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Appendices to the Teaching and Examination Regulations (TER) of the Bachelor's degree programme in Industrial Engineering and Management (2017-2018)

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**

Course unit name	***ECTS***	***Practical***	***Entry requirements***
Orientation IEM	5	Yes	
Global Supply Chain Management	5		
Calculus (for IEM)	5		
Linear Algebra & Multivariable Calculus (for IEM)	5		
Financial Accounting (for E&BE)	5	Yes	
Fundamentals of Process and Product Technology	5	Yes	
Physical Systems (for IEM)	5	Yes	
Algorithmics	5	Yes	
IEM Methods and Design	5	Yes	
IEM Integrated Design Project	5	Yes	
Statistics and Stochastics	5		
Management Accounting (for IB)	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 1	5	Yes	
Outlining & Implementing Innovation Strategy	5	Yes	
Marketing	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		Propaedeutic phase
Work Organization and Job Design	5	Yes	Propaedeutic phase
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).
3rd year: PTL track	**35**		
Control Engineering	5	Yes	Propaedeutic phase
Numerical Methods	5	Yes	Propaedeutic phase

Mechatronics	5	Yes	Propaedeutic phase
Computer Aided Design & Manufacturing	5	Yes	Propaedeutic phase
Digital and Hybrid Control Systems	5		Propaedeutic phase
Design and Construction (IEM)	5	Yes	Propaedeutic phase
Elective	5	Var.	
3rd year: PPT track	**35**		
General Process Equipment	5	Yes	Propaedeutic phase
Practical course (bio-) process technology	5	Yes	Propaedeutic phase
Special Process Equipment	5	Yes	Propaedeutic phase
Product Technology (IEM)	5	Yes	Propaedeutic phase
Mass Transfer and Reactions in Gas-liquid Reactors	5		Propaedeutic phase
Electives	10	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
WBIE13003	Molecular Biotechnology	Yes	5
CHQC-11	Quantum Chemistry		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

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

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

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

2. Non-native speakers of Dutch who wish to be admitted to the Bachelor's degree programmes in Biology, Life Science and Technology, or Pharmacy must also have passed the State Examination in Dutch as a Second Language, Programme II (NT2-II).

3. 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. Non-native speakers of Dutch who wish to be admitted to the Bachelor's degree programmes in Biology, Life Science and Technology, or Pharmacy must also have passed the State Examination in Dutch as a Second Language, Programme II (NT2-II).

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.

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. Non-native speakers of Dutch who wish to be admitted to the Bachelor's degree programmes in Biology, Life Science and Technology, or Pharmacy must also have passed the State Examination in Dutch as a Second Language, Programme II (NT2-II).

4. 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)

5. 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. Non-native speakers of Dutch who wish to be admitted to the Bachelor's degree programmes in Biology, Life Science and Technology, or Pharmacy must also have passed the State Examination in Dutch as a Second Language, Programme II (NT2-II).

4. 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)

5. 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. Non-native speakers of Dutch who wish to be admitted to the Bachelor's degree programmes in Biology, Life Science and Technology, or Pharmacy must also have passed the State Examination in Dutch as a Second Language, Programme II (NT2-II).

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.

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)

   People, Planet, Profit Minor (taught in English):
   - Overview and Coherence People Planet Profit (10 ECTS)
   - Paper People Planet Profit (5 ECTS)
   - Project People, Planet, Profit (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
   - Quantum World
   - Building blocks of matter

2. The Programme Committee for the Bachelor's degree programmes in Biology and Life Science & 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 & Environmental Sciences also has authority in the field of the Minor "People, Planet, Profit" 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 & Technology and the Master's degree programmes in Biology, Ecology & Evolution, Marine Biology and Molecular Biology & 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 & Environmental Sciences also has authority in the field of the People, Planet, Profit 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.

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

Appendix X Transitional arrangement (article 12.1)

Transitional arrangement for the Bachelor's IEM

Discontinued course units				**Substitute course units**				
Course unit code	*Course unit name*	*EC TS*	*Final exam period*	*Course unit code*	*Course unit name*	*EC TS*	*Explanation*	*Equivalent* Yes/No*
WBIE16000	Polymer Chemistry	5	Year 2-PPT, IB	WBIE16000	Industrial Polymers	5	New course name, better explanation content	Yes
CHTT-09	Technical Thermodynamics	5	Year 2-PPT, IB	WBIE17005	Technical Thermodynamics (IEM)	5	New 2nd year course for cohort ≥ 1617 , instead of Technical thermodynamics and elements from Separation processes	No; cohort ≤1516 may join Technical Thermodynamics from Chemical Engineering**
CHSP-11	Separation Processes	5	Year 2-PPT (IIA)				Course has been removed, see Physical Transport Phenoma (IEM) and Technical Thermodynamics (IEM)	Cohort ≤1516 may join Separation Processes from Chemical Engineering**
CHTFTV105E	Physical Transport Phenomena 1	5	Year 2-PPT and PTL, IIB	WBIE17003	Physical Transport Phenomena (IEM)	5	New 2nd year course for cohort ≥ 1617; instead of Physical Transport Phenomena 1 and elements from Separation processes	No; cohort ≤ 1516 may join Physical Transport Phenomena 1 from Chemical Engineering**
TBOBS-11	Business System Design (BSD)	5	Year 3-PPT and PTL, IA	WBIE17006	Research and Design Methodology	5	New 3rd year course for cohort ≥ 1516	No; cohort 1415 and earlier may replace TBOBS-11 by WBIE17006; students who still have to do a resit for BSD, please contact the course coordinator of Research and Design Methodology
WBIE16001	Practical course (bio-) process technology	5	Year 3-PPT, IA	WBIE17001	Industrial Biotechnology (IEM)	5	New 2nd year course for cohort ≥ 1617	No; WBIE16001 will still be taught in 2017/2018 for cohort 1516
EBB118B10	Project innovation and entrepreneurship	5	Year 3-elective, IB	EBB118B10	Entrepreneurship Project	5	New course name, better explanation content	Yes
CHTMFR105E	Multiphase reactors	5	Year 3-PPT (IB)				Course has been removed. Parts will be moved to new 3rd course Mass Transfer and Reactions in Gas-liquid Reactors	Cohort 1516 has to follow Mass Transfer and Reactions in Gas-liquid Reactors (WBIE17004); Cohort ≤1415 may join Multiphase reactors from Chemical Engineering
CHTPT05E	Product Technology	5	Year 3-PPT, IIA	WBIE17002	Product Technology (IEM)	5	New 3rd year course for cohort ≥ 1516	No; Cohort 1516 has to follow this new course. Cohort ≤1415 may join Product Technology from chemical engineering
CHBC-10	Biochemistry	5	Year 3-PPT-elective, IIA				Course has been removed. Overlap with new PPT-courses 2nd and 3rd year.	Cohort ≤1415 may join Biochemistry from chemical engineering.

* 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 TER.
** Cohort ≤1516 has to finish the old combination of 2nd year courses Physical Transport Phenomena 1 (CHTFTV105E), Technical Thermodynamics (CHTT-09) and Separation Processes (CHSP-11) or to follow the new combination Physical Transport Phenomena (IEM) (WBIE17003) and Technical Thermodynamics (IEM) (WBIE17005).
** Cohort ≤1415 has to finish the old combination of 3rd year courses Multiphase reactors (CHTMFR105E) and Product Technology) (CHTPT05E) or to follow the new combination Mass Transfer and Reactions in Gas-liquid Reactors (WBIE17004) and Product Technology (IEM) (WBIE17002).