Appendices Bachelor's Degree Programme Artificial Intelligence (BSc) 2020 – 2021

Appendix I Learning Outcomes of the Degree Programme (Article 3.1.1)

The bachelor demonstrates knowledge, understanding, and the ability to evaluate, analyse and interpret relevant data in the field of

1. the symbolic approach to Artificial Intelligence and has the ability to apply this.
2. the numerical, non-symbolic approach to Artificial Intelligence and has the ability to apply this.
3. computational models of cognitive processes and has expertise in constructing and applying this.
4. autonomous systems and robotics and has the ability to apply this.
5. linguistics and language technology and has the ability to apply this.
6. knowledge and agent systems and has expertise in designing, implementing and applying these.

The bachelor has knowledge and understanding of

7. the most important philosophical theories developed in the areas of artificial intelligence and cognition.
8. relevant theories developed in the area of empirical sciences, psychology, biology and physics and has experience applying and analysing results thereof.

The bachelor has relevant knowledge and ability

9. to apply methods and techniques from mathematics and logic used in Artificial Intelligence.
10. to use algorithms, data structures and important programming languages used in Artificial Intelligence.

The bachelor has the ability

11. on an academic level, to analyse problems, critically review scientific results and communicate about this both individually as well as in a group, both oral and in written form, also in a broader societal context.
12. to critically reflect on one's own working method and to recognize the need for continued learning on a high degree of autonomy, also in the context of a master or a specialist profession.

Appendix II Majors and Minors of the Degree Programme (Article 3.7.4)

The degree programme has the following **Major**:
– Artificial Intelligence (BSc)

Appendix III Course Units in the Propaedeutic Phase
(List of Course Units; Article 4.1.1)

The propaedeutic phase comprises a number of mandatory course units, each with a student workload of 5 ECTS credit points, listed in the table below. The modes of assessment and whether a course unit includes a practical element are described in the assessment plan of the BSc Artificial Intelligence of the respective academic year.

Mandatory Courses (60 ECTS credit points)
Algorithms and Data Structures [**WBAI018-05**]
Artificial Intelligence 1 [**WBAI023-05**]
Autonomous Systems [**WBAI002-05**]
Basic Scientific Skills [**WBAI010-05**]
Calculus [**WBAI048-05**]
Cognitive Psychology [**WBAI021-05**]
General Linguistics [**WBAI022-05**]
Imperative Programming [**WBAI003-05**]
Introduction to Artificial Intelligence [**WBAI004-05**]
Introduction to Logic [**WBAI012-05**]
Introduction to the Brain [**WBAI026-05**]
Linear Algebra and Multivariable Calculus [**WBCS037-05**]

Appendix IV Course Units in the Post-Propaedeutic Phase (List of Course Units; Article 7.1.1)

The post-propaedeutic phase comprises a number of mandatory course units, each with a student workload of 5 ECTS credit points, unless stated otherwise, listed in the table below. The different modes of assessment and whether a course unit includes a practical element are described in the assessment plan of the BSc Artificial Intelligence of the respective academic year.

Mandatory Courses (60 ECTS credit points)
Advanced Logic [**WBAI017-05**]
Architectures of Intelligence [**WBAI009-05**]
Artificial Intelligence 2 [**WBAI001-05**]
Data Analytics and Communication [**WBAI011-05**]
Knowledge and Agent Technology [**WBAI006-05**]
Language and Speech Technology [**WBAI007-05**]
Neural Networks [**WBAI028-05**]
Neurophysics (Physics for Artificial Intelligence) [**WBAI008-05**]
Object-Oriented Programming [**WBAI045-05**]
Philosophy of AI and Cognition [**FI203AI**]
Signals and Systems [**WBAI016-05**]
Statistics [**WBCS038-05**]
Practical Course Units (choose 15 ECTS credit points [a])
Agent Technology Practical [**WBAI046-05**]
Cognitive Ergonomics Practical [**WBAI025-05**]
Cognitive Modelling Practical [**WBAI020-05**]
Knowledge Technology Practical [**WBAI014-05**]
Language Technology Practical [**WBAI027-05**]
Reinforcement Learning Practical [**WBAI015-05**]
Robotics Practical 1 [**WBAI029-05**]
Robotics Practical 2 [**WBAI030-05**]
Bachelor's Project (15 ECTS credit points)
Bachelor's Project [b] [**WBAI901-15**]

a) It is possible to take more than 15 ECTS credit points in practical course units, if students use their elective space for the additional practical course units.
b) This course yields 15 ECTS credit points.

In addition to the mandatory (fixed) programme, the post-propaedeutic phase also consists of 30 ECTS credit points in elective course units. 15 of these credit points will have be chosen from a list of pre-approved electives. The other 15 credit points can either be from the list of pre-approved electives, or a free choice elective, provided the Board of Examiners has approved of this choice. The post-propaedeutic phase comprises the following pre-approved electives (each with a student workload of 5 ECTS credit points, unless stated otherwise):

Students can choose from the following list of course units without needing approval of the Board of Examiners:
(please refer to the Teaching and Examination Regulations and curriculum assessment plans of the relevant degree programmes for modes of assessment)

- Advanced Programming in C++ [**WBCS035-05**]
- C++ Fundamentals [**WBCS033-05**]
- Cognition and Attention [**PSB3E-CP02**]
- Computational Grammar [**LIX025B05**]
- Computer Graphics [**WBCS019-05**]
- Constraint-based Grammatical Analysis [**WBAI047-05**]
- Ethics in Artificial Intelligence [**WBAI040-05**]
- Functional Programming [**WBCS002-05**]
- Information Security [**WBCS004-05**]
- Introduction to Information Systems [**WBCS021-05**]
- Introduction to Machine Learning [**WBCS032-05**]
- IT Law for non-law Students [a,c] [**RGARI70210**]
- Learning: Theory and Practice [**PSB3E-M14**]
- Logic Programming [**LIX003B05**]
- Human Error [**PSB3E-M06**]
- Parallel Computing [**WBCS029-05**]
- Philosophy of Mind: Body, Brain, Mind [b,c] [**FI142LBG**]
- Philosophy of Science [**FI180WET**]
- Philosophy of Science, Technology & Society [c] [**FI073HH**]
- Philosophy of the Natural Sciences: Physics and Metaphysics [**FI153LH**]
- Problem Analysis and Design [**WBCS012-05**]
- Programming in C++ [**WBCS034-05**]
- Self-organization [**WBBY069-05**]

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a) This course unit yields 10 ECTS credit points.
b) This course unit yields 7.5 ECTS credit points.
c) This course unit is taught in Dutch.
d) Students who have passed Introduction to Intelligent Systems [INBINTS-08] cannot take this course.

A student *can* take additional practical course units from the list of practical course units in the mandatory course units list without the formal approval of the Board of Examiners.

As stated in Article 8.2.2, students are free to take any University Minor as a broadening module. Students will not need explicit permission from the Board of Examiners, similar to the pre-approved course units and practical course units. An exception to this universal approval is the *Data Wise: Data Science in Society* minor organized by the Faculty of Behavioural and Social Sciences, as the contents significantly overlap with the Artificial Intelligence BSc programme. It is also not possible to include a course from a University Minor if an equivalent or similar course is already taught in the Artificial Intelligence (BSc) programme.

Formal approval of the Board of Examiners is required, in case and before a student would like to deviate from these rules (e.g. including course units from other programmes or abroad).

(Compulsory Order of Examinations; Article 9.2)

The examinations for the course units listed below may not be taken before the examinations for the associated course units have been passed:

Course Unit Name	Entry Requirements [a]
Advanced Logic [**WBAI017-05**]	– Introduction to Logic [**WBAI012-05**]
Agent Technology Practical [**WBAI046-05**]	– Knowledge and Agent Technology [**WBAI006-05**]
Bachelor's Project [**WBAI901-15**]	– At least 135 ECTS credit points from the AI bachelor's phase (students must have their study programme approved by the Board of Examiners) – Data Analytics and Communication [**WBAI011-05**] – Statistics [**WBCS038-05**] – Students must have successfully completed all propaedeutic course units
Constraint-based Grammatical Analysis [**WBAI047-05**]	– General Linguistics [**WBAI022-05**]
Cognitive Ergonomics Practical [**WBAI025-05**]	– Cognitive Psychology [**WBAI021-05**] – Imperative Programming [**WBAI003-05**]
Cognitive Modelling Practical [**WBAI020-05**]	– Architectures of Intelligence [**WBAI009-05**] – Cognitive Psychology [**WBAI021-05**] – Statistics [**WBCS038-05**]
Data Analytics and Communication [**WBAI011-05**]	– Statistics [**WBCS038-05**]
Knowledge Technology Practical [**WBAI014-05**]	– Knowledge and Agent Technology [**WBAI006-05**]
Language and Speech Technology [**WBAI007-05**]	– Calculus [**WBAI048-05**] – General Linguistics [**WBAI022-05**]
Language Technology Practical [**WBAI027-05**]	– Language and Speech Technology [**WBAI007-05**]
Neural Networks for Artificial Intelligence [**WBAI028-05**]	– Calculus [**WBAI048-05**] – Linear Algebra and Multivariable Calculus [**WBCS037-05**]
Neurophysics (Physics for Artificial Intelligence) [**WBAI008-05**]	– Calculus [**WBAI048-05**] – Linear Algebra and Multivariable Calculus [**WBCS037-05**] – Signals and Systems [**WBAI016-05**]
Reinforcement Learning Practical [**WBAI015-05**]	– Autonomous Systems [**WBAI002-05**] – Imperative Programming [**WBAI003-05**]
Robotics Practical 1 [**WBAI029-05**]	– Autonomous Systems [**WBAI002-05**]
Robotics Practical 2 [**WBAI030-05**]	– Robotics Practical 1 [**WBAI029-05**]
Signals and Systems [**WBAI016-05**]	– Calculus [**WBAI048-05**] – Linear Algebra and Multivariable Calculus [**WBCS037-05**]

a) In the event that a student has applied for a course to count as a course replacement, this replacement course also counts as a valid alternative for the course entry requirement in question.

Appendix V Entry Requirements
(Article 2.2)

A. Deficient VWO-diploma

– 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

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

B. HBO (university of applied science) or academic propaedeutic certificate

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**
B Biology	wia or wib + na+sk+bio
B Pharmacy	wia or wib + na+sk
B Life Science and Technology	wib+na+sk

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 Qualifications General and Higher Education	Advanced (CAE) C1 Advanced Proficiency (CPE) C2 Proficiency
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 Qualifications General and Higher Education	Advanced (CAE) C1 Advanced

	Proficiency (CPE) C2 Proficiency
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)

– 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.

– 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).

– 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 Qualifications General and Higher Education	Advanced (CAE) C1 Advanced Proficiency (CPE) C2 Proficiency
English language test - University of Groningen Language Centre	Minimum section scores C2 or C1 (one B2 allowed)

– 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

1. 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 Qualifications General and Higher Education	Advanced (CAE) C1 Advanced Proficiency (CPE) C2 Proficiency
English language test - University of Groningen Language Centre	Minimum section scores C2 or C1 (one B2 allowed)

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

Appendix VI Clustering of Bachelor's Degree Programmes
(Article 5.3.4, Article 5.6.1)

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

Appendix VII Admission to the Post-propaedeutic Phase (Article 5.2.1)

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 3.6)

Degree Programme Year 1	
Type of Contact Hour	**Contact Hours per Year**
Lectures	Approx. 270
Tutorial	Approx. 180
Practicals	Approx. 90
Tutoring / Mentor Hours	Approx. 10
Supervision during an internship	0
Final Examinations and Re-examinations	Approx. 60
Mid-term Examinations	Approx. 15
Career Support (FSE General)	Approx. 12
Miscellaneous Sessions (e.g. Q&A)	Approx. 30

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.

4. 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.

Appendix X Transitional Arrangement
(Article 12.1)

The transitional arrangement is an arrangement that students can use if they wish to replace a course that is part of their Teaching and Examination Regulations, but either no longer exists or has been changed to a different course in a later set of Teaching of Examination Regulations. In some cases, an arrangement consists of multiple courses. For this reason, the transitional arrangements have been separated by thick lines. If a transition is not in the list of transitional arrangements, students will have to ask the permission of the Board of Examiners first. Previous arrangements can be found in previous Teaching- and Examination Regulations, and are still valid, provided they have not been overridden by arrangements in newer Teaching- and Examination Regulations.

Discontinued Course Unit(s)				Replacement Course Unit(s)			
Course Name	Course Code	ECTS credit points	Final Exam Opportunity	Course Name	Course Code	ECTS credit points	Notes
Autonomous Systems Practical	KIB.PAS05	5	-	Robotics Practical 1	WBAI029-05	5	-
Autonomous Systems Practical Extension	WBAI14001	5	-	Robotics Practical 2	WBAI030-05	5	-
Bachelor's Project	KIB.PROJ03	10	-	Bachelor's Project	WBAI901-10	10	Discontinued from Semester II onwards
Philosophy of Cognitive Science	FI053CW	5	-	Philosophy of AI and Cognition	FI203AI	5	-

Below, you can find a table of courses that are considered equivalent – but have changed course codes since the Teaching- and Examination Regulations of 2020 - 2021. While the course codes of these courses are different, these courses themselves can only be used on your diploma once. Note that this list only contains courses that have been part of previous Teaching- and Examination regulations, and only courses that have not changed their name (otherwise it is a discontinued course unit/replacement course unit pair – and listed in the TER of the organizing programme). Any other equivalences that may exist between courses that can be beneficial in the event of a course replacement or a potential block in the event of a free-choice elective will have to be checked with the Board of Examiners of your own degree programme.

Course Name	Old Course Code	New Course Code	ECTS Credit Points
Organized by Artificial Intelligence (BSc)			
Advanced Logic	KIB.VL03	WBAI017-05	5
Algorithms and Data Structures (AI)	WPAI18002	WBAI018-05	5
Architectures of Intelligence	KIB.AVI03	WBAI009-05	5
Artificial Intelligence 1	KIB.KI103	WBAI023-05	5
Artificial Intelligence 2	KIB.KI203	WBAI001-05	5
Autonomous Systems	KIB.AS03	WBAI002-05	5
Bachelor's Project	WBAI18001	WBAI901-15	15
Basic Scientific Skills	KIB.WBV06	WBAI010-05	5
Cognitive Ergonomics Practical	WBAI19002	WBAI025-05	5
Cognitive Modelling Practical	WBAI18002	WBAI020-05	5
Cognitive Psychology	KIB.CP06	WBAI021-05	5
Data Analytics and Communication	WBAI17001	WBAI011-05	5
General Linguistics	KIB.ATW03	WBAI022-05	5

Imperative Programming	WPAI19001	WBAI003-05	5
Introduction to Artificial Intelligence	KIB.ORKI03	WBAI004-05	5
Introduction to Logic (AI)	WPAI14001	WBAI012-05	5
Introduction to the Brain	WPAI18001	WBAI026-05	5
Knowledge and Agent Technology	KIB.KT03	WBAI006-05	5
Knowledge Technology Practical	KIB.PKT10	WBAI014-05	5
Language and Speech Technology	KIB.TST03	WBAI007-05	5
Language Technology Practical	KIB.PTT07	WBAI027-05	5
Neural Networks AI	KIB.NNKI03	WBAI028-05	5
Neurophysics (Physics for Artificial Intelligence)	KIB.NF07	WBAI008-05	5
Object-oriented Programming	INBOGP-08	WBAI045-05	5
Reinforcement Learning Practical	WBAI19001	WBAI015-05	5
Signals and Systems	KIB.SENS12	WBAI016-05	5
Organized by Other Programmes (Mandatory)			
Calculus	WPMA14003	WBAI048-05	5
Linear Algebra and Multivariable Calculus	WPMA14005	WBCS037-05	5
Statistics	WISTAKI-07	WBCS038-05	5
Organized by Other Programmes (Pre-approved Elective)			
Computer Graphics	INBCG-08	WBCS019-05	5
Functional Programming	INBFP-08	WBCS002-05	5
Information Security	INBSEC-08	WBCS004-05	5
Introduction to Information Systems	INBIIS-08	WBCS021-05	5
Parallel Computing	INBPAR-08	WBCS029-05	5
Problem Analysis and Software Design	WBCS16000	WBCS012-05	5
Philosophy of Science	FIWET090	FIWET180	5
Self-organization	WBLS19046	WBBY069-05	5