

**Appendices to the Teaching and Examination  
Regulations of the Bachelor's degree programme in  
Industrial Engineering and Management (2014-  
2015)**

## **Appendix I: Learning outcomes of the Bachelor's degree programme (art. 1.3)**

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 follow-on 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    Follow-on Master's degree programmes**

### **Article 1.3.c**

The Bachelor's degree programme will grant unconditional admission to the following Master's degree programmes at the University of Groningen:

- Industrial Engineering and Management
- Education and Communication in Mathematics and Natural Sciences (Science Communication programme)
- Energy and Environmental Sciences

## **Appendix III: Majors and Minors in the degree programme**

### **Article 2.1.2**

The degree programme comprises a Major with two tracks or specializations:

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

## Appendix IV 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>Type of examination*</i>
Orientation IEM	5	Yes	WE
Global Supply Chain Management	5		WE
Calculus for IEM	5		WE
Linear Algebra & Multivariable Calculus for IEM	5		WE
Financial Accounting	5		WE
Fundamentals of Process and Product Technology	5	Yes	WE
Physical Systems for IEM	5	Yes	WE
Algorithmics	5	Yes	Ass.
IEM Methods and Design	5	Yes	WE
IEM Integrated Design Project	5	Yes	Ass.
Statistics and Stochastics	5		WE
Management Accounting	5		WE

\*WE: written examination; Ass.: assignment

## Appendix V 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	Type of examination *	Compulsory order**
<b>2<sup>nd</sup> year: joint programme</b>	<b>35</b>			
Business Law for IEM	5		WE	
Operations Research 1	5	Yes	WE	
Signals and Systems for TBK and BMT	5	Yes	WE	
Outlining & Implementing Innovation Strategy	5	Yes	Ass.	
Marketing	5		WE	
Physical Transport Phenomena 1	5		WE	
Production Planning and Quality Control	5	Yes	WE	
<b>2<sup>nd</sup> year: PTL track</b>	<b>25</b>			
Mechanics	5	Yes	WE	
Materials Science and Design	5	Yes	WE	
Production Techniques	5	Yes	WE	
Modelling and Analysis of Complex Networks	5		WE	
Applied Manufacturing Research	5	Yes	Ass.	
<b>2<sup>nd</sup> year: PPT track</b>	<b>25</b>			
Technical Thermodynamics	5		WE	
Polymer Chemistry	5	Yes	WE	
Single-Phase Reactors	5	Yes	WE	
Separation Processes	5		WE	
Biological Systems	5	Yes	WE	
<b>3<sup>rd</sup> year: joint programme</b>	<b>25</b>			
Business System Design	5		WE, ass.	
Work Organization and Job Design	5	Yes	WE	
Integration Project	15	Yes	Ass.	1. Business System Design must have been followed; 2. 140 ECTS of Bachelor's IEM programme (including propaedeutic phase) must have been completed.
<b>3<sup>rd</sup> year: PTL track</b>	<b>35</b>			
Control Engineering	5	Yes	WE	Signals and Systems
Numerical Methods	5	Yes	WE	
Mechatronics	5	Yes	WE	
Computer Aided Design & Manufacturing	5	Yes	Ass.	

Digital and Hybrid Control Systems	5		WE	
Design and Construction	5	Yes	Ass.	
Elective	5	Var.	Var.	
<b>3<sup>rd</sup> year: PPT track</b>	<b>35</b>			
General Process Equipment	5	Yes	WE	
Practical course (bio-) process technology	5	Yes	Ass.	
Special Process Equipment	5	Yes	Ass.	
Multiphase Reactors	5		WE	
Product Technology	5	Yes	WE	
Electives	10	Var.	Var.	

\*WE: written examination, OE: oral examination, Ass.: assignment accompanied by a report and/or presentation, Var.: variable, depending on the chosen course unit; \*\*Compulsory order: the course units listed in this column must have been completed before the relevant examination may be sat.

### List of electives in the first semester of the third year

#### PTL electives list

Course code	Course name	Scheduled in period:
NAPMS-12	Principles of Measurement Systems	2
NAGO-11	Waves and Optics	2
NAGE-10	Geo-Energy	2

#### PPT electives list

Course code	Course name	Scheduled in period:
CHEVM1-11	<u>Physical properties of Materials 1</u>	1
WBIE13003	Molecular Biotechnology for IEM	2
CHOC1-10	<u>Organic Chemistry 1</u>	2
CHQC-11	<u>Quantum Chemistry</u>	2
NAGE-10	<u>Geo-Energy</u>	2
CHBC-10	<u>Biochemistry</u>	3
CHBCP-10	<u>Biochemistry Practical</u>	3
WBIE14002	Process Analytical Methods	3

## Appendix VI Entry requirements

### Article 10.1

#### A. HBO (university of applied science) propaedeutic certificate

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

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. The Faculty Committee for Special Admissions will determine whether deficiencies have been compensated satisfactorily.

#### B. Foreign qualifications (EEA)

1. Any certificate that grants access to a university in a European country will also grant access to Dutch universities.
2. The same requirements that also apply to candidates with an 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).



- In addition, candidates are required to be competent in English: an IELTS score of 6.5, a TOEFL score of 580 (paper-based), of 237 (computer-based) or of 92 (internet-based) or equivalent.
- The Faculty Committee for Special Admissions will determine whether deficiencies have been compensated satisfactorily.

### C. Foreign qualifications (German)

- German candidates must have a Zeugnis der Allgemeinen Hochschulreife ('Abitur').
- The following requirements apply to the entrance examination as defined in Article 7.28.3 of the Act:

<b>Degree programme</b>	
B Biology	wi (LK or GK) na (LK or GK) sk (LK or GK) bio (LK or GK) (at least one subject at Leistungskurs level)
B Pharmacy B Life Science and Technology B Chemistry B Chemical Engineering	wi (LK or GK) na (LK or GK) sk (LK or GK) (at least one subject at Leistungskurs level)
B Computing Science B Mathematics B Applied Mathematics B Artificial Intelligence	wi (LK)
B Physics B Astronomy B Applied Physics	wi (LK) na (LK or GK)
B Industrial Engineering and Management Science	wi (LK or GK) na (LK or GK) (at least one subject at Leistungskurs level)

wi= Mathematics; na = Physics; sk = Chemistry; bio = Biology  
LK = Leistungskurs level; GK = Grundkurs level followed until end of Class 13 or Class 12 (if Gymnasium education lasts 12 years).

- 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).
- The Faculty Committee for Special Admissions will determine whether deficiencies have been compensated satisfactorily.

#### D. Foreign qualifications (International Baccalaureate)

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

Degree programme	from 2010/2011
B Biology	Biology (SL or HL) Maths (SL or HL) Physics (SL or HL) Chemistry (SL or HL) two of these subjects at HL
B Pharmacy B Life Science and Technology B Chemistry B Chemical Engineering	Maths (SL or HL) Physics (SL or HL) Chemistry (SL or HL) two of these subjects at HL
B Computing Science B Mathematics B Applied Mathematics	Maths HL
B Artificial Intelligence	Maths SL <b>or</b> Maths HL
B Physics B Astronomy B Applied Physics B Industrial Engineering and Management Science	Maths HL Physics HL

SL = Standard Level, HL = Higher Level

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 Faculty Committee for Special Admissions will determine whether deficiencies have been compensated satisfactorily.

#### E. 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. The same requirements that also apply to candidates with an 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: an IELTS score of 6.5, a TOEFL score of 580 (paper-based), of 237 (computer-based) or of 92 (internet-based) or equivalent.

- The Faculty Committee for Special Admissions will determine whether deficiencies have been compensated satisfactorily.

#### **F. Entrance examination**

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

<b>Degree programme</b>	<b>Nature and Health VWO level</b>	<b>or</b>	<b>Nature and Technology VWO level</b>
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 of 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

- 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).
- The Faculty Committee for Special Admissions will determine whether deficiencies have been compensated satisfactorily.

## Appendix VII Clustering of Bachelor's degree programmes Article 4.3.6, Article 4.4.2

<b>Degree programme CROHO code</b>	<b>Name of degree programme</b>	<b>Clustered with CROHO code</b>	<b>Name of degree programme</b>
56286	B Life Science and Technology	56860 56157 56989	B Biology B Pharmacy B Pharmaceutical Sciences
56860	B Biology	56286  56157 56989	B Life Science and Technology B Pharmacy B Pharmaceutical Sciences
56157	B Pharmacy	56860 56286  56989	B Biology B Life Science and Technology B Pharmaceutical Sciences
56989	B Pharmaceutical Sciences	56860 56286  56157	B Biology B Life Science and Technology B Pharmacy
56980	B Mathematics	56965	B Applied Mathematics
56965	B Applied Mathematics	56980	B Mathematics
50206	B Physics	56962  50205	B Applied Physics B Astronomy
56962	B Applied Physics	50206 50205	B Physics B Astronomy
50205	B Astronomy	56962  50206	B Applied Physics B Physics
56857	B Chemistry	56960	B Chemical Engineering
56960	B Chemical Engineering	56857	B Chemistry

## **Appendix VIII Admission to the post-propaedeutic phase**

### **Article 5.1.1**

The following candidates will be admitted to the post-propaedeutic phase:  
Holders of a propaedeutic certificate of the degree programme  
Holders of a propaedeutic certificate of  
the Bachelor's degree programme in Industrial Engineering and Management

## **Appendix IX Contact hours propaedeutic phase Article 2.3**

<b>Degree programme year 1</b>	
<b>Structure contact hours</b>	<b>Contact hours per years</b>
Lectures	310
Tutorials	180
Tutoring	
Supervision during an internship	
Examinations	210
Practicals	50

## **Appendix X University Minors of the faculty of Mathematics and Natural Sciences Article 7.5.1**

1. Neurosciences Minor:

- Neuroscience (18 ECTS)
- Behavioral Neuroscience (6 ECTS)
- Neuroscience essay (6 ECTS)

People, Planet, Profit Minor:

- Overview and Coherence People Planet Profit (10 ECTS)
- People Planet Profit paper (5 ECTS)
- Multidisciplinary Cooperation (5 ECTS)
- Project Sustainability (10 ECTS)

2. The Programme Committee for the Bachelor's degree programmes in Biology and Life Science & Technology also has authority in the field of the Neurosciences Minor 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 People, Planet, Profit Minor 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.

4. These Teaching and Examination Regulations also apply in their entirety to the Minors in Neurosciences and People, Planet, Profit and/or their course units.