

Faculty of Science and Technology

Programme-specific appendix to the programme section of the students' charter, including the education and examination regulations of the

Advanced Technology

Bachelor's Programme

as of 1 September 2021

(Article 7.13 and 7.59 WHW)

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Preamble

1. The rules in this appendix apply to the full-time Advanced Technology bachelor's programme.
2. Unless otherwise specified, reference to 'the (study) programme', 'the programme committee' or 'the examination board', refers to the Advanced Technology bachelor's programme, the programme committee or examination board of the Advanced Technology bachelor's programme, respectively
3. Together with the general section of the Education and Examination Regulations (TNW/21.678/jg) this appendix forms the programme section of the students' charter for the bachelor's programme Advanced Technology of the faculty of Science and Technology at the University of Twente.
4. The examination board has set rules for the purpose of the conduction of its tasks and prerogatives (Article 7.12 WHW) in the "Rules and regulations of the examination board of Advanced Technology".

Reference: TNW/21.687/bs/jg

Date: 8 July 2021

Article 1a Definitions

In addition to the definitions as stated in Article 1.2 of the general section of the Education and Examination Regulations, 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, such as:

1. performing a literary study, performing an assignment, creating a test design, writing a thesis, article or position paper or preparing a public presentation,
2. completing a design or research project, performing tests and experiments, participating in practicals, practising skills,
3. performing an internship, participating in field work or an excursion,
4. participating in other educational activities that are deemed necessary, focused on achieving the intended skills, for example, focused practice of clinical skills in a skills lab specifically equipped for that purpose.

Article 1b Programme objectives

The international bachelor's programme Advanced Technology aims to impart knowledge, skills, and insight to the graduate in the field of Science and Technology by means of a broad-based and exploratory science and engineering programme. The graduate is able to apply knowledge, skills and insights in a global context to develop new technologies that are both economically and socially viable. The graduate is also able to make a well-considered choice for one of the University of Twente master's programmes or a master's programme at another university in the Netherlands or abroad. The programme offers students who wish to enter the labour market after acquiring their bachelor's degree the opportunity to gear their third and final year programme to that purpose.

Article 2 Admission to master's programmes

The programme does not have its own master's programme. However, the third year of the bachelor's programme is designed to let students participate in study units in order to become admissible to the master's programme of their choice. Students need to approach the admission committee of the master's programme of their choice to agree on the study units that are required to become admissible. Furthermore, the selected study units need to meet the requirements of the examination board. Therefore, a course list needs to be submitted to the examination board. The conditions for this course list are specified in Article 13 of the Rules and Regulations of the examination board of Advanced Technology.

Article 3 Language

1. The language used in the study units of the programme is English. This applies to both teaching and examination.
2. Articles 3.3, 4.1 paragraph 19 and 4.4 paragraph 2c of the general section apply *mutatis mutandis*¹ to this article.
3. Teachers at UT are required to demonstrate the language level requirement as stipulated in the UT Language policy. If it is established that a teacher's language proficiency is not up to standard the programme board will urgently appeal for the involved staff member to improve his/her English proficiency.

Article 4 Programme intended learning outcomes

The following learning outcomes need to be obtained to be able to graduate the programme.

1. Domain knowledge & skills

The student can apply basic theoretical concepts, important methods and techniques in the fields listed below and has skills to increase and develop this through study:

1. Elements from mechanical engineering, electrical engineering, physics, chemistry (Newtonian dynamics, Thermodynamics, Material Science, Mechatronic systems, Electromagnetism, System Engineering);
2. Mathematics and programming;
3. Innovation, entrepreneurship and development/trends of technology on a local and a global level;
4. Analysis of impact of technology on a local and a global level;
5. Experimentation in the technical sciences.

2. Research & Design

- a. The student is able to apply the scientific research method.
- b. The student is able to apply the scientific design methods and is able to divide a design problem in different sub problems.

3. Organize

The student is able to organize work both independently and as a member of an international project group. In project work, the student is able to define separate problems for team members, to assure the interconnection between these entities and to implement a timeline.

¹ *Mutatis mutandis* is a Latin term commonly used in legal text. It is used when comparing two or more things to say that although changes will be necessary in order to take account of different situations, the basic point remains the same.

4. Report & Presentation

The student is capable of communicating on technical-scientific issues both in writing and orally in a clear, concise and professional manner.

5. Problem solving

The student is capable of analysing, modelling, interpreting and solving technical-scientific problems with an academic approach, i.e., formulating a problem definition, selecting scientific information and processing it, conducting research and critically evaluating the subsequent results, and of formulating conclusions.

6. Personal Development

The student is able to recognize personal strengths and weaknesses as well as personal interests that are necessary to opt for either a follow-on study, in particular an academic master's programme which requires a high level of autonomy or a job in the labour market.

Article 5 The bachelor's final examination

The final examination of the programme consists of the programmes of the first, second and third course year (B1, B2 and B3). The core programme consists of the B1- and B2-programme plus 30 EC of the B3 programme (total 150 EC) of the AT curriculum.

The teaching methods used in the programme are lectures, tutorials, lab work, assignments, project work, presentations and problem based learning.

Subjects are tested in the form of written exams, oral exams, reports, presentations and posters.

The module intended learning outcomes of each module of the AT programme can be found in the OSIRIS Course Catalogue. Also further information on the contents and subjects is available in the OSIRIS Course Catalogue.

The B1 programme has a study load of 60 EC and consists of 4 modules, with the study units defined below:

Module	Name	Course code	Study units	Category ²	EC
1	Mechanics	202001212	Calculus 1	A	4.0
		202000611	Mechanics	B	4.5
		202000612	Laboratory Practice and Programming Skills 1	C	3.5
		202000613	Project Mechanics	D	3.0
2	Thermodynamics	202001216	Calculus 2	A	3.0
		202000615	Thermodynamics	B	4.5
		202000616	Laboratory Practice and Programming Skills 2	C	3.5
		202000617	Project Thermodynamics	D	4.0
3	Fundamentals of Materials	202001230	Vector Calculus	A	3.0
		202000619	Structure and Properties of Materials (incl. Project)	B	6.0
		202000620	Quantum Matter	E	3.0
		202000621	Organic Chemistry	E	3.0
4	Dynamics	202001208	Linear Algebra	A	3.0
		202000623	Dynamical Systems	B	4.0
		202000624	Basic Electronics and Instrumentation	C	4.0
		202000625	Project Accelerometer	D	4.0
	Total B1				60

For students of cohorts 2019 and before, transitional arrangements (as referred to in Article 6) are in effect.

² Categories are defined for the determination of the binding recommendation on continuation of studies as stated in Article 11, paragraph 1b.

The B2 programme has a study load of 60 EC. The second module of the second-year (module 6) consists of a one out of four choice. The choices 6a, 6b and 6c consist of 15 EC. Choice 6d has a different structure. AT students cannot do the entire Software Systems module as there is overlap in the Mathematics part. Therefore, AT students take a reduced version of the module (12 EC) and take an elective instead.

The modules of the B2 programme with the study units defined below are:

Module	Name	Course code	Content / Study units	EC
5	Signals, Models and Systems	202000627	Signals	4.0
		202000628	Models	4.0
		202000693	Project SMS	3.0
			<i>elective 1 of 4</i>	
		202000695	Engineering Solid Mechanics	4.0
		202000630	Programming in Engineering	4.0
		202000694	Classical Mechanics	4.0
		202000644	Electronics	4.0
6a	Materials Science and Engineering	202000634	Advanced Materials	3.5
		202000635	Fundamentals of Solids	3.5
		202000636	Chemistry and Technology of Materials	4.0
			<i>elective 1 of 2</i>	
		202000637	Semiconductor Devices	4.0
		202000638	Physical Chemistry of Interfaces	4.0
6b	Physical Transport (from BA-Chemical Science and Engineering (CSE))	202000737	Physical Transport Phenomena	7.5
		202000738	Project Transport Phenomena	4.0
		202000739	Numerical Methods	3.5
6c	Systems and Control (from BA-Electrical Engineering (EE))	202001141	Engineering System Dynamics	5.0
		202001140	Control Engineering	5.0
		202001142	Project S&C	5.0
6d	Software Systems (from BA-Technical Computer Science (TCS))	202001024	- Design Theory - Programming Theory - Design Project - Programming Project	2.0 4.0 2.0 4.0
				12.0
		201400385	- Introduction to Mathematical Analysis	3.0
7	Fields and Waves	202000653	Electro- and Magnetostatics and Dynamics	9.0
		202000654	Project Antenna	3.0
		202000652	Finite Element Methods	3.0
8	Business & Society	202000656	Entrepreneurship and Innovation Management	6.0
		202000657	Data, Statistics and Probability for Engineers	5.0
		202000658	Socio-technical Futures	4.0
	Total B2			60

For students of cohorts 2018 and before, transitional arrangements (as referred to in Article 6) are in effect.

The B3 programme consists of a compulsory and an elective part and has a study load of 60 EC. The study units of the B3 programme should be chosen in such a way that admission to one of the master's programmes referred to in Article 2 of this appendix is obtained. The admission requirements for a selection of master's programmes are available on the AT website. The selected subjects in the third-year programme require the approval of the examination board. The B3 programme consists of an elective space, a design project, the preparation bachelor assignment, and the bachelor assignment (module 12).

The B3 programme is defined below:

Module	Course code / Name	Content / Study units	EC	
-	202000668	Preparation Bachelor Assignment AT ³	4.0	45.0
-		Design Project ⁴		
9,10,11	Elective space			
12	202000670 Bachelor Assignment	- Scientific/Design - Communication (report & presentation) - Work process	6.0 4.5 4.5	15.0
	Total B3		60	

The programme is responsible for a number of third-year elective modules. Advanced Technology students can choose these modules in the elective space in their third-year programme. These modules are also open to students from other educational programmes.

Each module consists of 15 EC with the study units defined below:

Module	Name	Course code	Study units	EC
9	Condensed Matter Physics for AT	202000660	Introduction Solid State Physics	5.0
		202000661	Statistical Physics	5.0
		202000662	Optics	2.5
		202000663	Molecular Structure and Spectroscopy	2.5
11	Micro System Design and Realization	202000665	Micro Electro- Mechanical Systems Design	5.0
		202000666	Transducers	3.0
		202000667	Design verification with FEM	3.0
		202000668	Preparation Bachelor Assignment AT	4.0

The modules Fundamentals of Materials (Module 3), Signals Models & Systems (Module 5), Materials Science & Engineering (Module 6a), and Condensed Matter Physics (Module 9) are available to students from other educational programmes as join-in minor modules. The prerequisite knowledge for these modules can be found in the OSIRIS Course Catalogue.

Article 6 Period of validity of parts of study units

1. The rules of validity of parts of study units of module 6b Physical Transport are determined by the Chemical Science and Engineering programme. The rules of validity of parts of study units of module 6b Systems and Control are determined by the Electrical Engineering programme. The rules of validity of parts of study units of module 6d Software Systems are determined by the Technical Computer Science programme.
2. For the elective modules that can be taken in the third year, the rules of validity of parts of study units of the programme that offers the elective module apply.
3. In all other situations, the examination board may grant an extension of the validity of parts of study units, at the request of the student, on an individual basis and depending on the circumstances.

³ The course should be taken in the quartile before the start of the bachelor's assignment.

⁴ A design project should be part of the elective space in the third year. If a design project was part of the elective space in the second year this suffices.

Article 7 Transitional arrangements

1. If the study programme in Article 5 of this appendix is changed, or if one of the articles included in the general section of the Education and Examination Regulations or programme-specific appendix changes, the programme board will stipulate and publish transitional arrangements.
2. The transitional arrangements have to comply with the conditions set in Article 8.4 of the general section of the Education and Examination Regulations.
3. The transitional arrangements are valid for the year of publication and are updated every academic year.
4. The transitional arrangements are published on the programme's website.

Article 8 Safety

Before being allowed to work in a laboratory space, students are required to take note of the safety rules⁵ and to adhere to them.

Article 9 Sequence of study units

1. Before starting a study unit, students must meet the prior knowledge requirements of that study unit.
 - a. Students may only take the study units of the (Module 6a) Materials Science and Engineering module when the study units of the (Module 3) Fundamentals of Materials module have been passed.
 - b. Students may only take the study units of (Module 6c) Systems and Control for AT module when the study units of the (Module 1) Mechanics, (Module 4) Dynamics, and (Module 5) Signals, Models & Systems modules have been passed.
 - c. Students may only take the study units of the (Module 6b) Physical Transport module when the study units of the (Module 2) Thermodynamics module and the Vector Calculus study unit of the (Module 3) Fundamentals of Materials module have been passed.
2. Students may only start with B2 study units when the B1 study units of the same quarter have been completed.
3. Students may only start with B3 study units when the B2 study units of the same quarter have been completed.
4. Students may only start the bachelor assignment after completion of the core programme (the core programme consists of the B1- and B2-programme plus 30 EC of the B3 programme), total 150 EC. Students can submit a request to the examination board to deviate from this requirement.
5. The programme board is authorised to deviate from the requirements set in paragraph 9.1, 9.2 and 9.3 of this Article, in the event that strict adherence would result in an unreasonable delay in study progress. Students can submit a request for this to the programme board.

Article 10 Student guidance

In addition to paragraph 6 of the general section of the Education and Examination Regulations (TNW/21.678/jg)

1. The study adviser is responsible for individually advising students on all aspects of their study and informing the programme board on the study progress of the students.
2. The study adviser monitors and approaches students with a progress rate less than 75% of the nominal rate of 60 EC per year.
3. After the first year, the study adviser invites the students at least once a year for a progress meeting.

Article 11 (Binding) recommendation on continuation of studies (BSA)

1. In accordance with Article 6.3.3.c of the general section of the Education and Examination Regulations the programme board is allowed to set additional content-related requirements for the binding recommendation. A student can receive a binding recommendation on discontinuation of studies if:
 - a. the student has obtained less than 75% of the first-year study load, counted by the ECs of the study units as mentioned in the B1 programme in Article 5;
 - b. the student has obtained more than one insufficient grade (grade of 5.0 or lower) in one or more of the categories A, B, C, D and E as mentioned in the B1 programme in Article 5.

⁵ For B1 and B2 laboratory practice work, see the 'Health & Safety and Environmental Regulations' on <https://www.utwente.nl/tnw/intranet/diensten/amh/> and the information of the Science and Technology Laboratory Practice Group, on <https://www.utwente.nl/tnw/slt/>. For other labs different safety requirements may be in effect.

Article 12 Quality assurance

1. Quality assurance is the total of all activities and processes that a study programme organizes to ensure, evaluate, improve and justify the quality of education in a structural manner, with the aim that education is carried out with the predetermined (intended) quality.
2. The programme director is responsible for the quality of the content and the structure and organisation of the programme, including the organisation and execution of quality assurance.
3. The quality assurance is coordinated and managed by the quality assurance coordinator of the Science & Technology faculty, cluster Science. The quality assurance coordinator advises the programme (staff) on the internal quality assurance processes.
4. The AT Quality assurance committee (QAC), consisting of programme staff and students is, with the guidance of the Quality Assurance office of the Science & Technology faculty, cluster Science, tasked with the execution of quality attributes, such as the evaluation of the programme.
5. For the internal quality assurance, the following instruments are used:
 - a. panel meetings with students;
 - b. the UT Student Experience Questionnaire (UT-SEQ);
 - c. web surveys about the entire module or module parts⁶;
 - d. quantitative results, such as pass rates;
 - e. lecturer panel meetings with lecturers and representatives of the student panel meetings, in which the evaluation results mentioned under a-d are discussed.⁷
6. The outcomes of the internal quality assurance efforts are published as follows:
 - a. A findings report, based on the information and data derived from the instruments as mentioned in par5, is drawn up for each module. report is shared with the relevant lecturers, the involved staff members of the study programme and the programme committee;
 - b. Quantitative results, summaries of the web surveys and evaluation reports are published on Canvas course Quality assurance and evaluation, which is accessible to all students and lecturers of the programme.
7. The following internal and external evaluations are used to evaluate the curriculum and the degree programme as a whole:
 - a. the exit survey about the entire bachelor's programme;
 - b. the National Student Survey (NSE)⁸;
8. The programme director together with other staff as decided by the programme director, draws up improvement plan, based on internal and external evaluations and findings reports
 - a. The improvement plan is submitted to the programme committee for discussion, advice, instructions and control. The plan for improvement is included in the faculty's annual plan.
 - b. The faculty's annual plan is discussed by the dean and portfolio holder for education with the executive board in the fall meeting.
 - c. The improvement plan is submitted to the Quality assurance for the possibility of record keeping, control and future evaluation.

Article 13 Changes and transitional arrangements

In case of changes to the programme-specific appendix, Articles 8.3 and 8.4 of the general section of the Education and Examination Regulations apply.

Article 14 Effectuation

These regulations will come into effect on 1 September 2021 and replace the regulations dated 1 September 2020.

Established by the board of the faculty, in due consideration of the recommendations of the faculty council and the programme committee, with the consent of the faculty council to Articles 6 and 11 and with the consent of the Programme Committee to Articles 4, 5, 8 and 12.

Enschede, 8 July 2021

⁶ Web surveys are used when a module is new or largely renewed, or when the overall grade for the entire module or a module part in the UT-SEQ or the previous web survey was lower than 6.0.

⁷ Modules of the B1 and B2 program are evaluated annually.

⁸ The NSE is conducted annually.