology also has authority in the field of the Minor "Neurosciences" and/or its course units.

The Programme Committee for the Master's degree programme in Energy and Environmental Sciences also has authority in the field of the Minor "Future Planet Innovation" and/or its course units.

The Programme Committee for the Bachelor's degree programme in Astronomy also has authority in the field of the Minor "Astronomy through Space and Time" and/or its course units.

The Programme Committee for the Bachelor's degree programmes in Physics and Applied Physics also has authority in the field of the Minor "Einstein's physics: Space-time and parallel worlds" and/or its course units.

3. The Board of Examiners for the Bachelor's degree programmes in Biology and Life Science and Technology and the Master's degree programmes in Biology, Ecology and Evolution, Marine Biology and Molecular Biology and Biotechnology also has authority in the field of the Neurosciences Minor and/or its course units.

The Board of Examiners for the Master's degree programme in Energy and Environmental Sciences also has authority in the field of the "Future Planet Innovation" Minor and/or its course units.



The Board of Examiners for the Bachelor's degree programme in Astronomy also has authority in the field of the Astronomy through Space and Time Minor and/or its course units.

The Board of Examiners for the Bachelor's degree programmes in Physics and Applied Physics also has authority in the field of the Physics Minor "Einstein's physics: Space-time and parallel worlds" and/or its course units.

These Teaching and Examination Regulations also apply in their entirety to the Minors in Neurosciences, Future Planet Innovation, Astronomy through Space and Time and Einstein's physics: Space-time and parallel worlds and/or their course units.



Transitional arrangement (Appendix X, article 12.1 TER Bachelor IEM 2018-2019)

Transitional arrangement for the Bachelor's IEM								
Discontinued course units				Substitute course units				
Course unit code	Course unit name	ECTS	Final exam period	Course unit code	Course unit name	ECTS	Explanation	Equivalent* Yes/No
WPMA14007	Calculus for IEM	5	-	WPMA18003	Calculus 1	5	Name and course code change due to the addition of the course Calculus 2	Yes
EBP018A05	Global Supply Chain Management	5	2018-2019 at FEB	WPIE18002	Global Supply Chain	5	Course is now hosted by FSE instead of FEB. New course tailored to IEM students.	Yes, minor changes.**
TBOTBK1-08	Orientation IEM	5	2018-2019	-	-	-	Course is discontinued. Content will be partly distributed over other courses	-
EBP802B05	Financial Accounting for E&BE	5	2018-2019 at FEB	-	Organizational Behaviour and group Dynamics	5	Part of the content of financial accounting moves to Management Accounting	No
WPIE14001	Fundamentals of Process and Product Technology	5	-	CHIPPT-10	Introduction to Process and Product Technology	5	Course is discontinued. Content will be distributed over several new courses	Yes
WPMA14006	Linear Algebra and Multivariable Calculus	5	2018-2019	WPMA18005 + WPMA18004	Linear Algebra + Calculus 2	10	Multivariate calculus is moved to Calculus 2, linear Algebra is expanded.	Yes
INALGTBK09	Algorithmics	5	2018-2019	WPIE18007	Programming, Modelling and Simulation	5	New course, better suited to new curriculum. Contains parts of Algorithmics, parts of Orientation IEM and new material.	No
TBMOTBK-11	IEM Methods and Design	5	-	WPIE18008	System Dynamics	5	Course name and code changed to better fit content	Yes
NAFSYS05E	Physical Systems	5	2018-2019	-	-	-	Course is discontinued, content will be distributed over other courses.	-
WPIE13001	Integrated Design Project	5	2018-2019	-	-	-	Course is discontinued, content is partly distributed over other courses	-
EBP017B05	Management Accounting for IB	5	2018-2019 at FEB	WPIE18004	Management Accounting	5	Course is now hosted by FSE instead of FEB. New course tailored to IEM students.	Yes, minor changes**
EBB857A05	Operations Research 1	5	2018-2019 at FEB	WBIE18003	Operations Research	5	Course is now hosted by FSE instead of FEB. New course tailored to IEM students	Yes, minor changes**
EBB058A05	Production Planning & Quality Control	5	2018-2019 at FEB	WBIE18004	Production Planning & Quality Control	5	Course is now hosted by FSE instead of FEB. New course tailored to IEM students.	Yes, minor changes**
EBB056A05	Applied Manufacturing Research	5	2018-2019 at FEB	WBIE18001	Applied Manufacturing Research	5	Course is now hosted by FSE instead of FEB. New course tailored to IEM students.	Yes, minor changes**
WBIE16001	Practical course (bio-) process technology	5	-	WBIE17001	Industrial Biotechnology	5	Course is discontinued, content was moved to new course in second year.	Yes
WISS-08	Signals and	5	-	WBIE18005	Signals and Systems	5	Course is now hosted by IEM instead of MA, resulting in change of course code	Yes



	Systems							
EBB601B05	Work Organisation and Job Design	5	2018-2019 at FEB	WBIE18002	Design Science	5	Course is discontinued, content is partly moved to the course	No. ***
EBB601B05	Industrial Biocatalysis	5	-	-	-	-	Course was provided only in 2107-2018 to fill a gap in PPT electives. Course is discontinued.	-
CHQC-11	Quantum Chemistry	5	-	-	-	-	IEM students do not have sufficient prior knowledge for this elective	-

* It is also possible to substitute equivalent course units in the other direction. This can apply to students with a large backlog who want to fall under the new OER.

** Students from cohort $\leq 2017-2018$ who only need to take the exam can take the exam at FEB in 2018-2019. Students who need to follow the course need to follow the new course.

*** Students who have completed their Bachelor IP but have not passed WOJD have to complete WOJD. Students who have not completed their Bachelor IP and have not passed WOJD have to take Design Science.