

EDUCATION AND EXAMINATION REGULATION BACHELOR PROGRAMMES (EXCEPT FOR ATLAS)

General section

*of the programme part of the students' charter, including the
education and examination regulations (EER) for the
Bachelor's programmes Faculty EEMCS*

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1. General provision

Article 1.1 Applicability of these regulations

Explanation paragraph 2: right of consent Faculty council (FC), right of consultation Programme committee (PC).

1. This general section of the education and examination regulations applies to all students enrolled in the bachelor's programmes of the Faculty EEMCS.
2. For students who follow a study unit from another programme¹, the rules for testing apply that are laid down in the assessment plan of the study unit concerned, in the education and examination regulations and in the rules and regulations of the examination board of the programme that offers the study unit concerned. Special facilities² according to Article 6.2.5 can only be granted by the examination board of the programme for which the student is enrolled.
3. Each programme has its own programme-specific appendix.
4. For each programme, this general section and the programme-specific appendix together form the education and examination regulations for the bachelor's programme concerned.
5. The general section and the programme-specific appendix of the education and examination regulations are determined by the faculty board.
6. The institutional part of the students' charter includes a definition of what the UT considers as fraud. The rules of the examination board of the bachelor programme concerned has additional regulations about fraud, for instance about what action the examination board is entitled to take when they have detected a case of fraud.
7. The rules of the examination board of the bachelor's programme concerned include regulations about the rules of order during tests and rules in case of calamities.
8. The following rules about the language of the general section and the programme-specific appendix of the education and examination regulations and the rules of the examination board apply:
 - a) In the event of discrepancy, the Dutch version of this general section is binding.
 - b) For English-taught bachelor's programmes, English versions of the programme-specific appendix of the education and examination regulations and the rules of the examination board of the bachelor's programme must be available.
 - c) If both English and Dutch versions of the programme-specific appendix of the education and examination regulations and the rules of the examination board of the bachelor's programme concerned are available, both versions must include a rule about which version is binding in the event of discrepancy.
9. Requests for exceptions to provisions laid down in the education and examination regulations should be submitted to the examination board or the programme board, the guiding principle here is which body has the authority to make a decision on - or to make an exception to - a provision of these regulations.

Article 1.2 Definitions

The terms used in these Regulations should be interpreted as follows:

Academic year: The period that starts on 1 September and ends on 31 August of the following year.

Binding recommendation on continuation of studies (BSA): Recommendation on continuation of studies in accordance with Article 7.8b, paragraphs 1 and 2 of the WHW to which a rejection in accordance with Article 7.8b, paragraph 3 of the WHW is attached, issued by the programme board on behalf of the institutional board.

Assessment plan: A plan indicating how the testing of a module is organised. At first, it states the grading of the study units of the module, and secondly, the conditions for passing the entire module (including possible compensation rules within the module and compensation rules for study units or parts of study units of different modules).

Canvas: The digital learning management system of the University of Twente.

CPO: Personal Circumstances Committee. A committee formed by the institutional board that issues advice to the programme board in individual cases concerning the validity, term and seriousness of the personal circumstances of the student involved.

Curriculum: The entirety of compulsory and optional study units belonging to the programme, as set down in the programme-specific appendix.

EC: A unit of 28 hours of study workload, in accordance with the European Credit Transfer System, a full academic year consisting of 60 EC or 1680 hours (Article 7.4 WHW).

Education period: The period in which the study unit is offered. This period starts in the first week in which the study unit has any educational activity and ends in the last week in which the study unit has an educational activity and/or a test. Resits are not part of the education period. This period is not always the same as a quartile (a quarter of an academic year³).

Exam: An evaluation in a study unit of the knowledge, understanding and skills of the student, as well as the assessment of the results of this evaluation (Article 7.10 of the WHW); an exam may consist of a number of tests.

¹ This applies for example for a minor module, for an elective study unit from the study programme of a student and for a study unit which is not included in the standard study programme of the student. This does not apply, unless otherwise agreed, for units that are supplied.

² Under Article 6.2.5 this is about providing special facilities with regard to testing to a student with functional impairments. All other matters are handled by the examination board of the programme that offers the study unit.

³ <https://www.utwente.nl/en/ces/planning-schedules/frequently-asked-questions/>

- Examination board:** The body that establishes objectively and expertly whether a student meets the criteria set in the education and examination regulations regarding knowledge, insight and skills needed for obtaining a degree.
- Examiner:** The individual who has been appointed by the examination board in accordance with Article 7.12c of the WHW to hold exams and tests and determine their results.
- Exemption:** Establishing by the examination board that a student has acquired competences, i.e. on account of exams or final examinations in the higher education domain passed earlier, or knowledge or skills acquired outside the higher education domain, that are comparable in content, size and level to one or more study units or parts thereof.
- Faculty board:** Head of the faculty (Article 9.12 WHW).
- Final examination:** A programme concludes with a final examination. A final examination is deemed successfully completed if the study units belonging to a programme have been completed successfully.
- Honours programme:** Institution-wide Bachelor's Honours programme.
- Institution:** The University of Twente.
- Institutional board:** The Executive Board of the University of Twente.
- Module:** A total of 15 EC of one or more study units in which disciplinary knowledge, skills and attitude are developed and assessed in an as integrated and/or coherent way as possible.
- Module coordinator:** The individual charged by the programme board with organising the module.
- Module examiner:** In case the module consists of one study unit, the individual designated by the examination board to determine the result of the module.
- Part of study unit:** A part of a study unit.
- Programme:** The bachelor's programme referred to in the programme-specific appendix to these education and examination regulations.
- Programme board:** The committee charged by the faculty board with managing the programme. This may also be an individual person. In which case the term programme director is used.
- Programme committee (PC):** The committee as referred to in Article 9.18 of the WHW.
- Osiris:** System designated by the institutional board for registration and for providing information on all relevant data related to students and the programme, as described in the WHW.
- Practical exercise:** A practical exercise as referred to in Article 7.13, paragraph 2d of the WHW, is a study unit or part thereof, where the emphasis lies on the personal activity of the student, as described in the programme-specific appendix.
- Student:** Anyone registered with a programme in accordance with Article 7.34 and 7.37 of the WHW.
- Study adviser:** Person appointed by the faculty board who acts as contact between the student and the programme, and as such represents the interests of the students, as well as fulfilling an advisory role.
- Study load:** The amount of time an average student needs to capture the learning material. The study load comprises for instance project work, self-study, lectures and writing papers. The study load is expressed in credit points in accordance with the European Credit Transfer System.
- Study unit:** A component of the programme as described in Article 7.3, paragraphs 2 and 3 of the WHW. Every study unit concludes with an exam.
- Test:** An evaluation of the knowledge, understanding and skills of the student, as well as the assessment of the results of this evaluation. A test is a part of an exam. If a study unit has only one test, this coincides with the exam for the unit in question.
- UT:** University of Twente.
- WHW:** The Higher Education and Research Act (WHW), in the Dutch Bulletin of Acts and Decrees 1992, number 593, and as amended since.
- Working day:** Any day from Monday to Friday with the exception of official holidays and the prearranged compulsory holidays (compulsory days free of work) on which the staff is off.

Any terms not defined here have the meaning assigned to them by the WHW.

Article 2. Admission

Article 2.1 Prerequisites

Admission to the programme is granted if the requirements with regard to prior education for enrolment in university education are met, in accordance with the WHW, Articles 7.24, 7.25 and 7.28. The conditions pertaining to this can be found on the University of Twente's website⁷.

Article 2.2. Language requirement bachelor's programme for holders of foreign diplomas

Holders of diplomas from outside the Netherlands can only enrol in the following cases⁸:

- a) if the programme is offered in the Dutch language: after it has been shown that the requirement for adequate proficiency in the Dutch language to the level of the Dutch pre-university (VWO) examination has been met. The UT Admission Office provides a complete overview of the language requirements and certificates that show evidence of meeting these requirements⁹.
- b) if the programme is offered in the English language: after it has been shown that the requirement for adequate proficiency in the English language to the level of the Dutch pre-university (VWO) examination has been met. The UT Admission Office provides a complete overview of the language requirements and certificates that show evidence of meeting these requirements⁷.
- c) The provisions in paragraphs a and b relate to the entry requirements for incoming students. They involve only the formal aspects of language such as spelling and grammar: not academic language proficiency⁶. Acquiring academic language proficiency should be part of the programme's vision.

Article 2.3 Admission test or colloquium doctum

If the conditions referred to in Articles 2.1 and 2.2 are not met, the institution can grant an exemption on the grounds of a positive result of an admission test (colloquium doctum), in accordance with Article 7.29 of the WHW. The conditions pertaining to this can be found on the University of Twente's website⁷.

3. Content and structure of the programme

Article 3.1 Programme objectives and intended learning outcomes

Explanation: right of consent FC, right of consultation PC.

The qualities regarding the knowledge, insight and skills a student must have acquired upon completion of the programme (objectives and intended learning outcomes, Article 7.13, paragraph 2c of the WHW) are described in the programme-specific appendices.

Article 3.2 Structure of the programme

Explanation paragraph 1 f, j-l, paragraph 2: right of consent FC, right of consultation PC.

1. The programme is equivalent to 180 EC.
 - a) The curriculum always needs to contain a core programme of a maximum of 120 EC, a minor of 30 EC and a graduation phase of a minimum of 15 EC.
Exceptions are the programmes Advanced Technology and Technical Medicine which have electives instead of a minor or do not have a minor but a core programme of more than 120 EC.
 - b) The programme-specific appendix describes the core programme of the programme.
 - c) The curriculum is composed of modules.
 - d) A module is the total of 15 EC of one or more study units in which disciplinary knowledge, skills and attitude are developed and assessed in an as integrated and/or coherent way as possible.
 - e) Before the start of a study unit, the student must meet the prior knowledge prerequisites for that study unit, as described in the education catalogue.
 - f) In principle, the minors are done during the first semester of the third year of study.
 - g) The programme offering the minor module may set prerequisites for prior knowledge of the student for admission to the minor modules. These prerequisites must be included in Osiris.
 - h) The study programme in which the students is enrolled may set prerequisites for the number of ECs required for admission to the minor modules, these prerequisites have been included in the programme-specific appendix concerned.
 - i) The offer of minors from which the student can choose for his minor is limited by the restrictions in paragraph g and h. The offer can be examined on the website <https://www.utwente.nl/en/education/electives/minor/>
 - j) In principle, the graduation phase, requiring a minimum of 15 EC, is done during the second semester of the third year of study.
 - k) To be admitted to the graduation phase the student is required to have at least completed the core programme of the bachelor's programme.
 - l) The examination board⁴ is authorised to deviate from Article 3.2.1e, 3.2.1h, 3.2.1j and 3.2.1k in individual cases, if strict application of those terms would result in an unreasonable delay in study progress. In consultation with the study adviser, the student can submit a proposal to the examination board.

⁴ It is important that the student can still achieve the programme intended learning outcomes. As a result of this consideration, authority is formally placed with the examination board, since they must ensure that a student who has passed, has achieved the programme intended learning outcomes.

2. The programme is described in the programme-specific appendix to these regulations, in accordance with Article 7.13, paragraph 2 a to e, i, l, s, t and v of the WHW.

Article 3.3. The programme's language of tuition

Explanation paragraph 2-4: right of consent FC, right of consultation PC.

1. The official language of tuition is the language in which the education is given, in which teaching material is provided and in which tests and exams are held. In Dutch bachelor's programmes, study materials are provided in either the English or Dutch language.
2. The choice of the official language for the programme or a part of the programme lies with the programme board, for which the programme committee has the right of approval. The programme-specific appendix, which is established by the faculty board, specifies the language of tuition for the programme.
3. If there are deviations from this official language of tuition for components of the programme, this occurs in accordance with the UT Language Code of Conduct (Gedragscode Voertalen) and Article 7.2 of the WHW.
4. In Dutch bachelor's programmes parts of a study unit can be taught or tested in English if:
 - a) a lecturer or tutor of the study unit concerned is not a native speaker of Dutch, or
 - b) students of the bachelor's programme concerned are taught together with students of an English-language bachelor's programme, or
 - c) the programme board deems it necessary in order to meet one of the programme intended learning outcomes with regard to the communication skills in the English language.

Article 3.4 Exemption

Explanation: right of consent FC, right of consultation PC.

1. The examination board can grant students exemption from one or more complete study units at their request. To this end, the student will demonstrate that they have completed a component of a similar content, size and level of a university or higher professional education programme or have, as a result of work and/or professional experience, sufficient knowledge and skills regarding the study unit concerned.
2. The examination board is authorised to make exceptions to the provisions as stated in paragraph 1 and grant an exemption to a student from parts of a study unit.
3. An exemption granted by the examination board will be registered in Osiris with the concerning study unit or parts thereof with an EX (exemption).
4. Students cannot be forced to take extra study units or parts of study units in their curriculum instead of the granted exemption.
5. Students may be exempted from the obligation to participate in practical exercises if they can demonstrate that they expect to be placed in a moral dilemma as a result of the need to meet one of the requirements for this component. In such cases, the examination board decides whether the component can be carried out in another manner to be determined by the examination board.

Article 3.5 Flexible programme

Explanation: right of consent FC, right of consultation PC.

The examination board of the programme decides whether a student may take part in a flexible programme as stipulated in Article 7.3h of the WHW. The examination board assesses whether the programme is appropriate and consistent within the domain of the programme and whether the level is high enough in light of the intended learning outcomes of the programme.

4. Education and testing

Article 4.1 General

Explanation paragraph 1, 2, 3: right of consent FC, right of consultation PC.

1. The institutional board is responsible for the practical organisation of the exams and the final examinations.
2. A study unit is completed with an exam.
3. An exam consists of one or more tests.
4. Exams and tests can have various forms⁵. Tests or exams can be held online.
5. A test can be taken in multiple sessions or components, spread over time.
6. When a test or exam is held online by means of online surveillance⁶ or online proctoring⁷, the examination board may lay down further rules and conditions for online (proctored) testing.
7. These further rules and conditions must comply with the General Data Protection Regulation (GDPR⁸), the Data Protection Impact Assessment (DPIA⁹) on proctoring and the EER.

⁵ A test or exam can have the following forms: a written test, an assignment, an oral test, practical exercises, or a combination of these forms.

⁶ Camera-surveillance of student(s) during exams without recording via e.g. Canvas, Teams.

⁷ Surveillance of student(s) using special proctoring software e.g. Proctorio.

⁸ The text of the GDPR can be found here: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32016R0679>

⁹ The DPIA is an instrument to point out privacy risks of a processing operation to be able to take measures to mitigate those risks. In this case it is done for proctoring. Among a lot of other things, it describes the rights of the data subjects (in this case: the students) and the context in which proctoring can be used. <https://www.utwente.nl/remote-exams/students/proctoring/dpia-proctoring.pdf>

8. Pursuant to Articles 12-14 of the GDPR, students must be informed before the use of online surveillance or online proctoring about the processing of their personal data.
9. Pursuant the DPIA
 - a) in the event where no alternative exam method is reasonably possible, online surveillance or online proctoring can be used¹⁰.
 - b) the retention period of the data is 30 days unless the examination board decides that the data needs to be maintained longer for a fraud investigation.
10. Results of exams, tests or components of tests have to be announced to the students, in any case via Osiris or via the Grade Centre of Canvas. Osiris is used for the registration of grades.
11. The student has the right to refer to recent model test questions or trial tests or representative older tests and the related answers and the standard of the related assessment.
12. A test has a maximum duration of 3 hours¹¹.
If the examiner wishes to use a form of testing which takes more than 3 hours, they may request permission from the examination board to deviate from this provision. This request must be submitted not later than 4 weeks prior to the start of the period when a study unit is offered, to be able to meet the provisions in paragraph 19.
13. Test results are expressed in a grade from 1 to 10, with one decimal place, or as 'pass / fail'.
14. Exam results of a study unit, as determined by the examiner, are expressed in half grades from 1,0 up to and including 5,0 and from 6,0 up to and including 10,0 whereby:
 - Grades will only be rounded in the last phase of the assessment of the study unit.
 - The rounding is done in accordance with the following scheme:

In case n≠5	
Grade ≥ n.00 and <n.25	⇒ n.0
Grade ≥ n.25 and <n.75	⇒ n.5
Grade ≥ n.75 and <(n+1).00	⇒ (n+1).0
In case n=5:	
Grade ≥ 5.00 and < 5.50	⇒ 5.0
Grade ≥ 5.50 and <6.00	⇒ 6.0

15. Exam results of 6,0 or higher are a pass
16. Exam results, if passed, obtained at foreign universities will be registered as a P (Pass). Exam results obtained at Dutch universities will be adopted one-to-one in compliance with paragraph 14.
17. The ECs for a study unit will only be awarded if the exam has been successfully completed. No ECs will be awarded for parts of a study unit that have not been completed successfully.
18. If a student receives more than one result for the exam in the same study unit, the highest grade will apply. This also applies for the results of tests and components of tests within the same academic year and for the results of tests and components of tests that remain valid after the academic year in which they were obtained.
19. Through the education catalogue of Osiris, the programme board will announce at least the following aspects: size, course objectives and content of the module, language, required prior knowledge, mandatory and recommended study materials, design of the education (teaching methods) and testing.

Article 4.2 Modules

1. Each module has a module coordinator.
2. When a module comprises of one study unit, the examiner of this study unit is also module-examiner.
3. The examination board assigns the examiners for the study units and/or parts of study units

Article 4.3 Registering for a module, study unit and tests

1. To participate in a module or study unit, registration via Osiris prior to the start of the study unit is required.
2. By registering for the module or study unit the student is automatically also registered for the regular exam periods that go with this module or study unit.
3. Information on resits, the applicable conditions and the registration procedure will be published in the assessment plan.

Article 4.4 Module description and assessment plan

1. In the programme-specific appendix to these regulations, a module description is given for each module.
2. The module description defines at least:
 - a) if applicable, the study units that are part of the module and their related ECs;

¹⁰ This means online proctoring can be used for a few students as well as for all students.

¹¹ If a test consists of several parts spread over time, the maximum duration applies per part. Article 7.1, paragraph 10 includes a provision regarding the maximum extra time that can be allocated to students with dyslexia.

- b) if applicable, the number of ECs and the weighting factors of the parts of the study units;
 - c) the language of tuition and testing.
- Learning goals of the module and/or the learning goals of the study units that are part of the module will be published in time on Osiris and Canvas.
3. The assessment plan of a module is determined by the programme board after the module coordinator and/or the examiners of the study units that are part of the module have drawn up the assessment plan. The examination board advises on the assessment plan.
 4. At least 2 weeks prior to the start of the module, the assessment plan for the module is published on Canvas.
 5. The assessment plan of a module states at least:
 - a) when the module has been passed;
 - b) how the learning goals of the study units of the module are assessed;
 - c) the period of validity of the result of the test or tests of parts of a study unit
 - d) when tests will be administered
 - e) any required minimum grade per test; a minimum grade for a test may not be set higher than 5.5
 - f) resits for each test and – if applicable - any conditions for participating in the resit; for each study unit at least one resit has to be offered within the same academic year without any conditions for participating¹². An exception may be made for practical exercises¹³.
 - g) if applicable, any options to compensate test results within a study unit;
 - h) if applicable, any options to compensate test results with results from tests in other study units in the same module and/or results from tests in study units in other modules;
 - i) the grading period of each test; which is a maximum of 10 working days in compliance with Article 4.6.9 of these regulations.
 6. The programme board may modify the assessment plan during the course of the study unit.
 - a) The assessment plan may only be changed in consultation with the module coordinator and the examiners of the study unit or study units of the module.
 - b) The programme board consults the examination board beforehand in case of changes in the form or the method of administering of a test or tests. If the change involves nothing more than moving tests or test components to a timeslot other than as shown in the schedule, the programme board must inform the examination board of the decision to make the change at latest before the next meeting of the examination board.
 - c) Students are to be informed immediately of the change.
 7. Changes to the assessment plan may, in reasonable expectation, not put students at a disadvantage. Examination boards may provide special facilities in individual cases.

Article 4.5 Oral tests

1. Oral tests are open to the public, unless the examination board has determined otherwise in a particular case, possibly at the request of the examiner or the student.
2. A student or examiner who wishes third parties to be present during an oral test must submit this request to the programme board at least 15 working days prior to the oral test. The decision of the programme board will be made known to the student and the examiner not later than 5 working days before the oral test. The programme board must inform the examination board of the decision at their next meeting. This does not apply for public graduation colloquia, public presentations or group tests.
3. If the examination board has determined that members of the examination board (or an observer representing the examination board) are to be present during the oral test, it will notify the examiner and the student at least one working day prior to the test.

Article 4.6 Term assessment, date of exam or test

1. The examiner will inform the student of the result within at most 1 working day after conducting the oral test.
2. The provisions of paragraph 1 do not apply if the oral test is part of a series of oral tests for the same study unit, which take place on more than one working day. In that case, the examiner determines the result within one working day after the conclusion of the series of oral tests.
3. The deadline for determining and publication of the result of a written exam or an exam taken in some other way will be included in the assessment plan for the module.
4. The result of a test or part of a test will be made known to the student within 10 working days in compliance with paragraph 9 of this Article.
5. The exam result of a study unit will be made known to the student within 10 working days after the end of the education period in which the unity of study is offered. If the exam result is insufficient, and a resit is possible outside the education period in which the study unit is offered, and the examiner has determined that the students meet the terms and conditions to participate in the resit (in accordance with Article 4.4, paragraph 5f) this decision will also be made known to the students within 10 working days after the end of the education period in which the study unit is offered.
6. The date of exam is the date on which the last test for a study unit was passed.
7. The date of a test is the date on which a test is taken.

¹² A resit may also fall within the quartile with due observance of the provision in Article 4.6.9. If the result of a unit of study is determined by more than one test, there must be a resit for each test or part of a test. Combining several tests or parts of tests into one resit is allowed.

¹³ See the definitions in Article 1.2. These include projects and practical exercises.

8. If the assessment of a test is based on the completion of one or more assignments, a paper or a thesis, the deadline for submission of the final part will count as the test date.
9. If a resit is planned shortly after the first test, the results of the first test will be published at a time that provides the student with at least 5 working days to prepare for the resit.
10. Should an examiner not be able to meet the deadlines as described in paragraphs 1, 2, 4,5 and 9 due to special circumstances, they will report this with reasons to the examination board. The students involved will be informed of the delay as soon as possible including the new deadline when the result will be announced. If the examination board feels that the examiner has not met their responsibility, they can order a different examiner to determine the grade.

Article 4.7 Period of validity

Explanation paragraph 1: right of consent FC, right of consultation PC.

1. The period of validity for the results of an exam that has been passed is unlimited. The validity of an exam result can only be restricted if the tested knowledge, insight or skills are proven to be out of date.
2. A study unit that was not passed, has to be repeated completely in the next academic year. Results of parts of a study unit expire after the academic year. Exceptions are listed in the programme-specific appendix and in the assessment plan of the module.

Article 4.8 Right of discussion and review.

1. The student is entitled to a discussion, including review, of the results of a test with the examiner, where the examiner justifies the assessment.
2. If the examiner holds a plenary discussion, the student must make use of this opportunity to exercise their right of discussion as referred to in paragraph 1. In case the student cannot attend this plenary discussion or if the student was not offered the opportunity to discuss the justification of his assessment with the examiner, the student may submit a request to the examiner for an individual discussion within 5 working days after the plenary discussion. The individual discussion must take place no later than 3 working days prior to the next test opportunity.
3. If there is no plenary discussion of the test, the student may submit a request to the examiner for an individual discussion within 10 working days after publication of the results. The individual discussion must take place no later than 3 working days prior to the next test opportunity.
4. Plenary and individual discussions must take place no later than 5 weeks after the publication of the test results, but at least 3 working days prior to the next test opportunity, in the presence of the examiner or an authorised replacement.
5. Students have the right to inspect their work for a period of 2 years after the assessment.

Article 4.9 Retention period for tests

1. The questions, answers and the assessed work of written tests will be retained for a period of 2 years.
2. The retention period of final assignments of the bachelor's programme is at least 7 years.

Article 4.10 Evaluation of education

Explanation paragraph 1 and 2: right of consent FC, right of consultation PC.

1. The programme board is responsible for monitoring the quality of the programme.
2. The programme board is responsible for evaluating the programme.
3. The way evaluation is organised is described in the programme-specific appendix.

5. Final examination

Article 5.1 Examination board

Explanation: right of consent FC, right of consultation PC.

1. The faculty board appoints an examination board for each programme or group of programmes.
2. The faculty board establishes the examination board and appoints the members of the examination board based on their expertise in the domain of the relevant programme or group of programmes.
3. The faculty board ensures that the independent and expert operation of the examination board is adequate.
4. Under their own authority, an examination board define rules and regulations for examiners, exams and tests and the final examination (WHW Article 7.12b).

Article 5.2 Final examination

Explanation paragraph 1: right of consent FC, right of consultation PC.

1. In accordance with Article 7.10, paragraph 2 of the WHW, the bachelor's final examination is deemed successfully completed if the exams of the study units of the bachelor's programme have been taken successfully.
2. As proof that the final examination has been completed successfully, the examination board issues a certificate, after the institutional board has declared that the procedural requirements have been met. In this case, the date recorded on the certificate, i.e. the graduation date, is the date on which the student successfully completed the last remaining study unit (Article 7.11 WHW).
3. If so desired, the student has the right to submit a substantiated request in writing to the examination board to delay declaring the final examination as successfully completed and consequently the presentation of the certificate (WHW Article 7.11 paragraph 3). In principle the maximum duration of the delay that may be granted is 12 months. In

exceptional cases¹⁴ the student may have justifiable reasons to submit a request to delay the presentation of the certificate for more than 12 months.

4. If the student requests a delay on the basis of paragraph 3, the graduation date will be the date after the delay on which the examination board has decided to declare the student to have successfully completed the final examination.

Article 5.3 Degree

Explanation paragraph 1: right of consent FC, right of consultation PC.

1. Participants who have successfully met all requirements for the bachelor's final examination are awarded a Bachelor of Science degree.
2. The awarded degree will be stated on the certificate.

Article 5.4 Certificate

Explanation: right of consent FC, right of consultation PC.

1. The examination board grants a certificate as proof that the student has successfully passed their final examination. The chair of the examination board will sign the certificate. In their absence, it can also be signed by one of the members of the examination board.
2. The certificate will state the following (Article 7.11 WHW):
 - a) the student's name and date of birth;
 - b) the name of the institution and the programme as referred to in the register, referred to in Article 6.3 of the WHW, it concerns;
 - c) the date on which the final examination was sat;
 - d) which components¹⁵ the final examination included;
 - e) the degree awarded (WHW Article 7.10a);
 - f) where appropriate what qualification was attached thereto (taking into account Article 7.6, paragraph 1, of the WHW);
 - g) the date on which the programme was most recently accredited or passed the initial accreditation assessment as referred to in Article 5a.11 of the WHW.
3. The International Diploma Supplement will be appended to the certificate for the successfully completed final examination (WHW, Article 7.11, paragraph 4). The purpose of the supplement is to provide information on the nature and content of the completed programme, in order to support the international recognition of programmes. This supplement will contain at least the following information:
 - a) the name of the programme and the name of the University;
 - b) the fact that it is a programme in academic education;
 - c) a description of the content of the programme; where applicable also stating the specialization and/or minor taken;
 - d) the study load of the programme;
 - e) the components of the final examination and their assessment, based on the registration of grades in Osiris;
 - f) exams that were passed by the student, which are not part of the final examination;
 - g) if the student has successfully completed an honours programme during the bachelor's programme, this will be recorded on the diploma supplement as an extracurricular programme;
 - h) the average grade (Grade Point Average, GPA). The manner in which the GPA is calculated is stated on the diploma supplement.
4. If the examination board has granted the student a *judicium*, this will be stated on the certificate.
5. Students who have passed more than one exam and to whom no certificate as referred to in paragraph 1 of this article can be issued, can request a written statement from the examination board stating the exams they have passed (WHW, Article 7.11, paragraph 5).

6. Student guidance and (binding) recommendation on continuation of studies

Article 6.1 Study progress overview

The student can request a certified study progress overview from the Student Services Desk if required.

Article 6.2 Student guidance

1. The faculty board is responsible for student guidance, which includes informing the student of study opportunities in or outside the programme.
2. Each student is assigned a study adviser.
3. The study adviser guides the student and offers advice on study-related matters, as well as personal problems that may affect their studies if the student so desires.
4. If a student wishes to exercise their right to specific guidance or special facilities, they are required to contact the study adviser. The study adviser will record any agreements made with the student.
5. The following applies to the entitlement to special facilities:
 - a) demonstrable force majeure or personal circumstances;

¹⁴ Some examples (by way of illustration, not to exclude other situations): the student follows a double bachelor's programme, the student needs more time for a pre-master programme, an extensive extra-curricular activity requires more than 12 months.

¹⁵ 'Components' in the WHW refers to the study units that comprise the bachelor's final examination. Legally, these are all of the study units that are part of the modules and all modules that comprise one study unit of 15 EC. The programme determines which parts of study units are also mentioned on the certificate.

- b) if necessary and possible, dispensation for participation in exams or tests and/or the availability of special facilities with regards to testing. Such dispensation and additional testing opportunities can only be granted by the examination board.
- 6. An introductory interview is held with every student before 1 November of the first year in which they are enrolled in the programme.
- 7. In the first year in which they are enrolled in the programme, the student will receive a first preliminary recommendation on continuation of his studies in week 52 at the latest. This also applies to students in their second year of enrolment in the programme, whose recommendation on continuation of studies has been postponed. This recommendation is not binding.
- 8. In the first year in which they are enrolled in the programme, the student will receive a second preliminary recommendation on continuation of their studies in week 10 at the latest. This also applies to students in their second year of enrolment in the programme, whose recommendation on continuation of studies has been postponed. This recommendation is not binding.
- 9. Any student who receives a negative preliminary recommendation, will be invited for an interview with the study adviser to discuss the study method and a reconsideration of the choice of study.

Article 6.3 (Binding) Recommendation on continuation of studies

1. Each student receives a written recommendation on continuation of their studies within the programme no later than at the end of the first year of enrolment in the programme concerning, subject to Article 6.4. This recommendation is based on the student's study results and may be a positive or negative recommendation, in compliance with Articles 6.4 and 6.5.
2. The issuing of the recommendation on continuation of studies as referred to in paragraph 1 is by the institutional board to the programme board.
3. Results of completed parts of a study unit that remain valid beyond the current academic year are counted when issuing the recommendation on continuation of studies.
 - a) Only credits from study units and parts of study units in the first year of the programme that issues the final recommendation, count for determining the number of EC's.
 - b) Exemptions granted to the student for study units and parts of study units of the first-year count for determining the number of credits.
 - c) The programme board may set programme-specific requirements that must be met. These requirements are included in the programme-specific appendix. Programme-specific requirements may not state that all study units or parts of a study unit of a certain educational curriculum must be completed¹⁶.
4. The recommendation on continuation of studies as referred to in paragraph 1 may involve rejection from the programme, if the student, in the opinion of the programme board, is not deemed suitable for the programme because
 - the student has passed in total less than 45 ECs of the first year, or
 - has passed 45 ECs or more of the first year but does not meet the programme-specific requirements (as referred to in paragraph 3c of this Article).

A recommendation on continuation of studies that involves rejection is referred to as a binding recommendation on continuation of studies (BSA).
5. In its deliberations on attaching a rejection to a recommendation on continuation of studies, the programme board will take into account the student's personal circumstances at their request.
 - a) Personal circumstances are understood to be illness of the person involved, a physical, sensory or other impairment of the person involved, pregnancy of the person involved, exceptional family circumstances, top-level sports or top-level culture of the person involved and the membership of the university council, faculty council, programme committee or a board (category 3 or 4 in accordance with the FOBOS regulations).
 - b) The personal circumstances must be submitted to the Personal Circumstances Committee (CPO) for assessment. The application for assessment of the personal circumstances must be substantiated with evidence.
 - c) The CPO assesses the validity and seriousness of the personal circumstances. A recommendation is issued to the programme board and the relevant study adviser.
 - d) The programme board takes the judgement of the CPO into account in its handling of the student's request. The programme board will only take into account in its deliberations personal circumstances that have been reported to the study adviser by the student as soon as can reasonably be expected after they arose.
6. Before issuing a rejection, the programme board must first issue a warning to the student, while giving them a reasonable term to improve their study results, to the programme board's satisfaction. Moreover, the student has the right to be heard by the programme board before the issue of a binding recommendation (WHW Article 7.8b, paragraph 4).
7. The decision of the programme board with respect to the binding recommendation on the continuation of studies mentions the possibility of filing an appeal. Objections are only possible for a recommendation on continuation of studies involving rejection and the student may lodge an appeal within 6 weeks with the Board of Appeal for Examinations.
8. If a binding recommendation on continuation of studies has been issued to the student, they may not enrol in the same programme for a period of 3 subsequent academic years.
9. If a student re-enrols in the programme concerned after the period referred to in paragraph 8 of this Article, this enrolment is designated as their first-year enrolment and the relevant provisions of this paragraph apply in full.

¹⁶ For example: 'The student must have passed all mathematics study units from the B1 programme' is not permitted, whereas 'The student must have passed not less than 3 of the 4 mathematics study units from the B1 programme' is permitted.

Article 6.4 Discontinuation of enrolment

1. The programme is considered to be discontinued if the student stops taking courses or any form of tests of the programme and:
 - a) Submits a request for termination of enrolment to the UT, or
 - b) De-enrols for the programme at the UT, while they enrol in another programme at the UT and thus transfer to the other UT programme, or
 - c) Starts a study at another institution of higher education with a 'proof of paid tuition fee'.
2. If in their first year of enrolment for the programme, a student submits a request to terminate enrolment through Studielink not later than 31 January and they are de-enrolled before or on 1 February and they do not re-enrol for the same programme in that same academic year, a study recommendation as referred to in paragraph 1 of Article 6.3 will not be issued. If this student does re-enrol in the relevant programme, this enrolment is designated as their first-year enrolment.
3. Students who are de-enrolled after 1 February for the programme at the UT, will receive a recommendation on continuation of studies as referred to in Article 6.3 paragraph 1 from the programme they discontinued.

Article 6.5 Postponing recommendation on continuation of studies

1. The recommendation on continuation of studies as referred to in Article 6.3 paragraph 1 may be postponed if:
 - a) the student is enrolled in the programme on or after 1 October of the relevant academic year, whether or not this is due to a transfer as outlined in Article 6.4 paragraph 1b, and on 31 August at the latest has not met the requirements set in Article 6.3, paragraph 4, or
 - b) if personal circumstances preclude rendering an opinion on a student's academic capacities at the end of the first year of enrolment in the programme.
2. If the student whose recommendation on continuation of studies as referred to in Article 6.3, paragraph 1 has been postponed based on Article 6.5, paragraph 1, re-enrols in a subsequent academic year for the relevant programme, the end of the second year of enrolment in the relevant programme applies as the new deadline for the final recommendation. Within 6 weeks after the enrolment date the student will be notified in writing when the programme will issue the final recommendation. The same requirement as set out in Article 6.3; paragraph 3 applies to this recommendation.

In case of postponement based on paragraph 1a the recommendation on continuation of studies is issued by the programme in which the student is newly enrolled.
3. For students who transfer to a different programme within the UT before 1 October, the recommendation on continuation of studies will not be postponed on the basis of transfer and thus there will be no adjustment of the requirements as stipulated in Article 6.3 paragraph 4.

7. Studying with a functional impairment

Article 7.1 Studying with a functional impairment

1. A functional impairment is a physical, sensory or other impairment that might limit the student's academic progress.
2. Based on a discussion with the study adviser, the student will be consulted to determine which adjustments as referred to in Article 2 of the Equal Treatment Act on the basis of a Handicap/Chronic Illness (WGB h/cz) are deemed most effective for this student.
3. Adjustments are intended to remove specific obstructions when following the curriculum and/or sitting exams. Where necessary, these may concern facilities pertaining to the accessibility of infrastructure (buildings, classrooms and teaching facilities) and study material, changes to examination, alternative courses or a custom study plan. Realising the programme intended learning outcomes must be guaranteed when implementing changes.
4. On the basis of the interview described in paragraph 2, the student submits a written application for the facilities consultation with the study adviser. The application is submitted to the faculty board, preferably 3 months before the student is to participate in classes, exams and tests for which the facilities are required.
5. The application is supported by documents that can reasonably be requested to assess the application (such as a letter from a doctor or psychologist registered in the BIG register, or in case of dyslexia from a health care psychologist or remedial educationalist, also registered in the BIG register).
6. The faculty board makes a decision, within 20 working days of receipt of the application or earlier if the urgency of the application necessitates it, on the validity of the application as described in paragraph 4, and informs the student and the study adviser of their decision.
7. The study adviser ensures that the relevant parties involved are informed in due time of the facilities granted to the student with a disability.
8. Should the faculty board turn down the application in full or in part, the faculty board will inform the student of the reasons for this rejection and the possibilities for lodging an objection or an appeal. Objections must be submitted in writing within 6 weeks, of the decision being announced to the relevant party, at the Complaints Desk at Student Services.
9. Should extra facilities be granted, it will be stated for what term this grant will apply. The applicant and the study adviser will evaluate the facilities before the end of this term. During this evaluation, the parties will discuss the effectiveness of the facilities provided and whether they should be continued.
10. In the case of dyslexia, an additional period of 15 minutes for every hour is granted in the event additional time for a test is granted.

8. Amendments, transitional arrangements, appeals and objections

Explanation paragraph 8.5 and 8.9: right of consent FC, right of consultation PC

Article 8.1 Conflicts with the regulations

If other additional regulations and/or provisions pertaining to teaching and/or examinations conflict with these education regulations, the present education and examination regulations take precedence.

Article 8.2 Administrative errors

If, following the publication of a result, a grade list, or an overview of a student's progress, an apparent error is discovered by either the university or the student, is required to make this known to the other party immediately upon finding the error and with rectification of the error.

Article 8.3 Amendments to the regulations

1. Substantive amendments to these education and examination regulations are determined by the faculty board in a session.
2. In principle, substantive amendments to these regulations do not apply to the current academic year. Substantive amendments to these regulations may apply to the current academic year if the interests of the students are not prejudiced within reason or in situations of force majeure.
3. Amendments to these regulations have no effect on earlier decisions of the examination board.

Article 8.4 Transitional arrangement

1. In the case of amendments to the education and examination regulations, the faculty board may decide on a transitional arrangement.
2. The transitional arrangement will be published on the website of the programme.
3. Basic principles for a transitional arrangement if a curriculum is changed:
 - a) Changes to a curriculum are published before the start of the academic year in which they are to apply.
 - b) No guarantee can be given that all the study units or parts of study units of a programme, as they existed at the time of enrolment in a programme, will continue to be part of their programme. The curriculum as most recently approved by the faculty board serves as the basis for establishing the results of the bachelor's final examination.
4. The transitional arrangement will always include:
 - a) which lapsed study units or parts of study units are equivalent to study units or parts of study units in the current curriculum included in the programme-specific appendix;
 - b) that if a study unit or part of a study unit without practical exercises is removed from the curriculum, there will be opportunities in the subsequent academic year to take a written or oral exam or to obtain an assessment by some other means;
 - c) that if a study unit or part of a study unit that involves practical exercises is removed from the curriculum, in the subsequent academic year no opportunities are offered to carry out these practical exercises, at least one study unit will be offered as a suitable replacement for the lapsed study unit;
 - d) the period of validity of the transitional arrangement.

5. The transitional arrangement requires the approval of the examination board pursuant to the provisions of paragraph 4.
6. In exceptional cases, and if this is to the student's advantage, the examination board may allow deviation regarding the number of times and the way in which an exam or a test for a lapsed study unit or a lapsed part of a study unit can be taken.

Article 8.5 Assessment education and examination regulations

1. The faculty board is responsible for the regular assessment of the education and examination regulations and takes into account the resultant study load for the students to enable this to be monitored and adjusted if necessary.
2. In accordance with Article 9.18 of the WHW, the programme committee has an advisory role on some parts of the education and examination regulations and a right of consent on other parts.
3. The programme committee annually assesses the way in which the education and examination regulations are implemented.

Article 8.6 Appeal and objections

An appeal against a decision made by the examination board or an examiner, and objections to decisions made by the faculty board on the basis of these regulations, must be submitted in writing to the Complaints Desk at Student Services within 6 weeks after notification of the decision.

Article 8.7 Hardship clause

In the event of demonstrable, considerable unreasonableness and unfairness, departures from the provisions of these regulations can be permitted by the examination board or the programme board, as suggested in the relevant Articles of these regulations.

Article 8.8 Publication

The education and examination regulations and the rules and regulations of the examination board are published on the website.

Article 8.9 Entry into force

These regulations take effect on 1 September 2021 and supersede the regulations of 1 September 2020.

Enacted by the board of the Faculty EEMCS,

in view of Articles 9.5, 9.15, first paragraph under a, 7.13, first and second paragraph, 9.38, under b, and 9.18, first paragraph and 7.59 of the Higher Education and Research Act (WHW), and after consent of the faculty council.

Enschede, 27-07-2021

Explanatory memorandum

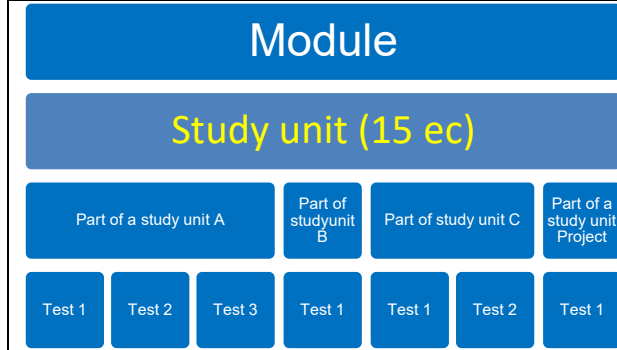
- When we speak of ***integrated*** education, we mean an integrated study unit that consists of different interdependent parts. These parts are assessed in an integrated manner. Integrated education is registered as one study unit, with 1 grade. The parts of an integrated study unit can be listed with “ECs” (as a measure of invested time) and grades are presented on a grade list.
- When we speak of ***coherent*** education, we mean that the education consists of different parts which are related. These parts are assessed separately. Coherent education is registered as separate study units with their own grades. The coherent module itself is not graded.
- Bachelor programmes decide for themselves which modules are integrated, and which are coherent.
- The number of ECs for a study unit is the same for all participating students. It is not possible for different designated target groups of students to receive different ECs for the same “study content and assessment”.
- It is possible to offer parts of an integrated study unit as a different study unit (with other learning objectives and assessment) to students of another bachelor programme.

Explanatory notes on terminology in assessment and the structure of a module.

Terminology in assessment
The bachelor is assessed with a Final Examination
A study unit is assessed with an exam.
Parts of a study unit are assessed with tests. A test can have the following forms: a written test, an assignment, an oral test, the assessment of practical exercises as referred to in Article 1.2, or a combination of these forms.

You can find the words ‘study unit’, part of study unit, Exam in the list of definitions (article 1.2).

Integrated module

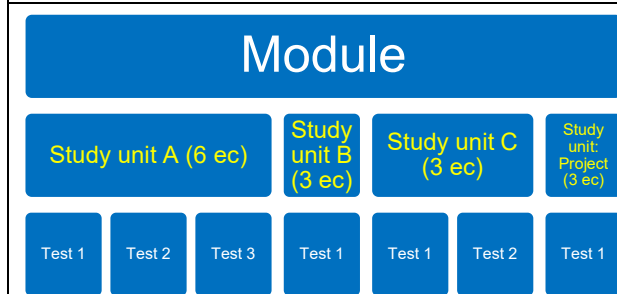


In integrated education, a module is a *study unit*. A study unit is tested with an exam. The exam result is expressed in half grades (see Article 4.1.9). This grade is determined by the *module examiner*. Successfully passed exams remain valid (see Article 4.7.2). A study unit that was not passed, has to be repeated completely in the next academic year. Results of parts of a study unit expire after the academic year. Exceptions are listed in the programme-specific appendix and in the assessment plan of the module).

Often, the integrated module is split up into *Parts of a study unit*, which are assessed with one or multiple *tests*. Results of tests are expressed in a grade from 1 to 10 with one decimal grade or as pass/fail (Article 4.1.8). Grades of *parts of a study unit* are determined by the *examiners*. Results of *part of a study unit (tests)* expire after the academic year in case the study unit was not passed (see Article 4.7.2).

In the study progress overview, *parts of study units* are listed with ECs and grades are presented on a grade list. The module is graded as well.

Coherent module

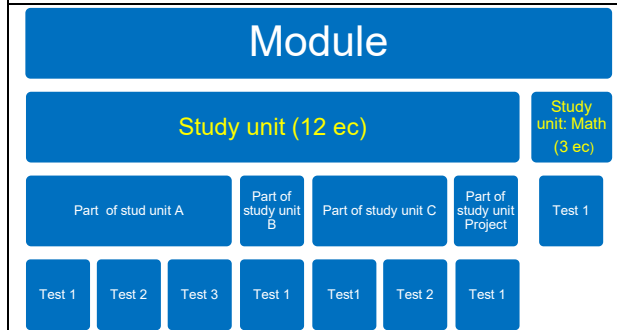


Coherent education consists of *study units* with their own grades. The coherent module itself is not graded. Each study unit is tested with an *exam*. The exam result is expressed in half grades (see Article 4.1.9). The result is determined by the *examiner* of the *study unit*. Successfully passed exams remain valid (see article 4.7.2).

The exam can consist of multiple *tests* (see example: study unit A, the exam consists of 3 tests). Results of tests are expressed in a grade from 1 to 10 with one decimal grade or as pass/fail (Article 4.1.8). Grades of tests are determined by the examiners. Results of part of a study unit expire after the academic year in case the study unit was not passed (see article 4.7.2: A study unit that was not passed, has to be repeated completely in the next academic year. Results of parts of a study unit expire after the academic year. Exceptions are listed in the programme-specific appendix and in the assessment plan of the module).

In the study progress overview, coherent modules are registered with separate study units with their own grades and ECs.

Mix: Some modules are a mix of coherent and integrated education.



Mixed modules consist of *study units*; the modules itself is not graded. Each *study unit* is tested with an *exam*. The exam result is expressed in half grades (see Article 4.1.9). The result is determined by the examiner of the *study unit*. (see example: study unit Math). Successfully passed exams remain valid (see Article 4.7.2: A study unit that was not passed, has to be repeated completely in the next academic year. Results of parts of a study unit expire after the academic year. Exceptions are listed in the programme-specific appendix and in the assessment plan of the module).

The study unit can be split up into *Parts of a study unit*, which are assessed with one or more *tests* (in the example: 4 parts of a study unit). Results of tests are expressed in a grade from 1 to 10 with one decimal grade or as pass/fail (Article 4.1.8). Grades of tests are determined by the examiners. Results of part of a study unit expire after the academic year in case the study unit was not passed (see article 4.7.2).

In the study progress overview, these modules are registered with separate study units with their own grades and ECs.

Section B: Programme-Specific Section

Bachelor Applied Mathematics

About this section

The Education and Examination Regulations (EER) are subdivided into two sections (Section A and Section B), which together form the EER. Section A, which can be seen as the university section, includes provisions that may apply to all EEMCS Bachelor's degree programmes. This section (Section B) contains the provisions that are specific to the particular degree programme, in this case the Bachelor's programme in Applied Mathematics.

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1 Contents and structure of the programme

1.1 General objectives of the programme

The objective of the bachelor's programme in Applied Mathematics is to train and educate its students to become academics who practice mathematics in the perspective of applications, in a societal and multidisciplinary context.

Most graduates will continue their education in a master's programme.

1.2 Provisions required by the Higher Education and Research Act (WHW)

The letters associated with the various paragraphs below refer to the corresponding letters in Article 7.13, paragraph 2 of the WHW.

a. The content of the programme and the associated examinations

The study units comprising the bachelor's programme in Applied Mathematics are given in Table 1, Table 2 and Table 3 in Appendix I. The rules regarding the Final Examination are given in Article 3.4.

For students who started the programme prior to September 1, 2013, study units comprising the curriculum are given in Table 4, Table 5 and Table 6 in Appendix I. These study units are no longer offered, and so, these students will have to make use of the transitional arrangements in Section 4. The rules regarding the Final Examination are given in Article 4.1.5.

Annex II contains a curriculum that has been adjusted for the combined final degree audit for Applied Mathematics and Applied Physics.

Annex III contains a curriculum that has been adjusted for the combined final degree audit for Applied Mathematics and Technical Computer Science.

b. The content of the specialisations offered by the programme

The programme offers a single specialisation, with its content as described in provision a.

c. The Programme Intended Learning Outcomes

The programme covers four fields of competence:

- (a) domain expertise;
- (b) research and modelling skills;
- (c) professional skills;
- (d) academic reflection.

These fields of competence are specified further in ten PILOs:

1. The graduate has thorough knowledge of mathematical theories in the areas of algebra, analysis, statistics, stochastics, and discrete mathematics, and an understanding of the application of these theories in technology, health care and business administration (associated with domain expertise).
2. The graduate can deal with abstraction, is capable of formal reasoning and can construct mathematical proofs (associated with domain expertise).
3. The graduate can use various research methods to answer research questions (associated with research and modelling skills).
4. The graduate can design and analyse mathematical models for problems of a multidisciplinary nature and assess their usefulness in practical situations (associated with research and modelling skills).
5. The graduate is proficient in using a computer to address the increasing size and complexity

of mathematical problems. Computer algebra, numerical methods and simulations are key applications in this regard (associated with research and modelling skills).

6. The graduate is information literate. The graduate is adept at making the most of the library's resources, including advanced search methods in modern library networks (associated with research and modelling skills and professional skills).
7. The graduate is proficient in oral and written communication, and is able to work effectively in a team. The graduate is capable of continuously developing collaborative skills.
8. The graduate has insight into the position of the field of applied mathematics in society and has acquired a basic understanding of the philosophy of science (associated with academic reflection).
9. The graduate can shape his/her learning process, his/her competencies and develop his/her professional identity, by consciously choosing, motivating and completing study units that match personal capacities, skills, and motivation.
10. The graduate is interculturally competent.

d. Structure of practicals

Practicals are not subject to any specific provisions with regard to their structure.

e. Study load of the programme and of each of the study units in the programme

The study load of the study units is indicated in Table 1, Table 2, and Table 3 in Appendix I.

f. Specific rules regarding Binding Recommendation (BSA)

A student of bachelor's degree programme in Applied Mathematics will receive a positive BSA upon satisfying the following conditions (Article 6.3, Guideline and Model EER):

1. Successful completion of at least 45 credits, including all the study units of at least two modules.
2. Successful completion of at least two of the following study units: Linear Structures I, Linear Structures II, and Analysis I.

Students pursuing a double degree in Applied Mathematics and Applied Physics are subject to different BSA provisions, as given in Article 7 of Annex II.

Students pursuing a double degree in Applied Mathematics and Technical Computer Science are subject to different BSA provisions, as given in Article 8 of Annex III.

g. Study load of the Master's programme

Not applicable.

h. The sequence of examinations

Any restriction on the sequence of examinations with relation to academic prerequisites is indicated in Appendix I.

i. Programme format

The programme is offered on a full-time basis.

j. Sequence and periods for examinations and degree audits

The schedules indicate the tests that make up an examination. Degree audits are not restricted to specific periods.

k. Not applicable

l. Teaching method and assessment and examination formats

The teaching method for the various study units is indicated in Appendix I. The following abbreviations are used:

Lec	Lecture,
Tu	Tutorial,
PR	Practical,
COL	Colstruction,
SS	Self Study.

The examination format for the study units is indicated in Appendix I. The following abbreviations are used:

W	Written examination,
Or	Oral examination,
O	One or more assignments: the student submits work (assignments, reports, essays, other documents) and the examiner assesses it without the student being present,
P	Practical assignment: the student creates and submits a product that can be activated and subsequently, assessed on behaviour and/or function and/or usability (e.g. a working program or a functioning prototype),
Pj	Project: the student participates in a number of group activities. The student will be assessed both on his individual contribution to the activities and the group's products (report, presentation, program),
Ps	Presentation: the student gives a presentation to the examiner and a group of interested people, generally fellow students.

These codes indicate the nature of assessment, without prescribing any rules for assessment.

- m.** See Guideline and Model EER, Article 7.1.
- n.** See Guideline and Model EER, Article 4.5.
- o.** See Guideline and Model EER, Article 4.6.
- p.** See Guideline and Model EER, Article 4.8.
- q.** See Guideline and Model EER, Article 4.8.3.
- r.** See Guideline and Model EER, Article 3.4.

s. Admission standards for examinations and practicals

The admission standards are listed in Appendix I.

t. Required participation in a practical exercise as a component of an examination

The 'form of assessment' column in Table 1, Table 2 and Table 3 in Appendix I shows whether participation is required in a practical exercise as a component of an examination.

- u.** See Guideline and Model EER, Articles 6.1 and 6.2.
- v.** Not applicable.

2 Description of modules

Table 1, Table 2 and Table 3 in Appendix I provide the study units and their related ECs for each module. The mode of teaching and assessment are also given there.

Brief descriptions and *module intended learning outcomes* for Modules 1-8, 11 and 12 are given below. For more detailed descriptions and intended learning outcomes for the individual study-units within a module, we refer to the Student Information System (Osiris) and the Learning Management System (Canvas).

2.1 Module 1. Structures and Models

This module is the first acquaintance with studying Applied Mathematics. The first taste of abstract and formal reasoning is received through Linear Structures I and Prooflab. Exposure to programming and modelling comes through the project (implemented with MATLAB).

The intended learning outcomes are: After successful completion of the module, the student:

- is aware of what it means to study applied mathematics at an academic level;
- knows and can apply the very basics of mathematics and modelling in about every subsequent module.

2.2 Module 2. Mathematical Proof Techniques

This module is primarily about deepening of abstraction and formal reasoning, studied from different perspectives: Linear Structures II, Analysis I, and Linear Optimization. The project: Prooflab II allows the student to experience how a complex proof can be decomposed systematically into different proof techniques.

The intended learning outcomes are: After successful completion of the module, the student:

- is proficient in abstract and formal reasoning in basic mathematics;
- has an overview of proof techniques;
- is able to assess and understand complex proofs and is able to derive proofs in a systematic way.

2.3 Module 3. Fields and Electromagnetism

This module is centred around vector calculus and its applications in physics. The module is a joint effort of Applied Mathematics and Applied Physics. In the project, students build electromagnetic devices from a historical perspective using modern materials. In addition, students gain knowledge about programming in a structured way, including the mathematics behind it, and about presenting mathematical topics.

The intended learning outcomes are: After successful completion of the module, the student:

- is able to use vector calculus in basic electromagnetic problems, both on a theoretical and a practical level;
- is able to write, design and analyze basic data and control structures, like conditional statements and loops, and provide a formal proof for the correctness of such constructs;
- is able to concisely convey mathematical concepts using presentation skills.

2.4 Module 4. Signals and Uncertainty

In this module, students get introduced to the mathematical foundation of probability theory and to frequency domain based tools to analyse signals as well as differential equations. The project allows the students to apply the gained knowledge in predicting some signals together with an uncertainty analysis. In addition, collaboration in relatively large groups is a focus point of the project.

The intended learning outcomes are: After successful completion of the module, the student:

- has knowledge of and insight into probability models, and is able to analyse them and interpret the outcomes;
- has knowledge of and insight into frequency domain analysis and ability to understand both signals and differential equations using frequency domain tools;
- is able to analyse large amounts of data, using, in particular, frequency domain tools and, working together, obtain predictions and understand the accuracy of those predictions.

2.5 Module 5. Statistics and Analysis

Mathematical Statistics and applying different statistical techniques in analysing real life data are what students learn in this module. Furthermore, the module broadens the knowledge of Analysis. Also, as part of the Reflection learning line, the students learn the cultural differences within and outside the field of mathematics.

The intended learning outcomes are: After successful completion of the module, the student:

- is able to derive mathematically the standard techniques for statistical data analysis and apply them properly;
- is able to work with infinite series of real numbers and functions, with metric spaces and with differentiability of functions in n -dimensional Euclidean spaces.

2.6 Module 6. Dynamical Systems

This module is about dynamic phenomena, their mathematical representations, computational aspects and applications in control problems. The subjects of the module are Ordinary Differential Equations (ODEs), Systems Theory, and Numerical Mathematics. The project focuses on modelling dynamical systems using the knowledge of the aforementioned subjects.

The intended learning outcomes are: After successful completion of the module, the student

- is able to analyse and control solutions of systems of ODEs;
- can model a physical system with ODEs;
- is able to use various numerical and analytical techniques to study the model.

2.7 Module 7. Discrete Structures and Efficient Algorithms

This module deals with discrete problems as encountered in various practical problems and solutions thereof using efficient algorithms. The module is a joint effort of Applied Mathematics and Technical Computer Science. Central in the module is a project about graph isomorphisms. The theoretical parts that are used and needed in this project are Algorithmic Discrete Mathematics, Language & Machines, and Algebra. The module also contains a training in Python.

The intended learning outcomes are: After successful completion of the module, the student:

- has knowledge of and insight into discrete structures as studied in mathematics and computer science;

- is able to apply the techniques to analyse these structures and to solve relevant problems through appropriate algorithms;
- is able to deduce the complexity and efficiency of such algorithms.

2.8 Module 8. Modelling and Analysis of Stochastic Processes

This module is about modelling situations with uncertainty using stochastic processes. The module is a joint effort of Applied Mathematics, Industrial Engineering and Management and Civil Engineering. The theoretical parts are closely connected (Stochastic Models being focused on applicability, while Markov Chains is more in depth), and Project Stochastic Models is closely related to Stochastic Models itself. The final multidisciplinary project serves the purpose of integrating all the acquired knowledge, working in a team of students from different disciplines.

The intended learning outcomes are: After successful completion of the module, the student:

- knows how to recognise when a situation or system should be modelled using stochastic models, and is able to select the most appropriate models;
- has knowledge of and insight into methods to analyse and/or simulate such models;
- is able to interpret the outcomes of the analysis or simulation.

2.9 Modules 11 and 12

The last semester of the programme contains the Reflections on Mathematical Research, Bachelor's Assignment, and the Electives. The Electives and Complex Function Theory broaden the students' horizon enabling them in making an informed choice of the subsequent master's programme. The course Reflection on Mathematical Research I prepares the student for the Bachelor's Assignment. Reflection on Mathematical Research II prepares the student for reflection on modelling, related to the Bachelor's Assignment. The student shows his/her skills of being able to integrate all of the gathered knowledge by executing the Bachelor's Assignment.

3 Specific characteristics of the programme

3.1 Language of tuition

English is the language of tuition - the examinations are administered in English. Exam and test questions have to be answered in English. Answers in any other language will be ignored and therefore not marked.

3.1.1 Transitional arrangement for cohorts 2015 and earlier

Students from cohort 2015 or earlier are entitled to language support.

3.2 Educational prerequisites

The following additional provisions apply with regard to the educational prerequisites in Article 2.1 of the general section of these Education and Examination Regulations.

Students with a first-year certificate from a technology programme at a university of applied sciences may be admitted to the Bachelor's programme in Applied Mathematics if they satisfy the following conditions:

- Colloquium doctum examinations for both Mathematics B and English
- Taking part in an Applied Mathematics matching activity. The programme's recommendation following the matching activity is binding.

3.3 Registration of results

In addition to Article 4.1 of the general section:

- Exemptions for examinations are indicated with the code 'EX', and they are assigned a numeric value of 6.0 for weighting purposes.

The student has the option of not requesting an exemption but taking the exam and possibly earn a higher mark.

- The exam results Pass (P) and Fail (F) have no numeric values.

3.4 Pass/Fail regulation

Students who meet the following requirements will pass the Final Examination of the Bachelor's programme in Applied Mathematics:

- a. The student has received an assessment for all study units of the Bachelor's curriculum;
- b. All study units have been completed with a grade of 5.0 or higher or pass;
- c. No more than one grade of 5.0 for the study units of the first year of the Bachelor's curriculum and no more than one grade of 5.0 for the study units of the second and third years combined. In case a study-unit has entered the curriculum through a transition rule, as given in Article 4.2, and its grade has been determined using a compensation-scheme, then it counts as a grade of 5.0;
- d. The grade for the Bachelor's Assignment is 6.0 or higher;
- e. The average of all numeric grades is 6.0 or higher. This is a weighted average based on the corresponding number of ECs per study unit.

In all other cases, the student will not pass the final examination.

3.5 Cum Laude (with distinction)

A student may pass the Bachelor's final examination with distinction (cum laude). As a guideline for determining whether to award a degree with distinction, all of the following conditions should be met:

- a. The student passes the Bachelor's final examination within four years of initial enrolment (performance requirement);
- b. All study units are completed with a passing grade. In case a study-unit has entered the curriculum through a transition rule, as given in Article 4.2, its grade must not have been determined using a compensation-scheme of 2019-20 or earlier;
- c. The average of all numeric grades (including EX) is 8.0 or higher. This is a weighted average based on the corresponding number of ECs per study unit. Results for study units outside the examination programme are not taken into account.
- d. No more than one study unit (including EX) may have a grade lower than 7.0;
- e. The grade of Bachelor's Assignment is an 8.5 or higher.

In exceptional cases and at the student's request, the Examination Board may award the distinction of cum laude if the student has met all requirements with the exception of the performance requirement, due to extenuating circumstances. These circumstances may involve delays recognised and provided for by the institution. It should be noted that the distinction of cum laude is never awarded automatically.

3.6 BSA procedure

The BSA rules are mentioned in section 1.2.f. The programme uses the BSA module in Osiris.

- At the conclusion of Module 1 and Module 2, interim recommendations will be given. It can be positive, neutral or negative;
- The final and binding recommendations (BSA) are issued based on the results of the study units of the first year.
- These official recommendations are issued by the Programme Board.
- The letters containing the binding recommendations are sent and signed digitally.

3.7 Electives and Minor

Students of the bachelor's programme in Applied Mathematics may choose elective courses as given in Module-11 of Table 3.

Minor profiles of Module-9 and Module-10 (Table 3) can be chosen from the approved minors listed on the minors website: www.utwente.nl/minor;

Students may propose an alternative minor composition to the Examination Board for approval. The proposal for the minor must meet the following conditions:

- The minor's academic level must be assured (to be assessed by the Examination Board).
- The minor's components are to be cohesive.

3.8 Secondary school teaching certificate

Students who pass the 30-EC minor *Leren Lesgeven*¹ receive, alongside a Bachelor's degree in Applied Mathematics, a mathematics teaching qualification for the initial years of senior general secondary

¹The minor *Leren Lesgeven* is only available in Dutch

education (HAVO), pre-university education (VWO), and the theoretical learning pathway of pre-vocational secondary education (VMBO) in the Netherlands.

3.9 Bachelor's Assignment

3.9.1 Assessment committee

- a. The committee consists of the student's supervisor(s) and an additional examiner, to be appointed by the coordinator of the bachelor's assignment.
- b. The additional examiners must belong to a research group different from the supervisor's research group.

3.9.2 Confidentiality

Reports of Bachelor's Assignments are in principle public documents. The Programme Board may deem a report to be confidential for a specific period based on a detailed request:

- a. The first supervisor must submit a request to the Programme Board prior to the start of the final assignment.
- b. The confidential report must be accessible/available to the committee responsible for assessing the Bachelor's Assignment, the Programme Board, and representatives of bodies that have a statutory duty of overseeing the quality of the assessment or the programme as a whole.
- c. The parties mentioned above are required to respect confidentiality with regard to the report.

3.10 Double Degree programmes

The programme offers two double degrees: Applied Mathematics combined with Applied Physics, and Applied Mathematics combined with Technical Computer Science. A tailored curriculum applies to students pursuing such a double degree.

All additional rules concerning the double degree AM-AP and AM-TCS are stipulated in Annex II and Annex III, respectively.

3.11 Evaluation of education

To monitor and to improve the quality of teaching, the AM BSc programme uses information about the students' learning and teachers' experiences. This information is obtained from:

- a. Internal evaluations
 - SEQ (Student Experience Questionnaire)
 - Panel discussions with students and teachers
 - Reflections by the module team or teacher
- b. External sources
 - National Student Survey (NSE)
 - National Alumni Survey
 - International Student Barometer

4 Transitional arrangements

Notwithstanding the current Education and Examination Regulations, the following transitional provisions apply for students who started the programme under a previous set of Education and Examination Regulations. Other necessary provisions are published on the BSc AM website.

4.1 Transitional arrangements for students of cohorts 2012 and earlier

Study units corresponding to Table 4, Table 5 and Table 6 in Appendix I are no longer offered. For the students who started the programme on September 1st 2012 or earlier, the following provisions apply.

4.1.1 Elective: Random Signals and Filtering

A student who started the programme on September 1, 2009 or earlier and who passed the course Random Signals and Systems (191571080) may use this course as the elective course Random Signals and Filtering (201200135).

4.1.2 Minor

Deviating from a 20 EC minor (Table 6), students are allowed to take a minor of a study load between 15 and 30 EC.

4.1.3 Bachelor's Assignment

The Bachelor's Assignment is now an individual assignment (of study-load 10 EC) combined with the courses Reflection on Mathematical Research I and II (5 EC + 2 EC). Students may submit a substantiated request to the Examination Board if they wish to deviate from it.

4.1.4 Discontinued courses

Students who still need to complete courses for which exams are no longer offered and for which there is no transitional arrangement provided, must contact the Study Advisor. An attempt will then be made to find study units from the current curriculum that cover the missing learning goals. The replacement has to be approved by the Examination Board.

4.1.5 Bachelor's final examination

Students will pass the Bachelor's final examination once they have satisfied the following conditions:

- All study units from the first year of the Bachelor's curriculum for cohorts 2012 and earlier (Table 4) have been completed with a grade of 5.0 or higher and no more than one 5.0;
- All study units from the second and third years of the Bachelor's curriculum for cohorts 2012 and earlier (Table 5 and Table 6) have been completed with a grade of 5.0 or higher and no more than one 5.0;
- The average of all grades is greater than or equal to 6.0;
- The grade for the Bachelor's Assignment is 6.0 or higher.

4.2 Transitional arrangements for students of cohort 2013 until 2019

For the students of cohort 2013 through 2019, the following hold.

4.2.1 Cohort 2017 and earlier

A student of cohort 2017 and earlier who completed the former module 4 Fields & Electromagnetism (consisting of the parts Vector Calculus, Electromagnetism, and Project of 5 EC each), and completed Presentation Skills separately, may skip the course Prooflab Revisited: Diversity in Cultures (202001351).

4.2.2 Cohort 2018

A student of cohort 2018, who has completed the 3-EC Presentation Skills within former module 3 Fields and Electromagnetism may skip the course Introduction to Programming (202001336).

4.2.3 Already completed modules

Modules as 15 EC study-units are no longer offered. Students from cohort 2013 through 2019 have to follow the current version of the Modules, consisting of several study-units totalling 15 EC. For these Students, however, the following provisions apply.

- M1 Students who passed the study-unit Structures and Models with code 201800135, 201700118 or 201300056 may use this course to replace all the study units of Module-01 of Table 1.
- M2 Students who passed the study-unit Mathematical Proof Techniques with code 201800136 or 201700140, or the study-unit Techniques for Mathematical Proofs (201300057) may use this course to replace all the study units of Module-02 of Table 1.
- M3 Students who passed the study-unit Fields and Electromagnetism with code 201800137, 201400535 or 201300183 may use this course to replace all the study units of Module-03 of Table 1.
- M4 Students who passed the study-unit Signals and Uncertainty with code 201800138 or 201300182 may use this course to replace all the study units of Module-04 of Table 1.
- M5 Students who passed the study-unit Statistics and Analysis with code 201800139 or 201400218 may use this course to replace all the study units of Module-05 of Table 2.
- M6 Students who passed the study-unit Dynamical Systems with code 201500103 or 201400222 may use this course to replace all the study units of Module-06 of Table 2.
- M7 Students who passed the study-unit Discrete Structures and Efficient Algorithms with code 201800141, 201700304, 201600270 or 201400433 may use this course to replace all the study units of Module-07 of Table 2.
- M8 Students who passed the study-unit Modelling and Analysis of Stochastic Processes for Math (201400434) may use this course to replace all the study units of Module-08 of Table 2.
- M11 Students who passed the study-unit with course-code 201500379 and name either Bachelor's Assignment prep or Bachelor's Assignment & Electives may use this course to replace all the study units of Module-11 of Table 3.
- M12 Students who passed the study-unit with course-code 201500380 and name either Bachelor's Assignment or Finalising Thesis - Bachelor's Assignment may use this course to replace all the study units of Module-12 of Table 3.

I Bachelor's programme AM

1 Curriculum AM

Table 1: The first academic year

Study Units		Study load (EC)	Teaching method	Form of assessment
Code	Name			
Module-01: Structures and Models				
202001214	Calculus I & Prooflab I	4 EC	Lec + Tu	W + O
202001325	Linear Structures I	6 EC	Lec + Tu	W
202001326	Project Programming, Modelling and Cultural Differences	5 EC	Lec + P	Pj + P
Module-02: Mathematical Proof Techniques				
202001223	Calculus II	4 EC	Lec + Tu	W
202001329	Analysis I	3 EC	Lec + Tu	W
202001330	Linear Structures II	3 EC	Lec + Tu	W
202001331	Linear Optimization	3 EC	Lec + Tu	W
202001332	Project Prooflab II	2 EC	SS + Tu	O
Module-03: Fields and Electromagnetism				
202001229	Vector Calculus	2 EC	Lec + Tu	W
202001335	Electromagnetics	5 EC	Lec + Tu	W
202001336	Introduction to Programming	1 EC	PR	P
202001337	Analytical Programming	1 EC	PR	P
202001338	Prooflab III	1 EC	Lec + Tu	O
202001339	Presenting a Mathematical Subject	2 EC	PR	Ps
202001340	Project Fields and Electromagnetism	3 EC	Pj	P
Module-04: Signals and Uncertainty				
202001343	Signals & Transforms	5 EC	Lec + Tu	W
202001344	Probability Theory	5 EC	Lec + Tu	W
202001345	Project Signals and Uncertainty	5 EC	Lec + PR	Pj + P
Entire academic year		60 EC		

Table 2: The second academic year

Study Units		Study load (EC)	Teaching method	Form of assessment
Code	Name			
Module-05: Statistics and Analysis				
202001348	Mathematical Statistics	6 EC	Lec + Tu	W
202001349	Project Statistics	2 EC	Lec + PR	Pr
202001350	Analysis II	5 EC	Lec + Tu	W
202001351	Prooflab Revisited: Diversity in Cultures	2 EC	Lec	Pj + Ps
Module-06: Dynamical Systems				
202001354	Ordinary Differential Equations	4 EC	Lec + Tu	W
202001355	Systems Theory	4 EC	Lec + Tu	W
202001356	Numerical Mathematics	4 EC	Lec + PR	W + P
202001357	Project Dynamical Systems	3 EC	PR	Pj
Module-07: Discrete Structures & Efficient Algorithms				
202001360	Algorithmic Discrete Mathematics	5 EC	Lec + Tu	W
202001361	Languages & Machines	3.5 EC	Lec + Tu	W
202001362	Algebra	3.5 EC	Lec + Tu	W
202001363	Implementation Project on Graph Isomorphism	3 EC	PR	Pj
Module-08: Modelling & Analysis of Stochastic Processes for Math				
202001366	Stochastic Models	5 EC	Lec + Tu	W
202001367	Project Stochastic Models	1.5 EC	PR	Pj
202001368	Markov Chains	2.5 EC	Lec + Tu	W
202001369	Project Stochastic Simulation	4 EC	PR	Pj + P
202001370	Multidisciplinary Project	2 EC	PR	Pj
Entire academic year		60 EC		

Table 3: The third academic year

Study Units		Study load (EC)	Teaching method	Form of assessment
Code	Name			
Minor profile M9 + M10 ^a		30 EC		
Module-11: Electives & Preparation Bachelor's Thesis				
202001373	Reflection on Mathematical Research I ^b	5 EC	Lec	O
Electives: <i>Two of the following four courses must be included in the students' exam programme:</i>				
191520751	Graph Theory	5 EC	Lec + Tu	W
201500372	Mathematical optimization	5 EC	Lec + Tu	W
201700034	Introduction to PDE	5 EC	Lec + Tu	W
202001377	Simultaneous Statistical Inference	5 EC	Lec + Tu	W
Module-12: Finalising Bachelor's Thesis				
201500405	Complex Function Theory	3 EC	Lec + Tu	W
202001380	Reflection on Mathematical Research II ^c	2 EC	Lec	O
202001379	Bachelor's Assignment ^c	10 EC	PR	P + Ps
Entire academic year		60 EC		

^a Sequence requirement 1: students may only participate in these study units once they have gained at least 75 EC.

^b Sequence requirement 2: students may only participate in this study unit once they have passed all the study units of the first eight modules except possibly at most 5 EC in Module-07 and at most 5 EC in Module-08.

^c Sequence requirement 3: students may only participate in these study units once they have passed the study unit *Reflection on Mathematical Research I (202001373)*.

2 Curriculum AM for cohorts 2012 and earlier

 Table 4: The first academic year for cohorts starting prior to September 1st 2013

Study Units		Study load (EC)	Form of assessment
Code	Name		
201100103	Calculus	5 EC	W + P
201100104	Vector Calculus	4 EC	W + P
201100100	Linear Structures I	5 EC	W
201100101	Linear Structures II	5 EC	W
191521611	Discrete Mathematics I	4 EC	W
191521631	Discrete Mathematics II	4 EC	W
191530370	Probability	5 EC	W
201100102	Analysis I	5 EC	W
191560123	Ordinary Differential Equations	4 EC	W
191580751	Deterministic Models in the OR	4 EC	W
191521501	Mathematical Modelling I	2 EC	Pj + O
191540160	Algorithms and Programming I	2 EC	P
194113000	Great minds in the history of science	3 EC	W or O
<i>Elective:</i>		5 EC	
191403021	Dynamics		W
191580612	Introduction to Mathematical Economics		W + P
Entire academic year		60 EC	

 Table 5: The second academic year for cohorts starting prior to September 1st 2013

Study Units		Study load (EC)	Teaching method	Form of assessment
Code	Name			
201100109	Signals and Tranforms	5 EC	Lec + Tu + PR	W
191515603	Intr. to investment theory	5 EC	Lec + Tu	W
191530382	Mathematical Statistics	5 EC	Lec + Tu	W
191530651	Markov Chains	5 EC	COL	W
191540270	Numerical Math. and Modelling	4 EC	Lec + Tu + PR	W + P
191505001	Presenting a mathematical topic	2 EC	Ps	Pr
191540170	Algorithms and Programming II	3 EC	COL + PR	P
191560561	Intro to mathematical systems theory	5 EC	Lec + Tu + PR	W + P
191505271	Mathematical Modelling II	5 EC	Lec + PR	Pj + O
191521400	Analysis II	5 EC	Lec + Tu	W
191511410	Algebra and security	5 EC	Lec + Tu	W
<i>Elective:</i>		5 EC		
191403033	Dyn. Modelling and Simulation		Lec + PR	W + P
191530881	Stochastic models in OM		Lec + Tu	W
<i>Elective:</i>		5 EC		
191403051	Electricity and Magnetism		Lec + Tu	W
192111801	Basic models in computer science		Lec + Tu + PR	W + P
Entire academic year		60 EC		

Table 6: The third academic year for cohorts starting prior to September 1st 2013

Study Units		Study load (EC)	Teaching method	Form of assessment
Code	Name			
191530821	Stochastic Simulation Project	5 EC	Lec	P + Or
<i>Elective:</i>		5 EC		
191561620	Optimal control		Lec	W
201200135	Random Signals and Filtering		Lec	W
<i>Elective</i>		5 EC		
191520751	Graph Theory		Lec + Tu	W
191550105	Theory of Partial Differential Equations		Lec + Tu	W
191530440	Regression and ANOVA	5 EC	Lec + PR	W + P
191520252	Complex Function Theory	5 EC	Lec + Tu	W
191580251	Mathematical Programming	5 EC	Lec + Tu + PR	W or Or
191599220	Bachelor's Assignment	10 EC		Pj + O
Minor		20 EC		
Entire academic year		60 EC		

Requirements for the Bachelor's Assignment:

A student may only participate in this study unit once he has gained his first-year certificate and at least 60 EC from the second and third years of the Bachelor's curriculum, excluding the minor. Furthermore, the student must have completed the subjects listed as prerequisites for the relevant assignments, and he must have passed Mathematical Modelling II.

Requirements for the Minor:

At a specific date, to be announced in advance, the student must have gained at least 80 EC. The credit total includes the results of examinations from the fourth quarter (or directly subsequent to the fourth quarter), whereas results of examinations during the summer break will not be included. The Examination Board may grant dispensation from the 80-credit requirement in individual cases.

II Annex to the education and examination regulations for the double degree programme Applied Mathematics and Applied Physics

This annex describes the rules regarding the double degree programme Bachelor's in Applied Mathematics and Bachelor's in Applied Physics. The studying requirements are based on the Rules of the Examination Board AM and the AP Examination Board².

The annex contains the following paragraphs:

1. Study programme AM-AP
2. Transitional arrangements
3. Safety
4. Minor and Bachelor's Assignment
5. Pass/Fail Regulations
6. Cum Laude
7. Binding Recommendation (BSA)

²In the event of a change to the double degree programme as stated in Article 1 of this annex, individual agreements will be made with the students by the examination committees of both programmes

1 Study programme AM-AP

The tailored programme for the double degree Bachelor's in Applied Mathematics and Bachelor's in Applied Physics is summarised in Tables 7, 8 and 9 below:

Table 7: The first academic year for the double degree programme AM-AP

Quartile	Applied Mathematics components		Applied Physics components	
	Q1 (21 EC)	Linear Structures I Calculus I + Prooflab I Workshop Intercultural Awareness	6 EC 4 EC	Dynamics & Relativity Experimentation 1 Programming & Data processing 1 Project Dynamics & Relativity
Q2 (20 EC)	Calculus II Linear Structures II Analysis I Linear Optimization Project Prooflab II	4 EC 3 EC 3 EC 3 EC 2 EC	Thermodynamics Programming & Data processing 2	4 EC 1 EC
Q3 (18 EC)	Vector Calculus Presenting a Mathematical Subject Prooflab III	2 EC 2 EC 1 EC	Electromagnetism Instrumentation Project Electromagnetism and Measurements Analytical programming	5 EC 4 EC 3 EC 1 EC
Q4 (20 EC)	Probability Theory Signals and Transforms Project Signals and Uncertainty	5 EC 5 EC 5 EC	Quantum Matter	5 EC
Entire academic year:			79 EC	

Table 8: The second academic year for the double degree programme AM-AP

Quartile	Applied Mathematics components		Applied Physics components	
	Q5 (20.5 EC)	Mathematical Statistics Analysis II Prooflab Revisited	6 EC 5 EC 2 EC	Models Project Signals, Models and Systems
Q6 (21 EC)	Ordinary Differential Equations Systems Theory Numerical Mathematics Project Dynamical Systems	4 EC 4 EC 4 EC 3 EC	Quantum Mechanics	6 EC
Q7 (21 EC)	Discrete Mathematics & Algebra	6 EC	Solid State Physics Statistical Physics PDE	7 EC 6 EC 2 EC
Q8 (19 EC)	Markov Chains	4 EC	Physics of Fluids Electrodynamics Numerical Methods for PDE	7 EC 6 EC 2 EC
Entire academic year:			81.5 EC	

2 Transitional arrangements

For students who started the programme earlier than September 1st 2020, many study units, or parts thereof, as they existed at the time the student's enrolment, may no longer be offered. The curriculum, as given in Article 1 of this annex, serves as the basis for establishing the results of the bachelor's final examination.

Curricula of previous years and accompanying transitional arrangements are published on the Applied Mathematics website: <https://www.utwente.nl/en/bam/bachelors-curriculum/>.

Whenever required, the programme coordinator BSc AM will set up an alternative curriculum, in consultation with the examination board.

Table 9: The third academic year for the double degree programme AM-AP

Quartile	Applied Mathematics components	Applied Physics components
Q9 (15 EC)	Minor https://www.utwente.nl/en/education/electives/minor/	
Q10 (17 EC)	Electives selection (10 EC)	
		Optics 7 EC
Q11 (15 EC)	Reflection on Mathematical Research I (5 EC)	
	10 EC of Electives:	
	Graph Theory 5 EC	Computational Physics 2.5/5 EC
	Simultaneous Statistical Inference 5 EC	Physical Materials Science 5 EC
	Mathematical Optimization 5 EC	Machine Learning 3/5 EC
		Remote Control of Experiments 2.5/5 EC
		Soft Matter Physics 5 EC
		Technical Optics 5 EC
Q12 (20 EC)	Complex Function Theory Reflection on Mathematical Research II Bachelor's Assignment	
		3 EC 2 EC 15 EC
Entire academic year:		67 EC

3 Safety

Safety requirements are compulsory while working in a laboratory. The student is obliged to follow these rules.

4 Minor and Bachelor's Assignment

- The minor consists of 15 EC (a quartile); The permitted minor offer is stated on the minor website: <https://www.utwente.nl/en/education/electives/minor/>
- Before starting a minor, the student is expected to meet the prior knowledge requirements, as described in the minor's course catalogue.
- Before starting a minor, the student must have obtained at least 100 EC from the B1 and B2 programs of the Bachelor's programme.
- The student can only register for the Bachelor's Assignment examination component if he has fully passed the first year programme and if he obtained a minimum of 60 EC from the second and third year programme excluding the minor.
- After the advice of the Examination Board, at the request of the student, the Programme Board may grant exemption from the condition referred in Paragraph a., Paragraph b., Paragraph c. and Paragraph d. of this article. This may cause a delay in the study progress.

5 Pass/fail regulations

- Students will pass the Bachelor's final degree audit for the AM and the AP programme if all study units have a passing grade.
- Otherwise, the student will not pass the final degree audit for AM and TCS and will not receive the Bachelor's degrees.

6 Cum Laude

- A student may pass the Bachelor's final degree audit for AP and AM with distinction (cum laude) for AM upon meeting the following requirements:

- a. The student passes the Bachelor's final degree audit for AP and AM within four years of initial enrolment (performance requirement).
 - b. All study units are completed with a passing grade.
 - c. The average of all numeric grades (including EX) is 8.0 or higher. This is a weighted average based on the corresponding number of ECs per study unit. Results for study units outside the examination programme are not taken into account.
 - d. No more than one study unit may have a grade lower than 7.0.
 - e. The grade for the Bachelor's Assignment is 8.5 or higher.
2. In exceptional cases and at the student's request, the Examination Board may award the distinction of cum laude if the student has met all requirements with the exception of the performance requirement, due to extenuating circumstances. These circumstances may involve delays recognised and provided for by the institution.
 3. Cum laude for one programme does not automatically imply cum laude for another programme of a double degree.

7 Binding Recommendation (BSA)

A student pursuing the double degree programme, as stipulated in Article 1 of this annex, will receive a positive recommendation on continuation of the study programme in Applied Mathematics upon satisfying the following conditions (Article 6.3, Guideline and Model EER):

1. Successful completion of at least 45 credits from the first year's study units.
2. Successful completion of at least two of the following study units: Linear Structures I, Linear Structures II, and Analysis I.
3. A maximum of 15 EC incomplete from the total ECs associated with the first year's AM-study units of the double degree programme. See Article 1 for the AM-study units.

III Annex to the education and examination regulations for the double degree programme Applied Mathematics and Technical Computer Science

This annex describes the rules regarding the double degree programme Bachelor's in Applied Mathematics and Bachelor's in Technical Computer Science.

The annex contains the following paragraphs:

1. Study programme AM-TCS
2. Extra requirements for double degree AM-TCS
3. Elective section
4. Sequence requirements
5. Teaching evaluation
6. Pass/Fail Regulations
7. Cum Laude
8. Binding Recommendation (BSA)
9. Transitional arrangements

1 Study programme AM-TCS

The tailored programme for the double degree Bachelor's in Applied Mathematics and Bachelor's in Technical Computer Science is summarised in Tables 10, 11 and 12 below, where the column Division indicates the programme a course belongs to, which is relevant for Articles 6.1.b and 8.3 below.

Table 10: The first academic year for the double degree programme AM-TCS

Course code	Course name	Q	EC	Division	Prerequisites
202001325	Linear Structures I	1A	6	AM	
202001190	Introduction to Mathematics + Calculus 1A	1A	4	AM/TCS	
202001022	Pearls of Computer Science Core	1A	11	TCS	
201500112	Programming Theory & Project	1B	8	TCS	
202001197	Calculus 1B for CS	1B	3	AM/TCS	
202001329	Analysis I	1B	3	AM	
202001332	Project: Prooflab II	1B	2	AM	
202001330	Linear Structures II	1B	3	AM	202001325
202001026	Network Systems Core	2A	12	TCS	
202001231	Vector Calculus EE	2A	3	AM	
202001339	Presenting a Mathematical Subject	2A	2	AM	
202001343	Signals & Transforms	2B	5	AM	
202001344	Probability Theory AM	2B	5	AM/TCS	
202001028	Data & Information Core	2B	12	TCS	201500112
Entire academic year:			79 EC		

Table 11: The second academic year for the double degree programme AM-TCS

Course code	Course name	Q	EC	Division	Prerequisites
202001348	Mathematical Statistics	1A	6	AM/TCS	202001344
202001349	Project Statistics	1A	2	AM	
202001030	Computer Systems Core for CS	1A	12	TCS	
202001355	Systems Theory	1B	4	AM	
202001354	Ordinary Differential Equations	1B	4	AM	202001197
202001032	Intelligent Interaction Design Core for CS/BIT	1B	12	TCS	
201600061	Introduction Mathematical Modelling	2A	1	AM	
202001360	Algorithmic Discrete Mathematics	2A	5	AM/TCS	
202001361	Languages & Machines	2A	3.5	AM/TCS	
202001362	Algebra	2A	3.5	AM/TCS	
202001363	Implementation Project on Graph Isomorphism	2A	3	AM/TCS	202001030
202001366	Stochastic Models	2B	5	AM	
202001367	Project: Stochastic Models	2B	1.5	AM	
202001368	Markov Chains	2B	2.5	AM	
202001369	Project: Stochastic Simulation	2B	4	AM	
202001370	Multidisciplinary Project	2B	2	AM	
202001345	Project Signals & Uncertainty	2B	5	AM	
Entire academic year:			76 EC		

2 Extra requirements for double degree AM-TCS

The prospective student enrolled to the double degree programme AM-TCS must attend an extra intake/conversation to determine whether the student is motivated, ambitious and possesses the skills needed to succeed in the double degree programme.

Table 12: The third academic year for the double degree programme AM-TCS

Course code	Course name	Q	EC	Division	Prerequisites
202001350	Analysis II	1A	5	AM	
201400365	Discrete Mathematics (M5)	1A	3	TCS	
202001373	Reflection on Mathematical Research I	1A	5	AM	
	Minor selection	1B	15	AM/TCS	Entire first year
202001049	Design Project Core	2A	15	TCS	All components of 8 quartiles, including all first year components
	Elective AM selection	2A	5	AM	
202001384	Bachelor's Assignment Double Degree	2B	15	AM/TCS	
202001380	Reflection on Mathematical Research II	2B	2	AM	
201500405	Complex Function Theory	2B	3	AM	
Entire academic year:			68 EC		

3 Elective section

- The Elective section consists of one elective course and one minor module;
- The elective course must be chosen from:
 - 191520751 Graph Theory
 - 201500372 Mathematical Optimization
 - 201700034 Introduction to the Theory of PDE
 - 202001377 Simultaneous Statistical Inference
- Available minors are listed on the minors site: www.utwente.nl/en/education/electives/minor/;
- For an individual minor approval of the AM examination board is needed before the minor starts.

4 Sequence requirements

- A student may enrol in the minor through the Minor Bureau once he/she has completed all first year study units upon registration in Osiris;
- A student may only enrol in the Bachelor's Assignment once he/she has passed at least eight quartiles of the complete programme. These eight quartiles include all first-year study units.

5 Teaching evaluation

- All study units of the programme are parts of some modules. The online Student Experience Questionnaire (SEQ) is used for evaluation purposes at the conclusion of modules;
- At least once a year there will be a panel of discussion with students participating in the double degree;
- Additionally, there will be an extra panel discussion after the first semester of the first year.

6 Pass/fail regulations

- Students who meet the following requirements will pass the Bachelor's final degree audit for the AM and the TCS programme:
 - a The student has received an assessment for all study units of the double degree programme;
 - b There is no more than one grade of 5.0 for the AM or AM/TCS study units of the first year of the AM-TCS curriculum. The grades are 6.0 or higher or pass for all other study units.

- c The grade for the Bachelor's Assignment is 6.0 or higher.
 - d The average of all grades is 6.0 or higher without taking into account the pass/fail grades. This is a weighted average based on the corresponding number of ECs per study unit.
2. In all other cases not specified under paragraph 1, the student will not pass the final degree audit for AM and TCS and will not receive the Bachelor's degrees.

7 Cum Laude

1. A student may pass the Bachelor's final degree audit for TCS and AM with distinction (cum laude) for AM upon meeting the following requirements:
 - a. The student passes the Bachelor's final degree audit for TCS and AM within four years of initial enrolment (performance requirement).
 - b. All study units are completed with a passing grade.
 - c. The average of all numeric grades (including EX) is 8.0 or higher. This is a weighted average based on the corresponding number of ECs per study unit. Results for study units outside the examination programme are not taken into account.
 - d. No more than one study unit may have a grade lower than 7.0.
 - e. The grade for the Bachelor's Assignment is 8.5 or higher.
2. In exceptional cases and at the student's request, the Examination Board may award the distinction of cum laude if the student has met all requirements with the exception of the performance requirement, due to extenuating circumstances. These circumstances may involve delays recognised and provided for by the institution.
3. Cum laude for one programme does not automatically imply cum laude for another programme of a double degree.

8 Binding Recommendation (BSA)

A student pursuing the double degree programme, as stipulated in Article 1 of this annex, will receive a positive recommendation on continuation of the study programme in Applied Mathematics upon satisfying the following conditions (Article 6.3, Guideline and Model EER):

1. Successful completion of at least 45 credits from the first year's study units.
2. Successful completion of at least two of the following study units: Linear Structures I, Linear Structures II, and Analysis I.
3. A maximum of 15 EC incomplete from the total ECs associated with AM or AM/TCS study units of the first year's programme (see Table 10 in Article 1).

9 Transitional arrangements

For students who started the programme earlier than September 1st 2020, many study units, or parts thereof, as they existed at the time the student's enrolment, may no longer be offered. The curriculum, as given in Article 1 of this annex, serves as the basis for establishing the results of the bachelor's final examination.

Curricula of previous years and accompanying transitional arrangements are published on the Applied Mathematics website: <https://www.utwente.nl/en/bam/bachelors-curriculum/>. In case of questions, contact the programme coordinator BSc AM.