SELF-EVALUATION 2023 BSc BUSINESS INFORMATION TECHNOLOGY

UNIVERSITY OF TWENTE.

Self-Evaluation
BSc Business Information Technology

2023

University of Twente

Final version 2 October 2023

Please Note

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- Additional information is available at the website of this visitation and on the website of the programme: https://www.utwente.nl/en/education/bachelor/programmes/business-information-technology/.
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This document was prepared according to the guidelines given in the Assessment Framework for the higher education accreditation system of the Netherlands [7]. Passing the institutional audits [3], [4] allows the degree programmes to perform NVAO's limited programme assessment.

Administrative data

Administrative data of the programme	
Programme name	Business Information Technology
Orientation and level	Scientific education, Bachelor of Science
Degree	Bachelor of Science
Number of credits	180 EC
Location	Enschede
Mode	Full time
Language of instruction	English
CROHO registration number	56066
Contact person	Dr. W. Corbo Ugulino (Programme Director) ☎ +31 53 489 3425 ✉ w.corbougulino@utwente.nl

Administrative data of the University	
Name	University of Twente
Status	Funded
Result of institutional audit	Positive (28 April 2020) [3] NVAO report (13 December 2018) [4]

Abbreviations and Acronyms

BA	Business Administration
BIT	Business Information Technology
BITOC	BIT Programme Committee
BKO	Basis Kwalificatie Onderwijs (University Teaching Qualification, UTQ)
B-BIT	BIT Bachelor's Programme
CEEP	Committee for Education Evaluation Panels
CELT	Centre of Expertise in Learning and Teaching
CES	Centre for Educational Support
CS	Computer Science
DSFR	Domain–Specific Frame of Reference
EAB	External Advisory Board
EB	Examination Board
EC	European Credit (1 study year is 60 ECs)
EEMCS	Faculty of Electrical Engineering, Mathematics and Computer Science
EER	Education and Examination Regulations
HBO	University of Applied Sciences (Dutch: Hoger Beroeps Onderwijs)
IELTS	International English Language Test System
ILO	Intended Learning Outcome
IS	Information Systems
IT	Information Technology
M-BIT	BIT Master's Programme
MC	Marketing & Communication
NSE	Nationale Studenten Enquête (National Student Survey)
OHL	Onbezoldigd hoogleraar (unpaid full professor)
OLD	Opleidingsdirecteur (Dutch for Programme Director)
PC	Programme Committee
PILO	Programme Intended Learning Outcome
PD	Programme Director
RESTS	REflection on Science, Technology and Society
SEQ	Student Experience Questionnaire
SUEQ	Senior University Examination Qualification
SUTQ	Senior University Teaching Qualification
TCS	Technical Computer Science
TOM	Twente Educational Model
UD	Universitair Docent / Assistant professor
UHD	Universitair Hoofd Docent / Associate professor
UT	University of Twente
UTQ	University Teaching Qualification (Dutch: BKO)

Preface

Business-based and IT-based competencies

Since its foundation in 1993, the BIT Programme at the University of Twente has acknowledged the distinctive profile necessary to work at the intersection of Business and Information Technology by offering a well-balanced division between *Business-based and IT-based competencies* with which the Programme forms its graduates. During these 30 years, the Business Administration and Computer Science areas have developed considerably, shaping the technologies and issues to be addressed in a programme dedicated to bridging the gap between these areas.

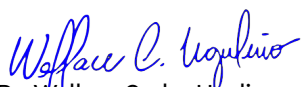
Emerging areas

Cyber security and Ethical aspects

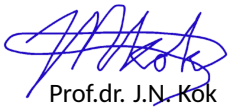
In the early years of this Programme, the issues to be addressed by the professionals and academics at the intersection of Business and Information Technology concerned the introduction of personal computers and computer networks to improve individual and group productivity. Nowadays, the scope of the challenge is much broader because of technological advancements that have broadened the concept of 'user' in Information Systems and the advancement in tools and techniques to understand, analyse, monitor, and deploy business processes. Among the technological advancements, the popularisation of Mobile and Cloud Computing, Artificial Intelligence and Big Data, and the Internet of Things stand out. These technologies expanded considerably the reach and the effects of newly devised IT solutions and business processes, requiring increased attention to *Cyber security* and the *Ethical aspects* of these newly designed business processes and IT solutions. To keep up with these changes, the BIT Programme has evolved accordingly, forming professionals and academics of whom we are proud.

In this report, we have done our best to present the Business Information Technology Programme openly and truthfully. Most of the actions that were identified after the previous visitation were implemented. Furthermore, writing this Self-evaluation has stimulated the fine-tuning of procedures and information for students.

This report's draft was sent to the whole BIT community, including lecturers, students, Programme Committee, Faculty Council, and Management Board. We are grateful for their valuable contributions. This report would not have been possible without the effort of many people, to whom we want to express our deepest gratitude.



Dr. Wallace Corbo Ugulino
Programme Director



Prof.dr. J.N. Kok
Dean EEMCS

Contents

1 Organisation of this report

Limited framework

This report contains the Standards 1-4 of the Assessment Framework for the higher education accreditation system of the Netherlands 2018 [7]. Because the UT passed the institutional audit [3], [4], we follow the *limited framework*.

The report starts in Standard 1 by describing the Programme's Intended Learning Outcomes. As an international Domain–Specific Frame of Reference, the 'IS 2020 report' is used. Because the IS 2020 report lacks competencies related to a 'Scientific Approach', the so-called 'Meijer's Criteria' are also used as a reference (See Figure 1). We will show how these competencies map to the Intended Learning Outcomes (ILOs) and how the ILOs map to the modules and courses of the curriculum.

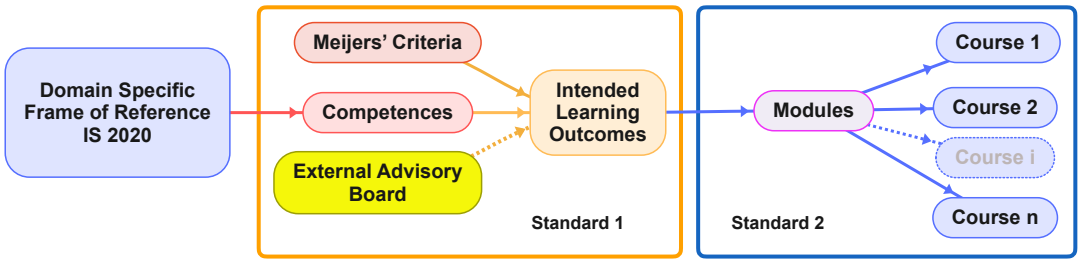


Figure 1
Mapping of Competencies on the Intended Learning Outcomes (ILOs) and mapping of ILOs on Modules and Courses

Domain–Specific Frame of Reference (DSFR)

IS2020

IS2020 will further be referred to as DSFR

External Advisory Board (EAB)

The (Domain–Specific Frame of Reference (DSFR) [8] chosen for the Information Systems cluster is the *IS2020*, which is an update on the 2010, used as a reference in the previous accreditation of this programme. Compared to the 2010 version, the new DSFR accounts for the new skills required to operate in a scenario that got significant developments in the technological environment, which includes the proliferation of mobile technology, sensors, Internet of Things (IoT), Artificial Intelligence, Virtual Reality (VR), among others (DSFR [8]) (p.24). These technological developments, especially mobile technology, further increased the reach and use of Information Systems (IS) to way beyond the walls of organisations. In fact, the term "user" in IS is not limited to organisation employees anymore, but should refer to all types of individuals (DSFR [8]) (p.26). Consequently, the IS graduates now have to develop in four additional competency areas: 'Application Development', 'Secure Computing', 'Ethics, use and implications for society', and 'Practicum.' Additional input for this continuous update is given by the External Advisory Board (EAB) [9]. The Intended Learning Outcomes (ILOs), described in Standard 1 of this document, are related to the competencies in the DSFR (See Table 1.2).

The remainder of this report is organised as follows: in Standard 2, we discuss how the Programme ILOs are achieved by the modules and courses of the curriculum as well as the Teaching and Learning environment. The processes used to safeguard the quality of education and examination, with a particular focus on examination, are discussed in Standard 3. A discussion on the ILOs achievement is presented in Standard 4. Finally, the Student Chapter provides insight into the strengths and weaknesses of the programme from the student's perspective.

2 Follow–up on the recommendations of the previous assessment

The actions we took as a direct result of the previous assessment are described in Appendix A at page 28.

3 The BIT programme at the UT

BMS

EEMCS

The programme management is shared by the Faculty of Behavioural, Management and Social Sciences (*BMS*) and the Faculty of Electrical Engineering, Mathematics and Computer Science (*EEMCS*). To reinforce the balance between Business Administration and Information Technology, the

BIT Programme Director is appointed alternately from EEMCS and BMS for a 5 years term. Details are shown in the organisation chart of Figure 2.

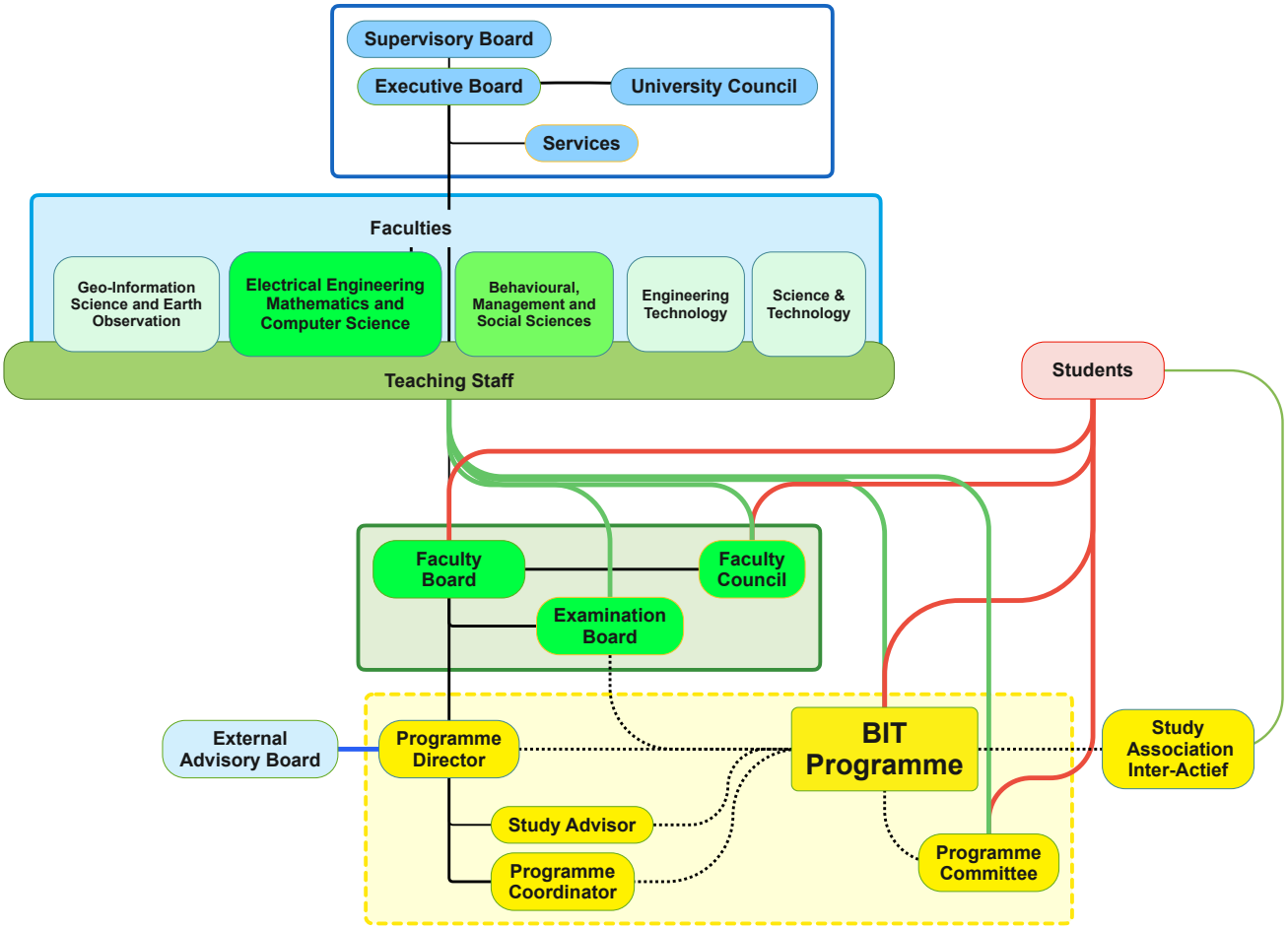


Figure 2 Organisation chart of the BIT programme in the UT

In Figure 2, the committees referred to as the Faculty Board, Examination Board, and the Faculty Council are those hosted and managed by the EEMCS Faculty.

4 Study and alumni association

Inter-Actief [10] is the BIT programme students' association, which also includes the students of the Computer Science Programme. The association is an important element within the study environment by organising social and networking events, symposia, excursions and study trips. Inter-Actief also maintains a database of old exams and sells textbooks at significant discounts. IAPC (Inter-Actief Personal Computing) has a shop where students can buy computer hardware.

The study association plays a complementary role in the quality control of the courses. The association keeps a website where students can send anonymous requests, complaints, and wishes to the Programme Management board. Finally, complementing the students' important role in maintaining the programme's quality, Inter-Actief awards the best teachers of each quartile and the best teacher of the year (the annual Inter-Actief Decentralised Educational Award, IDEA). For a lecturer, being the winner of this award is the condition for being nominated to the University-wide award competition (University of Twente Educational Award, UTEA).

ENIAC [11] is the alumni association for all computer science related programmes. They organise events, do matchmaking for BIT students with companies and hand out the ENIAC thesis prize.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Standard 1: The intended learning outcomes tie in with the level and orientation of the programme. The intended learning outcomes are geared to the expectations of the professional field, the discipline, and international requirements.

1 Intended Learning Outcomes

1.1 Objectives

The objectives of the programme and the Programme's Intended Learning Outcomes (PILOs) can be found in the Education and Examination Regulations (EER) of the programme at pages 25-27 [12]. They are discussed in Sections 1.2 and 1.3.

1.2 Vision and Goal

Vision

Society strongly depends on people who know how organisations (businesses) work and how to make information and communication technology (ICT) useful for these organisations and are capable of bridging the gap between these two areas. The B-BIT programme prepares students to become academics and professionals who are capable of bridging this gap to produce innovative ICT-based solutions to business problems as well as adapting business processes to leverage the benefits of technology.

Personal Computing revolution

Mobile Computing

Internet of Things

Artificial Intelligence

ICT has been transforming society for decades. In the 1980s, the *Personal Computing revolution* brought computing power to the masses. In the late 1990s, the popularisation of the Internet transformed how society communicated and accessed information. Additionally, the Internet enabled e-commerce by the early 2000s, which opened up new markets and transformed the retail industry. Social Media marked the 2010s, bringing another round of transformation in the way society shares information, engages communities and connects individuals. Finally, the onset of *Mobile Computing* in the early 2010s, and its maturation in the present days, brought computing power to our pockets. It expanded the concept of 'user' in the Information Systems field, which is not limited to people within the organisation's walls anymore, but also includes final consumers. Together with Mobile Computing, the maturation of the *Internet of Things* and *Artificial Intelligence* are contributing to the revolution of present times.

Goal of this programme

TOM 2.0

The *Goal of this programme* is to form professionals and academics capable of leading these ICT-driven business and societal transformations while the technologies, techniques and theories of Business and IT constantly evolve to keep up with the needs of organisations and society. To keep up with such a dynamic environment, this programme uses the Twente Educational Model 2.0 (*TOM 2.0*, See Standard 2), which privileges critical thinking, ethical and cultural reflection, and intensive practice through its project-based learning nature.

1.3 Programme's Intended Learning Outcomes

Programme's Intended Learning Outcomes (PILOs) are summarised in Table 1.1. More detailed PILOs are given in Table B.2 in Appendix B.

	After completing this study programme the student must have:
1	Business domain knowledge and skills
2	Information Technology domain knowledge and skills
3	Business-IT alignment knowledge and skills
4	Scientific approach
5	Professional skills
6	Taking account of Social and Temporal context

Table 1.1
Summary of the Programme's Intended Learning Outcomes.

The full version of the PILOs is given in Appendix B.1 at page 30.

1.4 Coverage of the Domain–Specific Frame of Reference

DSFR

As agreed by the accreditation cluster, we have used the IS2020 document 'A Competency Model for Undergraduate Programs in Information Systems' by the Joint ACM/AIS IS2020 Task Force as Domain–Specific Frame of Reference (DSFR) [8] for the B-BIT programme. This document is the international standard for curricula at the Bachelor level in the area of Information Systems with applications in the business domain, matching the profile of the B-BIT programme. Page 31 of the DSFR summarises the competency realms to be covered by the PILOs of the BIT programme.
In the upper part of Table 1.2, we relate the PILOs with the competency realms as proposed on page 31 of the DSFR [8]. A more detailed mapping is given in Table B.2 in Appendix B.

Meijers' Criteria
Dublin Descriptors

Because the DSFR does not cover the 'Scientific Approach' related ILOs (ILOs 4.1–4.5 in Table 1.2), the Meijers' Criteria are also used as a reference for the ILOs. The Meijers' Criteria [14], [15] are an adaptation of the Dublin Descriptors [16] for engineering programmes and describe the general competencies of a graduated engineer at bachelor as well as master level. The lower part of Table 1.2 shows how the Meijers' Criteria [14], [15] 1–7 are covered by the Intended Learning Outcomes of the B-BIT programme.

As a result of reconsidering the ILOs as part of this self-evaluation process, we recently added PILOs 2.4 and 3.5. This clarifies the contribution of existing ILOs of the BIT Programme, while simultaneously bringing them to attention and allowing for more extensive coverage in future reviews of the programme.

Table 1.2 Relation between the ILOs and the competencies in the DSFR

		Programme Intended Learning Outcomes																								
	Competencies of IS 2020	1.1	1.2	1.3	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	3.5	4.1	4.2	4.3	4.4	4.5	4.6	5.1	5.2	5.3	5.4	5.5	6.1	6.2
1.	Foundations	●	●	●	●					●										●	●				●	●
2.	Data & Information Management					●							●													
3.	Technology and Security					●		●																		
4.	Development				●		●	●			●															
5.	Organisational Domain	●	●	●					●	●	●														●	●
6.	Integration	●	●	●	●	●		●	●	●	●	●	●													
	Meijers' criteria																									
1.	is competent in one or more scientific disciplines	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●								
2.	is competent in doing research								●	●	●			●	●	●	●	●	●		●					
3.	is competent in designing		●	●	●	●	●	●	●	●	●	●	●	●			●		●		●					
4.	has a scientific approach		●	●	●				●					●	●	●	●	●	●	●		●				
5.	possesses basic intellectual skills												●	●	●	●	●		●	●				●		
6.	is competent in co-operating and communicating											●		●						●	●	●	●		●	●
7.	takes account of the temporal and the social context												●									●			●	

A more detailed mapping of the ILOs on the DSFR and Meijer's criteria is given in Tables B.2 and B.3

1.5 Keeping the ILOs up-to-date

Programme Committee
External Advisory Board

To keep the PILOs and the programme up-to-date, the Programme Committee (BITOC) supports the Programme Management Team by playing the role of a content-expert board. Additionally, the External Advisory Board [9] plays a role in this process. The External Advisory Board:

- Gives advice to the programme (director) based on (job) market perspective and needs. Serves as sounding board to discuss programme matters on a more strategic level,
- Has 7 members representative of industry,
- Meets 1–2 times per year. Rotating between UT and companies as hosts,
- Members are appointed for 5 years, with an additional 5 year term as a possibility.

The membership of our EAB is a personal position based on company/profile/link with BIT field (contrary to some advisory boards that have a structure where the company has a seat, and the person attending can differ).

1.6 Strengths, weaknesses, and action points

Strengths

✓ PILOs properly cover the IS2020 competencies, including competency areas that became required in the new DSFR, namely 'Application development', 'Secure computing', 'Ethics, use and implications for society', and 'Practicum'.

✓ PILOs cover IT-based solutions for business problems with equal attention to business and IT, well-aligned with our vision and objectives.

Weakness

✗ The discussion with the External Advisory Board to update the B-BIT curriculum was reduced during the period of social isolation, with priority being given to the M-BIT, leading to the need for a new round of consultation with the EAB.

Action Points

- Update the curriculum to cover established competency areas that match Dutch industry needs (requesting advice from EAB) and have academic relevance (following advice from PC).

Finals of the Design project in module 7

Standard 2: The curriculum, the teaching–learning environment and the quality of the teaching staff enable the incoming students to achieve the intended learning outcomes.

2 Teaching–learning Environment

We offer a stimulating student-driven teaching and learning environment in the B-BIT programme. The teaching methods follow the Twente Educational Model (TOM), which is strongly based on practice and developed around integrating projects. TOM has supported this programme to properly achieve its PILOs, while making the learning meaningful to B-BIT students. In this chapter, we start by presenting the curriculum structure, including a description of our educational model (Section 2.1), the realisation of Programme ILOs into B-BIT modules (Section 2.2), and an overview of the Learning Activities and Contact Hours (Section 2.3). We continue to present the programme by discussing its structural aspects, which include: Admission and Inflow (Section 2.4), Facilities & Support (Section 2.6), and the Staff of the Programme (Section 2.7).

2.1 Twente Educational Model (TOM)

Twente Educational Model (TOM)

The University of Twente has adopted the Twente Educational Model [21] since 2013. In TOM, all bachelor programmes organise their courses in 4 modules per year (4 modules x 3 years = 12 modules) of 15 ECs (15ECs x 12 modules = 180 ECs). By introducing the Twente Educational Model (TOM) in the BIT Programme, we took a step towards the future of education by applying Project-Based Education and striving for Student-Driven Learning. Since the academic year 2020-2021, the Programme has evolved to adopt *TOM 2.0*, giving students more flexibility to achieve the Intended Learning Objectives by breaking down the *Modules* into smaller pieces named *Study Units*, while keeping the project-driven nature of TOM 1.0 and its consequent integration between the study units.

TOM 2.0

Modules

Study Units

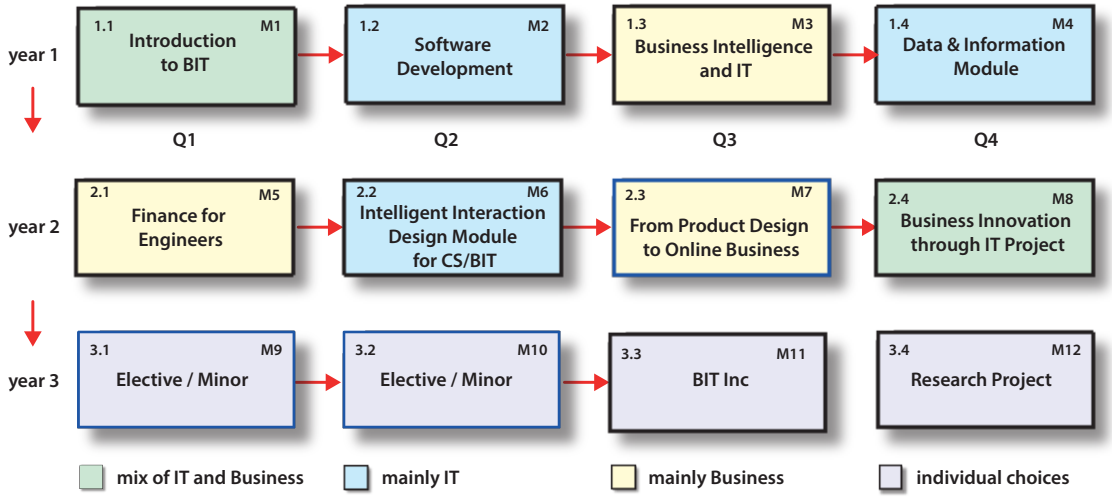


Figure 2.1 Overview of the BIT curriculum

Figure 2.1 illustrates the organisation of the Bachelor's BIT in 12 TEM modules. The programme consists of a *well-balanced mix* (roughly 50-50 split) of Business Administration (Management) subjects and IT subjects, focusing on multidisciplinary teamwork while considering the ethical, social, cultural, and societal aspects. The curriculum comprises 8 modules in the first two years, in which subjects of BA and IT are equally distributed. The third year features a minor semester and a final

Balanced mix of Business and IT subjects

semester. The final semester comprises M11 (a.k.a. BIT Inc) and M12. In M11, students work in small groups on a real business problem at a company. In M12, students do an individual research project. Both M11 and M12 have a study unit of 5 ECs dedicated to a reflection on *ethical*, *societal*, *and cultural aspects*.

Ethical, societal, and cultural aspects

A module's internal coherence is achieved by composing it with study units strongly connected to each other through their intended learning outcomes (ILOs). Additionally, they are further connected through *integrative projects*. All courses include an approximately equal amount of lecture hours for theoretical content and practical activities (workshops, lab sessions, project sessions, etc). In fact, with TOM 2.0, all theoretical content is further explored in a hands-on lab/project session. Because of that, our programme already provides coverage to the ILOs listed in the IS Practicum competency realm. In fact, thanks to TOM, our range of practical activities exceeds the recommendations. The projects apply the theory but also extend it; they are the place where academic, professional and personal skills are developed and where the students' creativity is stimulated.

Integrative projects

2.2 Realisation of Programme Intended Learning Outcomes

Table 2.1 shows how the PILOs are realised in the various B-BIT modules. Table C.13 (page 34 in Appendix C) presents the same mapping in a more detailed view (per Study Unit).

Table 2.1 Mapping of the programme to Intended Learning Outcomes

	Modules (see Appendix C for detailed description.)										
ILOs (see Table B.1 at page 30)	M1	M2	M3	M4	M5	M6	M7	M8	Minor	M11	M12
Business domain knowledge & skills											
1.1	●						●			●	●
1.2	●				●		●			●	●
1.3	●						●			●	●
Information Technology domain knowledge & skills											
2.1	●	●		●			●			●	●
2.2				●			●			●	●
2.3						●	●			●	●
2.4	●					●	●			●	●
Business-IT alignment knowledge and skills											
3.1			●				●	●		●	●
3.2			●				●	●		●	●
3.3			●				●	●		●	●
3.4							●	●		●	●
3.5	●						●	●			
Scientific approach											
4.1						●	●	●		●	
4.2	●		●					●			●
4.3	●		●								●
4.4	●						●	●		●	●
4.5							●	●	●	●	●
4.6	●	●	●	●	●		●	●		●	●
Professional skills											
5.1	●		●	●	●	●	●		●	●	
5.2	●	●	●	●	●	●	●		●	●	
5.3						●	●			●	
5.4							●			●	
5.5	●	●	●								
Taking account of Social and Temporal context											
6.1	●				●	●	●			●	●
6.2	●										

Beta part of the curriculum

As shown in Table 2.1, the PILOs related to technical content (*Beta*: Dutch terminology for natural sciences) are covered early in the programme, mostly in the first-year. This is the case with PILO 2.1 (IT Domain group, related to Application Development competency), and the PILOs related to the Scientific Approach group (to attend Meijer's criteria), especially the PILO 4.6 (Mathematics Line). PILO 5.5 (development of Self-Regulated Learning skills) is covered in the first semester, integrated with the programming courses. Finally, the IT-related PILOs 2.2 and 2.3 are covered in the first two years. This choice of placement aims to make the first-year more selective and avoid study delays. Another reason for this placement is that we envision the BIT Alumnus differential as the capacity of bridging IT and Business, and the Business Domain courses (2nd year) built upon first-year topics.

Gamma part of the curriculum

The PILOs related to the *Gamma* part of the curriculum (*Gamma*: Dutch terminology for the social sciences and the like), i.e. Business Domain and Business-IT alignment (Groups 1 & 3), are mostly covered in the second year. Module 7, in the second year, is fully dedicated to fostering an entrepreneurial attitude and is thus the main module that implements PILO 5.4. In the third year, the knowledge and skills on IT Domain, Business Domain, and the alignment between Business and IT, are applied in the modules BIT Inc. (M11) and the Research project (M12).

Business domain's theories and techniques

Finally, the DSFR does not provide recommendations on specific theories, techniques, and business domains for the Bachelor's curricula. Instead, it mentions that it's necessary to cover theories and techniques from some business domains and that the absence of these in a curriculum would make it incompatible with said DSFR [8] (page 51, Section 4.1.2). In this programme, the theories and techniques related to specific business domains are covered in the Section Business Domain Knowledge and Skills (1.1 to 1.3) and in the Business-IT Alignment Knowledge and Skills (3.1 to 3.3).

2.3 Learning activities and contact hours

According to TOM, the teaching activities in each module (lectures, tutorials, labs, assignments) are centred around an integrating project. To make the education activities more stimulating and more effective, since the introduction of TOM we have been increasingly moving from classic frontal lectures to a combination of lecturing, tutoring and assignments. Table 2.2 shows the average number of contact hours allocated to the different teaching activities per year. Students receive regular feedback on their progress via intermediate testing, diagnostic testing, peer feedback and regular meetings with project mentors. The third year was not included in this table because its first semester is reserved for the 'minors', and the last semester is comprised of BIT Inc. (internship) and Research Project, both intensive in self-study combined with weekly meetings with the supervisor.

Table 2.2 Average hours per activity

Activities	Year 1	Year 2
Lecture	8	4
Practicals (lab sessions)	5	1
Tutorials	2	3
Project Sessions	6	4
Self-study (supervised)	1	2
Formative Assessment	2	1
Total Contact Hours	**21**	**15**
Self-study (unsupervised)	13	18
Project Sessions (unsupervised)	6	9
Total	**40**	**40**

In comparison with the previous report, we increased the number of contact hours in the first year from 20 to 21 per week (average), while in the second year, contact hours increased from 14 to 15 hours per week (average). Because of TOM [21], the number of contact hours in practical activities is usually the same number of lectures (frontal lecture, theoretical content). In the first year, however, the number of hours in practicals is greater than theoretical lecture hours because the 1st year

concentrates the majority of credits in technical study units, like the learning line Application Development, which spans through the entire first year (and partially in the 2nd year). In the programming courses of modules 1 and 2, for instance, the hours of practicals with the support of teachers and tutors increased 2.5x after a pedagogical redesign. This new design made it possible to increase the pass rate of the Application Development line to 70% (before it would oscillate between 38-50%), keeping the same learning outcomes and levels of assessment and instruction.

2.4 Admission & Inflow

Entry requirements

Entry requirements for the B-BIT programme can be found at the UT-website [17] as well as in a pdf-copy of this website on the accompanying website [18] of this visitation.

Programme information

The main source of information about the B-BIT Programme for prospective students is the UT website [19]. Additionally, the University of Twente has a Marketing & Communication department (MC), which organises a broad spectrum of activities to inform prospective students about our programmes. The programmes contribute the content to these activities. Because of COVID–19, these activities had to be adapted and were mainly held online in the years 2020 and 2021. Currently, a mix of online and on-campus activities is organised to serve all target groups:

- Online and on-campus Open Days: for all students in (or around) November and March.
- 'Student for a day': prospective students spend 1 day following the course of their preference (all lectures, lab sessions, etc.) together with a current B-BIT student.
- Matching Days in June: (online and on-campus): students already registered for the B-BIT Programme are invited to participate in workshops about Business and IT led by B-BIT's lecturers.

Overall increase in the intake

Regarding the *intake of students*, as shown in Table D.1 (Appendix D), the B-BIT programme moved from a cohort of 58 students in 2017 (50% Dutch nationals) to a cohort of 150 (56% Dutch nationals) in 2022. The intake of the academic year 2022-2023 may have been affected by the *numerus fixus* rule applied to the B-TCS Programme (Computer Science). The B-TCS Programme abandoned the *numerus fixus* in the academic year 2023-2024, which may influence the BIT intake.

Intake of female students

Fluctuations in the *intake of female students* are small, with an average of 19.3% in the intake of the last 6 years (please, refer to Appendix D, Table D.2 for more information). This percentage is higher than the average for the EEMCS faculty but falls short compared to the Programme Industrial Engineering Management (IEM, BMS Faculty), which has an intake of female students averaging 30%. The BIT Programme has a strong technical foundation, and this may have an influence on the choices made by students before joining the university. Our actions include a pre-university programme in which (Dutch) BIT female students (and staff) visit schools to lead workshops on topics related to the BIT Bachelor. This kind of intervention requires time to show results, but is promising. Our expectation is that such an initiative will increase not only the intake of female students but also the intake of students with VWO pre-education, thus shaping the input to a more suitable profile. This measure was also designed to shape the profile of our new students because the BIT Programme receives less than half the percentage of students with VWO pre-education when compared to other studies in the EEMCS Faculty. We also observe an undesirable dropout rate in the first year (details in Appendix D, Tables D.4 and D.5) that might be connected to the profile of our intake. In addition to the Pre-U initiative, we also improved sharply the communication about the programme in the Open Days. In the last year, when compared to the other Programmes at UT, BIT Open Days received the highest grade from visitors.

Shaping intake & dropout rate

2.5 Motivation of choice for teaching and programme title in English

What the rectors say on internationalisation

Graduates of the B-BIT programme will be active in a globally–oriented academic world. Therefore, we consider the international character of the programme and the student population as necessary. The internationalisation arguments given by the rectors of all Dutch universities [20] on this topic

are fully valid for the Business Information Technology programme. Teaching the programme in English is inevitable for obtaining an international student population, and it contributes significantly to the development of competencies of our graduates to function in international academic and business environments. While the Dutch industry increasingly needs professionals in technical areas like BIT, the number of Dutch students following a VWO education (source DUO) shows a tendency to decrease, especially in the Overijssel region (the most affected), as shown in Figure 2.2:

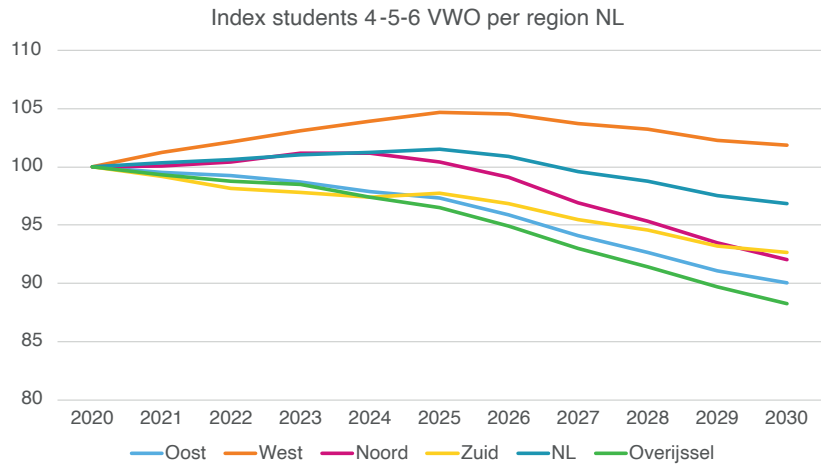


Figure 2.2 Students with VWO-profile per region. (2020 is 100).

The Dutch labour market also benefits from international students because the majority of them stay in the Netherlands (see Standard 4, Section 4.4). A programme taught in English naturally has an English title.

2.6 Facilities & Support

The UT offers an excellent study environment, as reflected in the scores of the Dutch annual Students' Survey (NSE) [35]. The UT is a campus university, and as such it is a place where living, leisure and study come together. Among its facilities are a high-speed network, extensive library, project rooms and state-of-the-art lecture rooms. Each B-BIT student must own a laptop for educational purposes, which can be bought at the UT with a discount. Students can work in the project rooms available in many buildings spread around the campus.

The Programme Coordinator offers programme-specific support and advice to the students. The Study Advisers assist and advise students concerning their study (choices, progress, process and planning). The Study Advisers also help and advise students about their academic skills and requests to the Examination Board. They also assist and advise students who are affected by personal circumstances, psychological problems, disability and illness, as well as pregnancy, student activism or top-level sports and arts. In addition to the support of Study Advisers, students who are (at risk of being) hampered in their progress as a result of personal circumstances are supported by the Student Affair Coaching and Counseling (SACC), such as Student Psychologist or Student Counselor. The university offers support and counselling in case of psychological problems and for career choices after the study. A variety of workshops and courses for personal development are available at the UT. Students who intend to go abroad or are looking for an in-company placement are supported by the EEMCS Mobility office.

2.7 Staff of the programme

Information about the staff of the programme is given in Table 2.3. No lecturing staff is exclusively dedicated to the BIT programme; the overview in Table 2.3 concerns the relevant faculty members of EEMCS and BMS faculties. Information on how we calculated the figures in this table is provided in Appendix D.6

Table 2.3
Programme staff (Spring 2023)

	#	%	
Total staff (persons)	104	100%	HL: 8% , UHD: 15%, UD: 54%, docent: 17%, guest: 2%, researcher: 3%, OHL*: 1%
Female	33	32%	HL: 6%, UHD: 15%, UD: 58%, docent: 18%, OHL: 3%
Total staff (fte)	90,8		
Qualifications			
PhD	97	93%	4 Lecturers & 2 researchers are doing their PhD / 1 guest lecturer has an MSc. Degree
UTQ Completed	48	46%	
UTQ Started	28	27%	
Exemption	21	20%	Diploma equivalent to UTQ, decided by CES
UTQ no obligation	1	1%	Decided by dean, historically >20 years experience with teaching
Total UTQ	98	94%	
UTQ not started	6	6%	
English C1, C2 level	98	94%	
Docent	18	17%	Staff members with the main task of teaching

More detailed information about the staff is available for the committee on a password-protected web page.

Improved # of UTQ-certified lecturers (or ongoing)

In the previous Self–Evaluation Report, we were recommended to 'monitor the proportion of UTQ-certified lecturers'. In that report, the percentage of lecturers with UTQ certification or ongoing (completed + exemption + dispensation + started) was 74% (54% certified/exempt + 20% started). Currently, this percentage has improved from 74% to 94%. Both EEMCS and BMS faculties have consistently hired more lecturers for the programme, and all are required to obtain an UTQ. In practice, it might take some time to obtain the UTQ, and hence there might be a small percentage of the lecturers with UTQ 'ongoing' (status 'started'). Additionally, the percentage of lecturers with certification of English level C1 or C2 is 94%. Another difference from the previous report is the increased number of 'docents', which are staff members with the main task of teaching.

Teachers appreciation on NSE 2023

We are very proud of the teaching quality of our staff, and so are our students. For instance, in the most recent National Student Survey [35], B-BIT students indicated that they were satisfied with the teachers in their course programme (overall mark in 2023 is 3.88 out of 5, a slight improvement from 3.80 in 2022). In fact, despite an increased influx since 2017 (an increase from 58 in 2017 to 150 in 2022), the distance between lecturers and students remains short. Additionally, the collaboration between members of the BIT community (teachers, students, and admin staff) is intense, with students taking an important role. For instance, each module has two evaluation panels conducted by the CEEP, a committee formed by students that support the faculty in these panel evaluations (check Section 3.3 for details). Additionally, our students are active in the organisation of the Programme itself, and many of them take up tasks as teaching assistants and members of education committees. Therefore, we are proud to say that we have an engaged community of lecturers and students committed to fulfilling the Programme's educational goals.

Course evaluation performed by students

Student–staff ratio: 15.3

The *student–staff ratio* in the BIT Programme is 15.3, as demonstrated in the calculations listed in Appendix D, Section D.7. According to a recent report from 'Universiteit van Nederland' [38], the national average in the last ten years is approximately 19 students per faculty member. The universities in the Netherlands with the most favourable numbers have a ratio of approximately 15 students per faculty member (1 FTE). Although we consider our numbers satisfactory, we keep monitoring them to guarantee the proper capacity to deliver high-quality education.

2.8 Study load

The study load is divided evenly over the programme, as listed in Table 2.2. However, there's a gradual decrease in supervised activities through the years, which aims to form independent learners. The study load is distributed as follows:

First year

- The *first academic year* deals mainly with the *beta* part of the curriculum and has a selective function due to the BSA. To level the students in the *beta* part of the curriculum, we have provided more contact hours in the first year when compared to the second. Since 2020, we have provided students extra support in specific learning lines. First, we introduced a new pedagogical design in the Programming line that is centred on metacognition training, mentoring, and community building. The new design includes increased support hours in the programming lab sessions by a factor of 2.5. In the second half of the academic year 2022-2023, we launched a pilot one-on-one tutoring project in the Mathematics line for students who receive such a recommendation from the study adviser. The goals of this initiative are: (1) provide immediate support to improve students' learning and, consequently, the success rate in the mathematics line, and (2) increase our understanding about the student's needs to help us redesign the mathematics line in the near future. In the academic year 2023-2024, the project was implemented and expanded to encompass the entire academic year.

Second year

- The *second academic year* contains mainly Business Domain courses and courses on the Business-IT alignment. Throughout the year, students have more hours of self-study than in the previous year (both supervised and unsupervised increase). The amount of hours per week on lectures (4hrs on average) is the same as practicals/tutorials (1+3, 4hrs on average per week). Project sessions (13hrs per week on average, supervised and unsupervised) are the main mode of instruction, consuming more than 3 times the number of hours in lectures.

Third year

- The *third academic year* starts with a semester dedicated to the minors. In the last semester, students enrol in the 'BIT Inc.' module (module 11), which includes 5ECs of lectures and discussion panels led by a lecturer of the programme. These lectures and discussion panels aim to discuss *ethical and societal aspects* related to their internship. The programme's lecturers and the company supervisor closely follow the students. The final report is assessed and graded in cooperation with the company supervisor, who provides feedback to our examiners. Finally, in the last quartile, students enrol in the 'Research Project Module' (module 12), in which they work on a research assignment that results in a scientific paper presented by them in our internal Scientific Conference (Twente Student Conference on IT) [37]. Students experience the whole process of working on a *BIT-like* research in collaboration with one of our faculty members (either from EEMCS or BMS). The experience includes abstract submission (subject to acceptance/rejection), multiple peer review rounds during the research, the submission of the paper for assessment and its final version, concluding with a presentation at the conference. The research proposal, once accepted, is registered in the online environment Mobility–Online [23] system. The third-year workload is high, and students have many contact hours with their Internship and Research supervisor. Students plan these meetings directly with their supervisors.

Ethical and societal aspects

Twente Student Conference on IT

Finally, students provide us with an overall evaluation of the study load through the National Student Survey (NSE). The most recent report [35] is from 2023, and it shows relevant improvement on the general mark (from 3.36 in 2022 to 3.54 in 2023). The detailed list of marks regarding study load (page 2 of the NSE report) shows that all grades improved. A significant improvement is seen in the 'perceived study pressure' (table 'Content and Organisation of Teaching', page 2), which came from 48,10% (2022) of respondents considering the study pressure as 'exactly right' to 63,41% (2023). Detailed reports show this index has improved consistently throughout the last three years. We see study pressure as an indicator strongly connected to study load.

NSE marks on study Load

2.9 COVID–19 pandemic

The COVID–19 pandemic influenced our education in three academic years, as follows:

2019/2020

After the lockdown started on March 12, 2020, BIT students were informed about and asked to follow the UT COVID–19 Policy. Our lecturers turned all upcoming courses to online mode, including practicals. Online lecturing was (and still is) based on a mix of Canvas Learning environment, Microsoft Teams, and Zoom; The submission and grading of reports are also done on Canvas (or through systems integrated to it). Additionally, we introduced some measures meant for community building, particularly a 'mentoring scheme' for the programming courses. The scheme proved effective not only in alleviating social isolation but also in sharply improving the performance of the programming line. To support teachers in their switch to online education, the UT created a website [22] with recommended tools for online teaching. Study places were made available on campus for students who could not study well at home.

2020/2021

During large parts of the academic year 2020–2021, Covid–19 measures were still in place. Activities that could take place on campus were exams and practicals, although it was encouraged to have as many activities online as possible. Tutorials were also allowed on campus at the beginning of this academic year. Final project presentations were held online. The mentoring scheme, launched in the previous year, migrated to a hybrid mode, including on-campus meetings (for the practicals) and online meetings (for additional support).

2021/2022

During a large part of the academic year 2021/2022, there were basically no restrictions concerning educational activities for groups with less than 75 students. This required students to be split into two rooms, which did not cause any issues with the courses offered in that period. In general, education was executed as planned. However, in the second quarter, the Covid–19 related measures became stricter, and lectures had to be given online (practicals were still allowed on campus). In general, this transition from on–campus to online lectures did not cause major issues.

In general, the programme was already somewhat prepared before the pandemic. The programme was in transition to digital testing via Remindo and Canvas and most assessments require a combination of an exam with (individual) assignments and project work and hence are less vulnerable to fraud compared to a single (digital) test.

The pandemic also had some positive effects on our teaching and learning environment: most courses now have for example micro lectures and information is not only communicated during the lectures. Digital platforms are used in the communication around projects. The pandemic forced us to take a closer look at assessment and safeguarding of tests.

2.9.1 Internship and Research Project

Individual agreements

During the COVID–19 pandemic, *individual agreements* have been made with students concerning their internship and the final project. For internships, company policy concerning on–site presence for employees was followed for students. Consequently, some students did their internship online during the COVID-19 pandemic or in a mix of on-site and online, according to the company's policy. Although these students missed the experience of daily presence at the premises of a company, they still learned the way of working within a company (routines concerning meetings, status updates, supervision, and company standards), which made the internship a valuable experience.

Final projects online

Final projects were mostly done online as long as the presence on campus and within a company was not allowed. Meetings with supervisors were also online. This quickly became a standard way of working for students and supervisors.

2.9.2 Bachelor before master

The bachelor–before–master rule was lifted for students (a.k.a., smooth transition) that had 30 EC or less to complete for their bachelor's programme (6 EC in case of pre–master students). They were allowed to start attending courses of the master's programme while still completing parts of the bachelor's (pre–master) programme. The student had to apply for this, based on unavoidable delay due to Covid, by submitting a realistic study plan.

2.9.3 Student support

Additional resits

Students had a difficult time during COVID. To help limit the negative consequences, our student advisers followed the students closely. The Programme Management Team monitored for the need to hire additional personnel. Students were allowed to attend *additional resits* if they missed exams because of COVID - either because they were sick themselves or due to indirect consequences that affected their preparation for the exam like a roommate being sick near the day of an exam or long-lasting effects that remained after recovering from COVID.

2.10 Strengths, weaknesses, and action points

Strengths

- ✓ Varied and challenging curriculum with a solid theoretical and technical foundation.
- ✓ Hands-on education delivered throughout the entire programme, fostering meaningful connections between subjects through integrative projects.
- ✓ Student–staff ratio is among the lowest in the Netherlands.

Weaknesses

- ✗ The Mathematics line is not engaging the students enough, presents the lowest success rate in the programme, and is currently one of the main factors impacting the dropout rate in the first year.
- ✗ The dropout rate in the first year is too high.
- ✗ Intake of Dutch students with VWO pre-education is too low.

Action Points

- Redesign the Mathematics line to match BIT students' needs, improve students' learning (and the pass rate, consequently), and increase connection with other lines.
- Improve communications of the Programme regarding its technical nature, especially in Dutch schools, to help attract more students with VWO pre-education.

Standard 3: The programme has an adequate system of student assessment in place.

3 Student Assessment

In the BIT programme, we perform various quality assessment activities to ensure that the PILOs are achieved in each module. Students, lecturers, and the Examination Board are central to the quality assurance schema. The EEMCS Quality Assurance Team also supports the Programme Management and the Examination Board in safeguarding the quality of education and examination. This chapter presents the processes for safeguarding the quality of examination (and education) and the stakeholders' roles and contributions.

3.1 Assessment Policy

The University of Twente has obtained the institutional accreditation [4], which ensures that there is a quality assurance system in place at the university level. The B-BIT programme follows the guidelines of the Quality Assurance Framework for Student Assessment UT [5] as well as the EEMCS faculty assessment policy [6]. The quality rests on the following three pillars:

Examination Board (EB)

1. A well–functioning *Examination Board (EB)* monitors the assessment system and intervenes if necessary,

Examiners

2. The appointed *examiners* for components of the programme are well–trained and qualified to teach and assess (see Standard 2),

Rules and procedures

3. Detailed *rules and procedures* are in place to ensure a high–quality assessment system and to prevent fraud.

In accordance with the Higher Education and Research Act [24], the EEMCS faculty at the University has also defined in detail the responsibilities of each committee related to the Study Programme, namely the Study Programme Management, Examination Board, and Programme Committee. These specifications are described in the EEMCS Faculty Regulations document [25].

3.2 Examination Board

The EB is an independent body that has as a legal task [24] to safeguard the fulfilment of the PILOs and the quality of the assessment system of the programme(s) for which it is held responsible. It:

- determines whether a student has fulfilled the conditions regarding knowledge, insight and skills as stated in the Education and Examination Regulations [12] of the programme for which it is responsible, in order to receive the degree of the corresponding programme,
- treats requests for exceptions to the rules for students, such as exemptions, flexible degree programmes and additional exam– or test opportunities. Exemptions are made after careful analysis of the curriculum of a student's previous educational programme,
- judges cases of academic misconduct (fraud/plagiarism and free–riding) and determines the sanctions,
- appoints (senior) examiners for administering and grading tests and exams,
- safeguards the quality of the assessment of theses and monitors the quality of assessment throughout the programme.

The EB is organised at the level of the faculty EEMCS. Since the BIT Programme is offered in conjunction by two faculties (EEMCS and BMS), we chose to delegate the BIT Programme's Examination Board responsibilities to the EEMCS Examination Board. Responsibilities are mandated to subcommittees and only members of the EB can participate in a subcommittee. For more details, see the overview of the subcommittees [28].

Faculty–wide affairs are mandated to the subcommittee for General Affairs, all other committees are dedicated to different educational programmes of the EEMCS faculty. The chairs of the subcommittees are also a member of the EEMCS General Affairs EB. The main subcommittee's responsibility is to perform the Examination Board role on the courses organised by its related programmes, although the EEMCS EB as a whole has the final responsibility. For courses taken outside the faculty, the EB of the offered course is responsible for performing the EB duties. In case of a fraud suspicion, the EB of the offered course determines whether fraud has occurred and the EB-BIT determines the measures to be taken.

SUEQ/SKE trajectory

The dean appoints the members of the EB. The appointed EB members are active contributors to the BIT Programme and have obtained their UTQ and Language Proficiency certifications. Additionally, they are offered a seat in the course Senior University Examination Qualification [27] (SUEQ, or in Dutch: 'Senior Kwalificatie Examinering'; SKE) in the first year of their term in the Examination Board. If such a course is not available at the moment of their appointment, they are offered a seat in the next edition of such a course.

3.3 Students' role in the BIT quality assessment scheme

Several procedures are involved to guarantee quality during a course's (or module's) lifetime. To initiate a new course (or redesign a module), the lecturer provides a document describing the topics, learning objectives, teaching methods, planning, teaching material and assessment scheme. The programme committee assesses this document. After the Programme Committee approves, the Examination Board reviews the assessment and the Programme Management authorises the course to be registered and started. While a course is running, the BIT quality-assessment cycle takes place. Students play a relevant role in providing lecturers, the Programme Committee (BITOC), and the Programme Management with a comprehensive report at the end of each course. This document is sent to the lecturers, Programme Committee, and Programme Management. Students' contribution is illustrated in Figure 3.1.

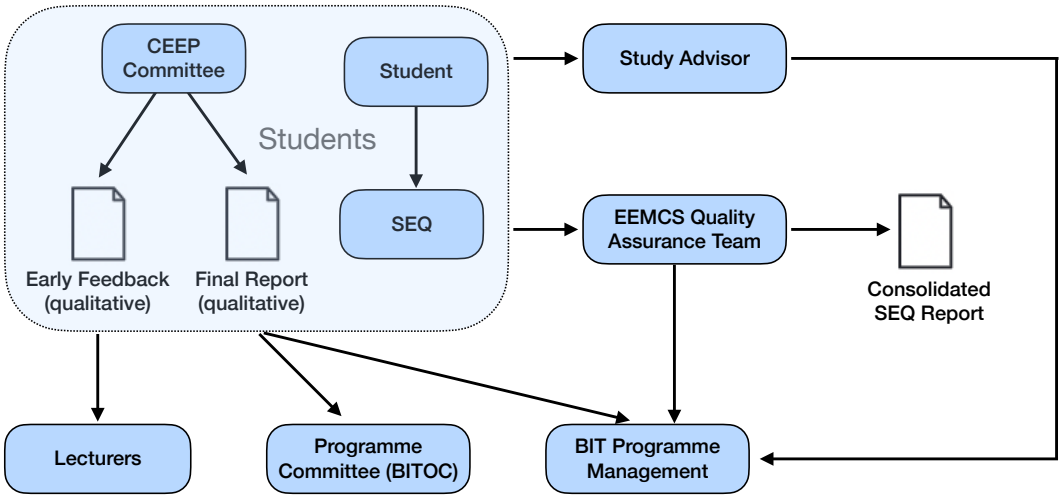


Figure 3.1 Student's role in the BIT Quality Assurance Scheme

CEEP

In-depth feedback

The *CEEP* (Committee for Education Evaluation Panels) is an independent committee formed by students. CEEP supports lecturers and Programme Management with an in–depth evaluation of various educational aspects at the end of a course. This final report (in–depth) is sent to the Programme Committee (BITOC), Programme Management, and the lecturers. It is worth mentioning that attendance to such panels has increased significantly in the last three years.

Quality Control: Student Experience Questionnaire (SEQ)

At the end of a course, each student is asked to fill in the *Student Experience Questionnaire (SEQ)*, providing feedback on content, teaching (since the COVID–19 pandemic, it included questions about online and hybrid education), knowledge and skills gained and study load. The questionnaire also allows for general feedback. The EEMCS Quality Assurance Team consolidates the results of the SEQ and then sends it to the Programme Director and Programme Committee. The Programme Management shares the results with the responsible lecturers and asks for a reflection from the responsible lecturer, including an action plan to address relevant issues. The BIT Programme Committee (BITOC) also receives the consolidated SEQ and analyses it together with the report provided by the CEEP. The BIT Programme Committee, based on the outcomes, provides the Programme Management with a set of recommendations to improve the course whenever applicable.

This document is available for the committee on the password–protected website.

An overview and the evaluations of recent SEQ results are described in the report '*Quality Control Business Information Technology*'. Of the 10 bachelor's modules, 8 have satisfactory or good overall marks. The coordinators of the remaining two modules have been contacted, and a redesign cycle was initiated.

3.4 Safeguarding quality of education

In 2023, the BIT Programme sealed an agreement with the BIT EB subcommittee and the EEMCS Quality Assurance Team on a new workflow for continuous improvement, illustrated in Figure 3.2.

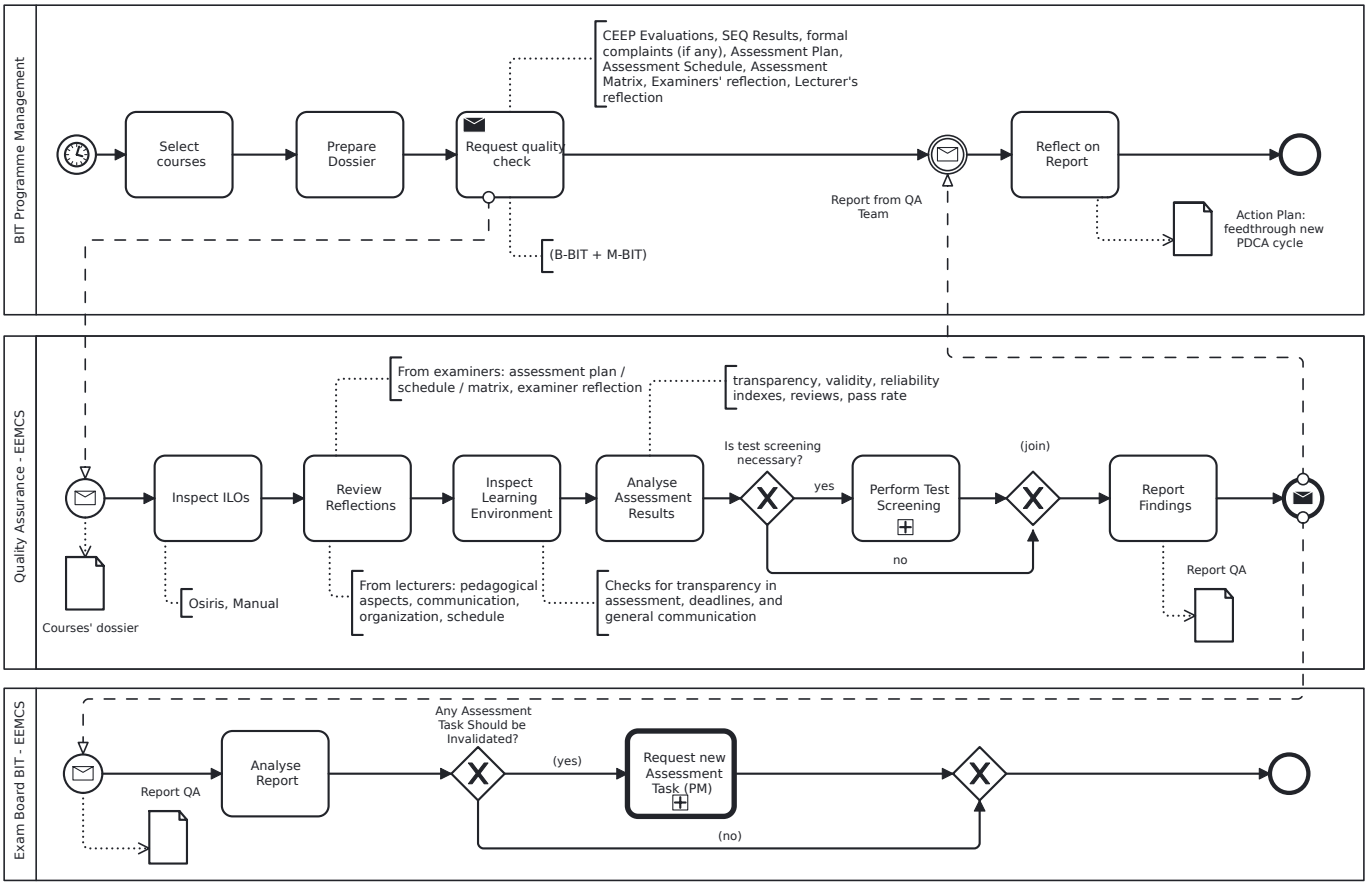


Figure 3.2 BIT Quality Assurance Workflow
Also available as a single pdf [26]

In the workflow illustrated in Figure 3.2, at the end of each quartile, the Programme Management prepares a dossier about the selected courses, including all relevant information for quality

assessment, namely CEEP Reports, SEQ results, formal complaints (if any), Assessment Plan/Schedule/Matrix, Examiners' reflections and lecturers' reflections. The dossier comprises documents related to one bachelor's module (including multiple study units) and two master's courses. This ensures that all bachelor modules are checked at least every three years.

Thorough evaluation

The EEMCS QA Team starts by checking the quality of the course ILOs (language, clarity, and the matching Course and Programme ILOs), the reflections of lecturers and examiners, the learning environment, and the assessment results. The evaluation includes pedagogical aspects, communication, organisation of the module, and assessment (transparency, validity, reliability, and success rate). Based on this assessment, the QA Team decides if a complete screening is necessary. Finally, the QA Team prepares a report about the evaluation and sends it to the lecturers, the Programme Management, and the Examination Board.

Upon receiving the report from the evaluated courses, the Programme Management reflects on the results and prepares an Action Plan. The Examination Board, however, checks whether any Assessment Task (test, project, etc.) must be deemed invalid. Should any assessment task be considered invalid, the Examination Board requests the Programme Management to prepare a replacement assessment task.

Follow-up assessment: redesign cycle

Whenever a course receives improvement requests from any contributing committee (Quality Assurance Team, Examination Board, Programme Committee), it starts the 'redesign cycle.' Courses in the redesign cycle are followed closely by the Programme Educational Coordinator in the following years until a satisfactory result is received. The cycle starts with a meeting involving the Programme Management (director and coordinator), the responsible lecturer and examiners. In this meeting, the lecturers and examiners share their reflections on the received feedback and present an action plan (as part of their PDCA cycle). This action plan is then followed closely in future editions until improvements are satisfactory.

3.4.1 Assessment validity, transparency, and reliability

Assessment scheme in Osiris

Assessment plan on Canvas

The *assessment scheme* is published in the Osiris [13] course information system at least two months before the start of the course so that students are informed about the assessment well in time. A detailed *assessment plan* (including the schedule) for each course is published on Canvas two weeks before the start of a course. Generally, at least one representative practice test is available for students to prepare for the examination. Regulations about assessment transparency and what constitutes a 'representative practice test' (or equivalent) are described in the EER [12].

Peer review

Written tests are *peer-reviewed* to assure the assessment quality. The peer review is done preferably by another lecturer with the necessary content expertise. Alternatively, a senior PhD student can play this role, or can help the lecturer with a simulation of the test (for instance, to check for the feasibility of completion within the allotted time for the test). The aspects checked in the peer review include validity (the complete evaluation of ILOs according to the assessment matrix), reliability (questions' quality and language), and difficulty level.

In the case of oral exams, there are either two assessors (preferred situation), or the exam is recorded in video. In case project reports or presentations are distributed for grading over multiple examiners, they discuss the grading criteria and interpretation to ensure consistency.

3.4.2 Appointment of examiners for courses and internships

University Teaching Qualification (UTQ)

Examiners are appointed by the EB explicitly for the courses they are involved in. All UT lecturers and examiners are required to have the University Teaching Qualification (UTQ) [29]. The trajectory starts when a lecturer is appointed and should be finalised within 3 years. The UTQ certificate is a prerequisite for further career development. As described in Chapter 2, almost all of the lecturers involved in the Business Information Technology programme have already obtained or are in the process of obtaining their UTQ certification. This guarantees that they are competent to assess students in a transparent, reliable, and valid manner. The EB appoints staff members as examiners if

they have UTQ and (English) Language Proficiency certification. By exception, staff members working towards the UTQ are allowed to assess students.

3.5 Bachelor's Final Project

Following the modular structure of TOM, our educational model, students register for the 'Research Module' (Module 12, 202001050) to work on a research project with the individual supervision of one of the approved examiners from EEMCS or BMS faculty. This module is organised by the (Technical) Computer Science Programme and takes the form of a local scientific conference. After finishing their research project, students write a scientific paper to submit through the conference management software. The paper is assessed by 2 additional reviewers selected by the student's supervisor (where one of the reviewers is a student from the same 'track' of the conference). The student's supervisor is the chair of the review committee. As the review committee chair, the supervisor is responsible for consolidating the feedback of other reviewers, making a 'meta-review' and forwarding the feedback document to the student —including their feedback (as supervisor/reviewer). The student's supervisor is responsible for the grading, which is done based on their expertise, their experience with the student during supervision, and the other reviewers' feedback. Finally, to determine the grade, the supervisor applies the following weights to the grading criteria: Scientific Quality (50%), Paper Writing Quality (20%), Oral Presentation (10%), and Overall Process (20%).

3.6 Academic Misconduct

Rules and guidelines

The EEMCS faculty has specified the rules and guidelines for the EB in Rules and Guidelines 2021–2022, EEMCS [30]. This document describes measures that guarantee the orderly conduct of the examination processes. With respect to academic misconduct, the document specifies:

- Scientific integrity and academic misconduct, preventive measures and consequences of academic misconduct,
- Rules of order during on–campus written tests,
- Rules of order for remote exams and oral exams,
- Rules in the event of emergencies,
- A procedure for suspected academic misconduct.

The examination board recently made a website on fraud [36].

Plagiarism, free riding, generative AI

One of the examiners' duties is to monitor examinations and check for academic misconduct. In case of suspicion, the examiner informs the student and the BIT subcommittee of the EB. One of the duties of the BIT subcommittee is to assess the case and determine consequences. Tools are available for examiners to detect plagiarism [31]. On the Final Project evaluation form, a box has to be ticked explicitly to confirm that the thesis has been checked for plagiarism. Within the B-BIT Module 1, a part of the first lecture is dedicated to the Netherlands Code of Conduct for Research Integrity [32]. Additionally, in the 'Introduction to BIT' and 'Research Methods' study units, the lecturer discusses academic integrity and misconduct, approaching topics like plagiarism, free-riding, and the use of generative AI services like the Open AI ChatGPT.

3.7 Impact of the COVID–19 pandemic

Oral tests

Immediately after the first lockdown in the Spring of 2020, teachers had to adapt not only the mode of education but also the mode of assessment. In most cases, written tests were held onsite (or delayed as a last resource). Oral tests could be held online. Working this way, the risks of fraud were limited because of the immediate two–directional interaction between examiner and student.

Written tests

Regarding written tests , however, the UT issued guidelines for those held online to mitigate the risk of fraud by students. The measures were as follows:

- Online proctoring was limited to personal inspection of the student, writing the test, by invigilators using the camera of the student's laptop,

- An integrity statement was added to all online exams, and the statement that the entire exam could be declared invalid when irregularities in the outcome would warrant this. In addition, students could be selected at random for an oral discussion about the test afterwards. During this discussion, the examiner could test if the student could make clear that he/she indeed understood the answers given during the test. Only a few written tests (closed book) were organised as the risks of fraud were considered too high and because of the efforts for invigilation. Instead, other options were used:
  - Written tests were delayed until they could be held onsite. As COVID came in waves, in some periods, onsite tests were possible,
  - Written tests were converted to online oral tests. As argued above, the risks of fraud are limited in this format,
  - Written tests were replaced by assignments with reports, including checks for plagiarism,
  - Written tests were changed from closed book to open book. In this case, simple cheating was no longer an issue, but still care was taken to check for copy and paste from the internet. All changes in the assessment method had to be approved by the EB through an Application form [33]. In this application, the examiner also had to argue that the same learning outcomes, the entire course syllabus, were being tested (validity).

Final Project presentations

A procedure was developed for the online Final Project presentations (Module 12) using a Canvas Conference or Microsoft Teams. Since the module runs like a scientific conference, the session started with a public online presentation by the student to be witnessed by the supervisor and online visitors (the audience of the conference, usually all conference participants: students, supervisors, and guest students and teachers). Next, questions could be posed by the committee members and by visitors. At this point, the supervisor had already prepared most part of the assessment. Therefore, the supervisor took notes during the presentation to finish filling in the evaluation form. The students were informed about their grades directly by their supervisors, by email, with the assessment form attached to the message.

3.8 Strengths, weaknesses, and action points

Strengths

✓ The distance between students, lecturers, and the Programme Management is short, contributing to a quick identification of problems.

✓ Students are seriously involved in the Programme, many of them assuming paid positions to work at various committees (PC, Quality, etc.), with a special contribution to the continuous improvement of the programme's overall quality.

✓ Almost all processes planned in the last cycle were designed and implemented in the current cycle, which contributed to improve overall quality of the programme.

Weakness

✗ The 'paper carousels' approach was not implemented in the Bachelors.

Action Point

- Implement a 'paper carousel' routine to check for the assessment quality in the BSc Final Project.

Standard 4: The programme demonstrates that the intended learning outcomes are achieved.

4 Achieved Learning Outcomes

The B-BIT programme delivers qualified professionals and academics in the Information Systems field. The most common option chosen by our graduates (40%) has been to continue their education in the M-BIT Programme, while the second most common option was to leave the University of Twente, either to join the labour market, return to their country of origin, or pursue a master degree on a study programme of another institution. Finally, some of our graduates, the entrepreneurs, start their own business as discussed in Section 4.2.

4.1 Student satisfaction

We consider student satisfaction an important performance indicator. In the NSE 2023 [35], although some scores oscillated downwards, none of the indicators presented a significantly lower score when compared to the NSE 2022. In the same report, ten indicators are significantly higher in 2023 when compared to the results obtained in 2022. The indicators with significant improvement are 'General skills acquired in the programme', 'Based on my experiences so far, I would choose this course programme again', 'The quality of examination of knowledge and insight', 'The possibility to broaden or deepen the knowledge/skills', 'Acquiring skills for professional practice', and all five indicators within the theme 'Skills - Scientific Skills'. Another result we are proud of is the score obtained on the question 'How likely would you recommend the UT to a friend or relative?', with a score of 8.32 (improved from 7.73 obtained in 2022).

Since the questions change from one year to the next, the comparison with the results obtained in the year that preceded the last panel evaluation (2017) is limited. From the common questions between the 2017 and 2023 NSE results, we would like to highlight the results listed in Table 4.1:

Table 4.1 NSE Results: Comparison 2017 & 2023

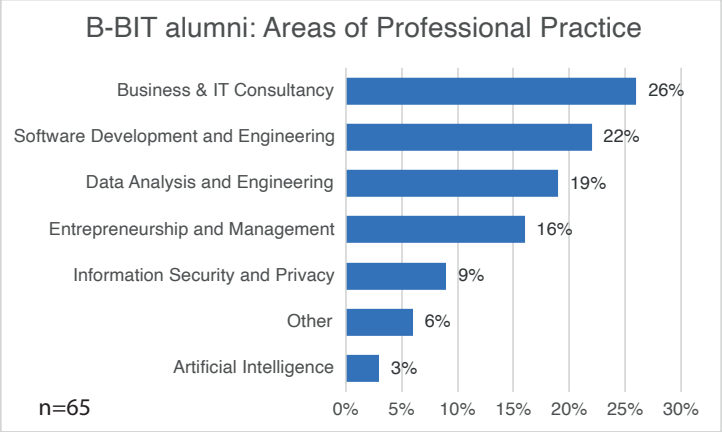
Indicator	2017	2023
The teachers are content experts	4,07	4,22 ▲
The degree to which credits (ECs) correspond to the actual study load	3,26	3,34 ▲
The teachers are involved with the students	3,97	3,84 ▼
Acquiring skills for professional practice	3,78	3,95 ▲
The course programme in general	4,24	3,99 ▼

Although the student–staff distance remains short in the programme, the increased intake observed in the last years and the increased number of staff members may have slightly affected the perception of students regarding the involvement of the lecturers and the programme in general. Although we perceive a constructive interaction student–staff and we receive positive feedback from the students about the programme, we keep observing these indicators closely. These and other aspects of an effective lecturer are addressed in the UTQ trajectory, which is mandatory for all lecturers of the University of Twente. Among the items that improved from 2017 to 2023, we highlight the recognition of the expertise of our lecturers, the designed workload and the development of skills for professional practice.

4.2 Alumni areas of professional practice

One of the indicators we monitor continuously is the performance of our alumni in the Dutch market. We are proud of the professionals and academics we form in the BIT Programme. Among the entrepreneurs, some alumni have had outstanding success, like Mathilde Oude Velthuis, CEO of OVSoftware, and David Lamers, chief visionary, co-founder and CTO of Datakeeper. Among the most recent graduates from the B-BIT programme, Wim Kamerman is the co-founder of Clairify, a startup focused on developing smart IoT devices and analytics to improve indoor environments, a company that took off during the pandemic and due to the increased need to monitor indoor air quality. Other BIT alumni work in businesses in different domains as consultants, developers, designers, etc. Figure 4.1 presents the most common job positions taken by (a sample of) our alumni (graduates from jan/2017 to may/2023, n=65) after graduating. In Figure 4.1, the areas of professional practice aggregate professional roles that share a common set of skills (according to the DSFR IS2020) required to work on said professional roles.

Figure 4.1
BIT Alumni: areas of professional practice

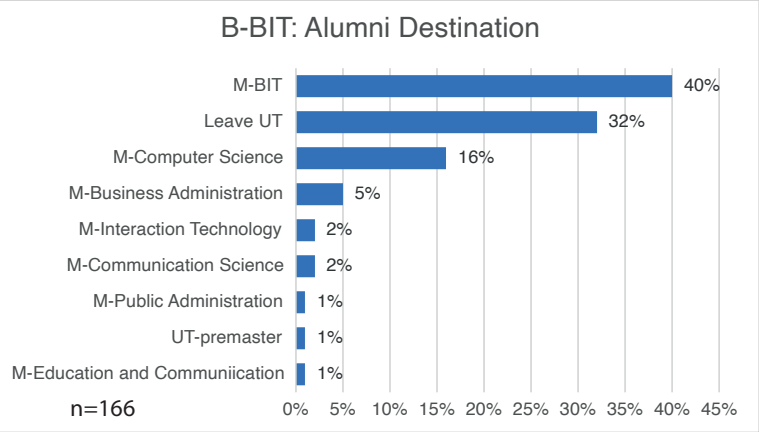


The most common areas of professional practice chosen by our alumni are ‘Business & IT Consultancy’ (23%), Software Development and Engineering (20%), and ‘Data Management and Analysis’ (17%). Among the professional profiles grouped in these areas, the most frequently performed by our alumni are Business Consultant and IT Consultant, Business (Intelligence) Analyst, and Data Analyst, followed by AI or Data Science Consultant. These professional profiles match B-BIT’s learning lines. In the last years, we observed an increased interest in our students to work on research projects (Module 12) related to Cybersecurity. During the production of this report, we observed a relevant number of jobs taken by our alumni in the area of Cybersecurity. The number of final projects of our students on Cybersecurity started to increase in 2020 (Q4, April). This is just after the beginning of the pandemic and the increased need for working remotely as part of the social distancing measures taken during the pandemic (2020–2022).

4.3 After graduation

The most common choices of our B-BIT graduates are continuing their studies on the M-BIT Programme (40%) and Leaving the UT (32%), either to pursuit another institution’s study programme or to join the labour market, as illustrated in Figure 4.2.

Figure 4.2
BIT alumni outflow



The outflow of 40% from B-BIT to M-BIT is lower than that observed in other EEMCS faculty programmes (for instance, CS outflow to its masters programme is 51%). In the previous report, however, the outflow from B-BIT to M-BIT was reported as 52%. At that time, the intake was much smaller, and the internationalisation of the programme hadn't yet affected the intake numbers. Although we are proud of the professional success of our graduates, we would like to inspire B-BIT graduates to continue their education in the M-BIT programme (increasing the outflow to M-BIT) and, ultimately, to pursue an academic career in the IS field. We are investigating ways to improve the connection between B-BIT, M-BIT students and researchers collaborating in the master's programme.

4.4 Internationalisation

Source: LinkedIn, as of September 2023

As part of our alumni monitoring activities, we track their professional trajectory, and we recently started to check if international students stay or leave the Netherlands after they finish their studies. Since the discussion about internationalisation has intensified in Dutch society, we analysed a significant sample of our B-BIT alumni (n=65) that didn't continue their education to a master's programme. From our sample of 65 B-BIT alumni, 20 are foreign nationals, and 12 of them (60%) have found jobs in the Netherlands and have been contributed to the Dutch economy. The percentage of B-BIT alumni who remain in the Netherlands and join the local labour market is similar to that of the M-BIT alumni (58%).

60% of internationals remain in the NL

4.5 Strengths, weaknesses, and action points

Strengths

- ✓ Highly appreciated graduates who often take leadership roles in their professional careers.
- ✓ High coherence between the knowledge and skills developed in the B-BIT programme and the professional roles taken by our alumni.
- ✓ High general satisfaction with the BIT programme, expressed by current students and alumni.

Weakness

- ✗ The outflow B-BIT to M-BIT is less than desired.

Action Point

- Improve the connection between the BIT bachelor's programme and the BIT master's programme, possibly by bringing students closer to the research groups linked to the BIT Programme.

This chapter was written by a workgroup of students from different cohorts of the Bachelor and Master BIT programmes. Supported by an Educational consultant, a workshop was organised to collect student views on the BIT programmes. These views were subsequently compiled into this text by the students. Four main themes were defined that helped students focus their views and guide them into the feedback formation process for the Programme Management.

Content of the programmes (Standard 1)

We appreciate the scope of both programmes. The programmes teach us to be critical professionals and to search for new solutions for business. We value the broad array of topics offered in both programmes, preparing us for a role as 'Jacks of all trades' within companies. Furthermore, both the bachelor's and the master's programmes help us connect technical research developments to management and business control. The scope of the BSc programme is very broad as it is designed for students to find out which specific topic suits them best. Every module focuses on a different field of expertise, allowing us to take on different roles and see where our interests lie. During the bachelor's program, students gain a broad understanding of various aspects of modern business technology. This includes learning how to adapt and maintain these technologies effectively, providing us with a concise and satisfying overview of these subjects. Furthermore, by providing broad and diverse topics, we are encouraged to freely observe and interact with real-world problems and situations. The expressiveness of the BIT Programme serves as a guiding light to everyone undergoing their student journey, providing them with an incredible pool of opportunities to freely explore their interests within inter-business and technology relationships. This makes it easier to shape our future, whether it is for choosing a master's or for pursuing a job opportunity. For the master's programme, we are allowed to choose and specialise in one of the two tracks available. Alongside courses which are common, creating a solid knowledge base for every student, the opportunities to broaden our interests are given with the help of track courses and electives (students are free to choose). We like how even though the choice of courses is quite diverse, they all link together and create a whole when you zoom out. It is very satisfying when the knowledge you achieved in another course can be used as an aid in new assignments and projects. Most of the courses offered in both the BSc and MSc programmes go beyond teaching just theory. We are supported to apply the learned knowledge in practical contexts. This is usually done via projects which are either set up in organisations or based on real-life company examples. This approach to learning is highly appreciated. Furthermore, offering us these opportunities promotes metacognition, thus helping with an active approach to learning. The set-up of the programme is generally appreciated, where all modules in the BSc are shared with other degree programmes; however, we see room for improvement. We would like to see a more specific BIT-focused module in year 2, possibly in the form of two electives based on the tracks of the MSc. Some students feel this could improve the density of content in year 2 (which is less full than year 1) and offer them the opportunity to prepare for their MSc whilst also focusing on topics very specific to BIT. Another improvement for the Bachelor is seen in the courses on Research Methodology. These are often seen as the least interesting topics, while they are such an important base for all the research to come. Making the theory more applicable and showing how it is used in a real-life setting (e.g., for the BSc Thesis) would make it more engaging. For example, having an enthusiastic and motivated teacher and/or a clear overview of the course and its use may already improve students' experience.

Teaching and Organisation (Standard 2)

The teaching and support staff of the BIT programmes is perceived as motivating and enthusiastic. They are approachable and willing to help individual students. Teachers are overall knowledgeable and challenge students to excel. Exemplary of that is a Bachelor teacher who made visible improvements since his arrival at the university. By adding a mentoring approach, in which older students could assist newer students with both studying and personal issues (e.g., having bi-weekly meetings to discuss progress, being a first point of contact in case something was going wrong), students became more engaged. This also created the feeling of a community in which BIT students

can learn and grow with each other. Furthermore, there are also teachers who are extremely attentive, organised and involved in their courses. By having such teachers who strive for the best in both the BSc and the MSc, we feel grateful and are influenced in a positive manner to do our best. For example, having a comprehensive overview of which papers/chapters to read in which week and when all assignments are due helps us to create a proper planning. Some modules and courses, however, are affected by organisational issues. We sometimes feel that the workload of some teachers influences their organisation of courses and course materials. This results in information offered too late or too scattered and diffuse communication lines. Students would highly recommend the programmes to streamline communication channels, prevent the use of many different platforms next to Canvas, and have a backup system in place in case teachers fall ill.

Student evaluation (Standard 3)

Overall, we feel that there is a good balance between group projects and individual assignments and tests. Both in BSc and MSc, we appreciate that group work is always accompanied by individual grades, minimising possible negative effects of group dynamics. For master students, managing multiple groups at the same time is challenging. Usually, an MSc quartile is composed of 3 courses (however, some students can do more or less). Most of the time, a course has a project group, of which we do not always choose the composition. This can sometimes lead to difficulties in group communication, dynamics, or work ethics. Managing multiple different project groups at the same time is very challenging. Especially when you do multiple courses together with the same people, it is convenient to be able to work together. A suggestion for improving the group formation process is for the teachers to let us choose group members and provide us with pointers on the project. Based on them, we can choose appropriately. Generally, we are well prepared for the offered exams, which are transparent and fair. Rules and regulations are clear, so we are aware of what to expect and what is expected of us in return. Open book exams are highly appreciated, as we see this as a fitting assessment form for the topics that are usually covered. Especially for the MSc courses, we prefer the approach of open-book exams as a course covers a lot of information, and the teachers always explain the importance of “knowing where to look” instead of memorising every detail (as this is seen in a work setting as well). Also, example practice exam material is offered to prepare us well, but grading (especially for projects) is sometimes late. Intermediate feedback is often given in modules and coursework and helps students to guide their learning. We do feel the examiners could improve the offering of feedback for final assignments. This is often left out, but we do not learn anything from just a grade or some points. Receiving feedback on a project (or another final assignment) helps the learning process and can even be of aid for related future work.

Evaluation of Education (Quality Control)

For the evaluation of education, several activities are organised. For example, panel meetings and questionnaires for feedback on modules and courses, and ad-hoc evaluations of teachers. However, for many courses and modules, the questionnaires are barely filled in. Some teachers have solved this problem by dedicating time during a lecture to fill in the evaluation or by asking us to write some tips and tops on paper. Both approaches lead to a higher engagement in the evaluation process. The panel meetings are very much appreciated, but the timing can sometimes be better. These are often scheduled in busy times (e.g., an exam week), which results in low attendance. Considering the feedback moments, normally, at the end of each module, feedback forms are sent out to students. A visible trend is for students to have suggestions or points of improvement to fill these forms in. Discussing with the students in the course, a consensus has been seen on why not everybody is completing the forms. Most of the time, students lack an update on the feedback they sent, so “What happened with the feedback?”, “Any visible changes?” etc. Given this issue, some teachers are nicely creating interactive sessions at the end of their course in which they can discuss with students. Based on the feedback, they also explain how potential changes will be implemented, and later they mention the changes to the new students in the following year. This is a great addition for the students as their concerns will be considered and then they will help reshape the course.

Final Remarks

Based on our combined views and thoughts we hope that the numerous positive aspects of the programme can be maintained and possibly enriched in the next period of time. Building from the strong aspects of both programmes, we see great potential to improve them further. With our feedback, we hope to have made a meaningful contribution to the future development of the quality of the programmes.

Appendices

A

Comments Previous Assessment

This appendix presents the follow up on the recommendations of the previous assessment.

A.1 Actions at the University of Twente

For the University of Twente, the panel made the following additional recommendations, which we will address.

Recommendation 1	To present some concepts and theories more clearly in the curriculum, for students to better understand them.
Response:	With the adoption of TEM 2.0 in 2020 (B-BIT), all course descriptions were updated to list each study unit's ILOs separately. This helped clarify the learning objectives of each study unit, among other benefits in the study plan progression.

Recommendation 2	To monitor the proportion of UTQ-certified lecturers, as this number is relatively modest.
Initial response:	The last self-evaluation report listed a total of 54% of lecturers with UTQ (or exempted), 20% with the status 'started UTQ'. To improve these numbers, the EEMCS and BMS faculties took the following measures: career progression cannot occur before obtaining UTQ certification, workshops and supporting groups were created to help lecturers streamline their UTQ trajectory, increased staff dedicated to UTQ supervision, and adding the requirement to start UTQ trajectory to be appointed as a lecturer or examiner.
Current status:	Currently we have 74% of our lecturers UTQ-certified and 20% are on the process to obtain it. Only 6% didn't start the UTQ. The lecturers that didn't start UTQ can't be appointed as examiners and can only work supporting the appointed lecturer and examiner.

Recommendation 3	To strengthen the research efforts in information science within the Faculty of Electrical Engineering, Mathematics and Computer Science.
Initial response:	There has been a sharp increase in the number of faculty members and their involvement with BIT, also made possible by the sector plans, and this has strengthened the research within Information Systems. For example, within the SCS department, newly hired Prof. Giancarlo Guizzardi and his already large group are now working on *Conceptual Modeling*, *Ontologies* and *Enterprise Semantics*. Within the Human Media Interaction department, new positions have been created in *Language and Multimedia: Analysis, Retrieval and Interaction* and in *Conversational and Interactive Agents* (Assistant Professors Lorenzo Gatti and Shenghui Wang, Associate Professors Birna van Riemsdijk and Khiet Thruong, respectively). Our students published 25+ papers in scientific conferences and journals from 2017 to 2022.
Current status:	To benefit from the expertise of new colleagues and the added capacity of our groups to perform research within the Information Systems field, we planned a series of curriculum and research workshops that will take place starting the following year. Our goals include strengthening the connection between education and research and leveraging the expertise of our new colleagues to update the BIT curriculum, opening new research lines within the programme. It's worth noticing that this added capacity also happened within BMS Faculty, which adds even more opportunities but also creates the need to update the *Identity of the BIT Programme* to one that increases the sense of belonging and benefits from the newly added research and education capacity.
Recommendation 4	To increase the study load, stimulating students to spend a minimum of 40 hours per week on their studies.
Initial response:	The study load in the Programme has increased since 2020 due to the adoption of a new pedagogical approach that privileged the contact hours, especially in the Programming and Mathematics lines. In the surveys for quality control, students have consistently indicated that the workload is high in the first year and we don't see space to increase it further (except for Mathematics. It's worth checking the feedback on workload on 2nd year modules).
Current status:	The review in the Mathematics line is ongoing and the current stage includes one-on-one support with a tutor, in addition to the existing contact hours.
Recommendation 5	To intensify the carousel meetings to discuss and calibrate Bachelor Research Projects' assessments and grades, the carousels themselves being greeted by the panel.
Current status:	An internal 'paper carousel' for the BSc Final Projects is planned for the calendar year 2024.

B

Intended Learning Outcomes

Pages 30 and 31 are best viewed in a two-page view as two opposite pages.

In this Appendix we provide the full version of the Intended Learning Outcomes (Table B.1) and their relation with the competencies of the DSFR (Table B.2) and Meijer's Criteria (Table B.3).

Table B.1 Full version of the Intended Learning Outcomes

After completing this study programme the graduate:

1	**Business domain knowledge and skills**
1.1	Understands theories of the process behind the production of goods and services and can apply this in designing solutions.
1.2	Understands models of costing and budgeting and their significance for the ability to manage business processes and can apply this in designing solutions.
1.3	Can analyse, design and/or redesign business processes that support business operations, making use of theories and models of business processes and methods for analysis and design.
2	**Information Technology domain knowledge and skills**
2.1	Understands the methods, techniques and tools for the development of software systems and can apply them.
2.2	Understands theories, methods and techniques for the management and analysis of data, as well as of relevant implementation and maintenance aspects.
2.3	Knows and understands how to design user interfaces, focusing on the interactions between the end-users and the system.
2.4	Knows and understands how to design, implement, and manage secure information systems and networks.
3	**Business-IT alignment knowledge and skills**
3.1	Can systematically integrate requirements and practices from business and IT in specified application areas using theories and models of organisation and IT.
3.2	Understands theories concerning the role of information technology in business operations and innovation.
3.3	Can analyse, design and/or redesign the information systems that support business operations using the design cycle (see 4.1).
3.4	Understands the management aspects, quality and risk management of the software development process and software products.
3.5	Can analyse and interpret data through data-driven approaches to inform intelligent business decision-making and drive innovation.
4	**Scientific approach**
4.1	Can under supervision systematically apply the design cycle (analysis, design, implementation, evaluation and reflection) to IT– and business–related problems, while applying theories from different disciplines if necessary.
4.2	Can under supervision systematically design and execute a research plan (literature research, problem analysis, formulating hypothesis, design and execution of a research plan, data analysis, reporting, conclusions) crossing different disciplines or fields if necessary.
4.3	Has basic knowledge of, and is able to apply research methodology and research ethics, both in the area of social science research as in design research.
4.4	Can apply creative and critical thinking, reflection and argumentation.
4.5	Is capable of independently acquiring new knowledge and skills from different disciplines.
4.6	Can apply specific mathematical theories, and analyse problems and solutions conceptually.

Table B.1a Intended Learning Outcomes (continued)

5	**Professional skills**
5.1	Can co–operate, discuss and report in written and verbal ways, in English, in both professional and research settings, and is aware of the differences between these settings.
5.2	Is capable of working as part of a (multi-disciplinary) team in different roles, as member or leader, in terms of sharing responsibilities, applying time management, and planning resources and reporting, and is aware of group dynamics in development projects.
5.3	Is capable of functioning as a professional in and between different disciplines/fields.
5.4	Is capable of setting up and leading a (simple) enterprise.
5.5	Is capable of shaping his/her learning process, his/her competencies and develop his/her professional identity, by deliberately choosing, motivating and completing study units that match personal capacities, skills, and motives.
6	**Taking account of Social and Temporal context**
6.1	Is capable of analysing and discussing ethical, social, cultural, and societal aspects of problems, solutions and developments and their consequences in the field.
6.2	Can value differences between cultures and can learn from these.

Table B.2 Relation between the ILOs and the competencies in the DSFR

		Programme Intended Learning Outcomes																								
	Competencies of IS 2020	1.1	1.2	1.3	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	3.5	4.1	4.2	4.3	4.4	4.5	4.6	5.1	5.2	5.3	5.4	5.5	6.1	6.2
1	**Foundations**	●	●	●	●					●										●	●				●	●
1a	Foundations of Information Systems																									
2	**Data & Information Management**					●							●													
2a	Data / Info. Management																									
3	**Technology and Security**					●		●																		
3a	IT Infrastructure																									
3b	Secure computing																									
4	**Development**				●		●	●			●															
4a	Systems analysis & design																									
4b	Application Development & Programming																									
5	**Organisational Domain**	●	●	●					●	●	●														●	●
5a	Ethics, use and implications for society																									
5b	IS management and strategy																									
6	**Integration**	●	●	●	●	●		●	●	●	●	●														
6a	IS Project Management																									
6b	IS Practicum																									

Table B.3 Relation between the ILOs and the Meijers Criteria

		Programme Intended Learning Outcomes																								
	Meijers' criteria	1.1	1.2	1.3	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	3.5	4.1	4.2	4.3	4.4	4.5	4.6	5.1	5.2	5.3	5.4	5.5	6.1	6.2
1.	is competent in one or more scientific disciplines	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●								
2.	is competent in doing research								●	●	●			●	●	●	●	●	●		●					
3.	is competent in designing		●	●	●	●	●	●	●	●	●	●	●	●			●		●		●					
4.	has a scientific approach		●	●	●				●					●	●	●	●	●	●	●		●				
5.	possesses basic intellectual skills												●	●	●	●	●		●	●				●		
6.	is competent in co–operating and communicating											●		●						●	●	●	●		●	●
7.	takes account of the temporal and the social context												●									●			●	

C

Overview of Modules and Courses

The course codes refer to the course information system OSIRIS [13].

Module 1 Introduction to BIT (202001060)

	Year 1	EC
202001187	Introduction to mathematics + Calculus 1A for BIT	4
202001061	Intro to Computer Science	6
202001062	Intro to Business Information Technology	4
202100155	Research Methods	1

Module 2 Software Development (202001064)

202001194	Calculus 1B for BIT	3
202001065	System Design	4
202001066	Programming	8

Module 3 Business Intelligence and IT (202001067)

202001202	Linear Algebra for BIT	3
202001068	Business Intelligence and Databases	4.5
202001069	Business Process Management	4.5
202001070	Research Methods	2.5
202001071	Academic Skills	0.5

Module 4 Data & Information (202101027)

202001233	Probability Theory for CS/BIT	3
202101028	Data & Information Core	12

Module 5 Finance for Engineers (202000410)

	Year 2	EC
202000411	Accounting and Finance	3.5
202000412	Option Pricing	2.5
202000413	Project Finance for Engineers	6
202100211	IT and Law	3

Module 6 Intelligent Interaction Design (202001031)

202001033	Statistical Techniques	3
202200146	Human-Computer Interaction Design and Evaluation	6
202200145	Artificial Intelligence and Cyber Security	6

Module 7 From Product Design to Online Business (202000420)

202001084	ERP, Apps & ICT Architecture	5
202000421	Product Design to Online Business Theory	4
202000422	Product Design to Online Business Project	6

Module 8 Business Innovation through IT Project (202001087)

202001188	IT Project Design & Initiation	4
202001089	IT Project Performance	4
202001090	IT Project in Context	3
202001091	IT Project Design in Practice	4

	Year 3	EC
Module 9 Minor	Choice of many minors. See for options page 30 of the EER [12].	15
Module 10 Minor	Choice of many minors. See for options page 30 of the EER [12].	15
Module 11 BIT Inc (202001092)	202001093 Practical Component 202001094 Reflection Component	10 5
Module 12 Research Project (202001050)	202001051 Research Project Core Reflection Component	10 5

Table C.13 Relation between the Courses and the ILOs

Courses	Short name	Programme Intended Learning Outcomes																								
		1.1	1.2	1.3	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	3.5	4.1	4.2	4.3	4.4	4.5	4.6	5.1	5.2	5.3	5.4	5.5	6.1	6.2
M1 - Introduction to BIT		●	●	●	●				●	●				●			●		●	●	●			●		
202001187	Intro Math + Calculus 1A																		●							
202001061	Intro to CS				●																			●		
202001062	Intro to BIT	●	●	●					●	●										●	●					
202100155	Research Methods M1													●			●									
Module 2 - Software Development					●			●		●									●		●			●		
202001194	Calculus 1B for BIT																		●							
202001065	System Design				●					●											●					
202001066	Programming				●			●													●			●		
M3 - Business Intelligence and IT				●		●			●	●	●		●		●	●	●		●	●	●	●		●		
202001202	Linear Algebra																		●							
202001068	B. Intelligence & DB					●							●								●					
202001069	Business Process Mngmt			●					●	●	●										●					
202001070	Research Methods														●	●										
202001071	Academic Skills																●			●				●		
Module 4 - Data & Information					●	●	●	●			●	●							●		●					●
202001233	Probability Theory																		●							
202101028	Data & Information				●	●	●	●			●	●									●					●
M5 - Finance for Engineers			●																●	●	●					
202000411	Accounting and Finance		●																●							
202000412	Option Pricing																		●							
202000413	Project Finance for Eng.		●																		●					
202100211	IT and Law																			●						
M6 - Intelligent Interaction Design							●	●						●					●	●	●	●				
202001033	Statistical Techniques																		●							
202200146	HCI Design and Evaluation						●							●						●	●	●				
202200145	AI & Cyber Security						●	●																		
M7 - Product Design to Online Business		●	●	●	●	●	●		●	●		●			●	●					●		●		●	
202001084	ERP, Apps & ICT Arch.				●	●	●					●														
202000421	Product Design to Online Business Theory	●	●	●		●	●									●					●		●		●	
202000422	Product Design to Online Business Project	●		●		●			●	●					●								●		●	
M8 - Business Innovation via IT Project									●	●	●	●														
202001188	IT Prj Design & Initiation								●	●	●	●														
202001089	IT Project Performance								●	●	●	●														
202001090	IT Project in Context								●	●	●	●														
202001091	IT Prj Design in Practice								●	●	●	●														
Minor (M9 and 10)																										
M11 - BIT Inc.		●	●	●																					●	●
202001093	Practical Component	●	●	●																						
202001094	Reflection Component																								●	●
M12 - Research Project		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●						●	
202001051	Research Project (Core)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●							
202001051*	Reflection																								●	

For the full names of the modules and courses and links to the OSIRIS descriptions of the courses see the tables at pages 32 and 33.

D

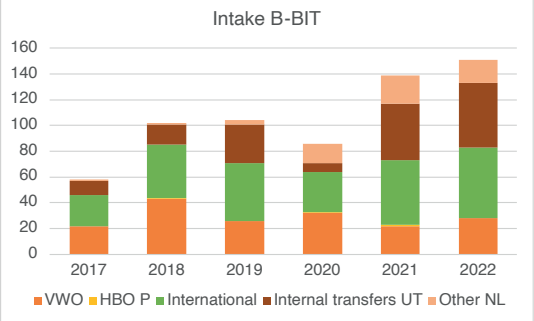
Other Appendices

D.1 Intake of students B-BIT

Table D.1
Intake of students

	2017	2018	2019	2020	2021	2022
VWO	22	43	26	32	22	28
HBO P	0	1	0	1	1	0
International	24	41	45	31	50	55
Internal transfers UT	11	16	30	7	44	50
Other NL	1	1	3	15	22	18
Total	58	102	104	86	139	151

Figure D.1
Table D.1 as a graph



As shown in Table D.1, the influx has increased since 2018. This was one of the action points we addressed after the last accreditation cycle. The internationalisation of the programme (started in 2017) supported this growth. We are happy with the increase in the intake, and we acknowledge the importance of the programme's internationalisation to enrich the formation of our students.

Students with preparatory scientific education (category VWO) account for 19% of the intake, while the average in the faculty is 39%. As a parameter for comparison, a similar programme like Computer Science has a percentage of VWO intake of 38% (twice as big as the BIT intake). Since 2021, we have improved communications about the nature of the programme, aiming to increase the percentage of students with VWO pre-education.

Another outstanding category from Table D.1 is the 'Internal transfers UT', which relates to students who transferred to BIT after having started another programme at the university. Former TCS students who failed to obtain the BSA are the most common source of transferred students to BIT. The courses supporting the BSA decision (first year) are 75% identical in TCS and BIT Programmes. These transfers account for 33% of our intake in 2022, while the average in the faculty is 7%, which is a possible explanation for the dropout rate in the BIT Programme (as discussed in Section D.4).

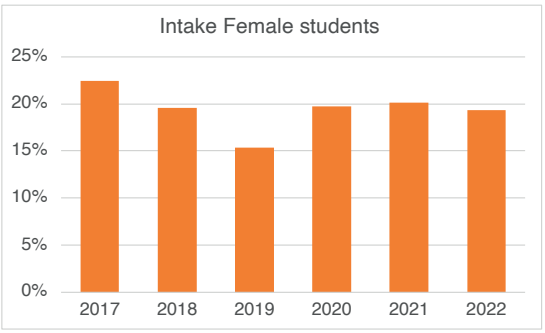
One possible reason for the low percentage of the intake with VWO education is that, until recently, we had no activities of the BIT Programme within Dutch high schools. To increase the intake of female students and all students with VWO, we formed a team with a balanced composition of male/female students to visit Dutch high schools (see action points of Section 2.10). These students will lead workshops and disseminate the typical topics studied in this programme. This kind of activity needs time to show results and we hope to see improvements in 3–5 years both in the female/male ratio and the percentage of Dutch students with VWO.

D.2 Intake of female students

Table D.2
Intake of Female students

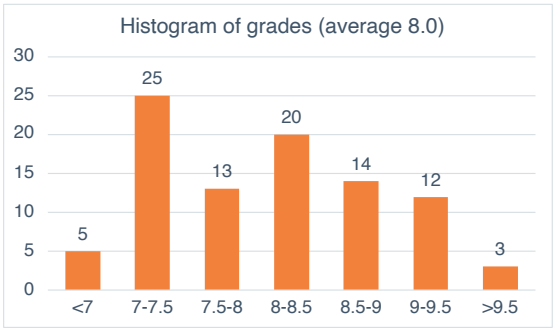
	2017	2018	2019	2020	2021	2022
Female	22%	20%	15%	20%	20%	19%
Numbers	13	20	16	17	28	28

Figure D.2
Table D.2 as a graph



D.3 Grades

Figure D.3
Grades of Final Assignment



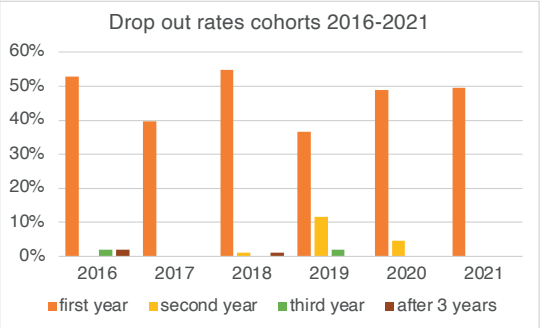
D.4 Dropouts

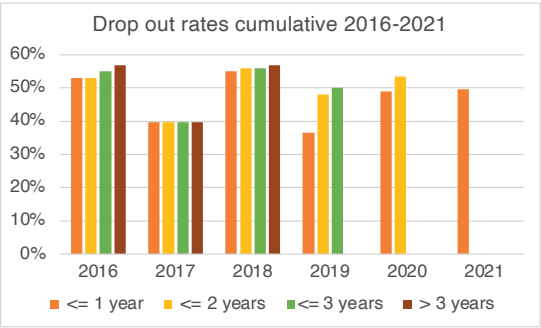
Table D.4
Dropouts (left) and Cumulative Dropouts (right)

cohort:	2016	2017	2018	2019	2020	2021
first year	53%	40%	55%	37%	49%	50%
second year	0%	0%	1%	12%	5%	
third year	2%	0%	0%	2%		
after 3 years	2%	0%	1%			

cohort:	2016	2017	2018	2019	2020	2021
≤ 1 year	53%	40%	55%	37%	49%	50%
≤ years	53%	40%	56%	48%	53%	
≤ 3 years	55%	40%	56%	50%		
> 3 years	57%	40%	57%			

Figure D.4
Tables D.4 as graphs





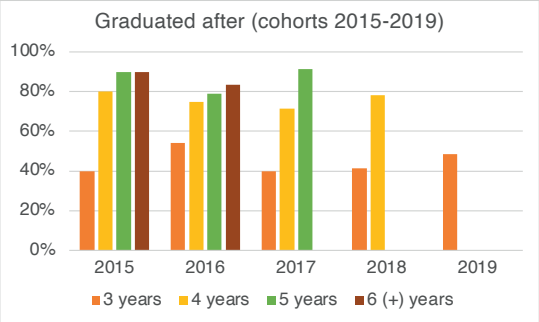
This is a very selective programme: the success rate after the first year is an indication of this programme's selectivity. Additionally, we acknowledge that TOM has shifted the dropouts from the last years to the first, which we consider as a positive feature of TOM. However, the dropout rate in the first year is high even when compared to the rate in the UT as a whole (equally affected by TOM) and within the programmes offered by the EEMCS faculty (more technical programmes). While we are happy with the low dropout rate of the second and third years, the rate in the first year doesn't meet our expectations. It's worth noticing, however, that the intake of students with VWO in this programme is 19%, while the average within EEMCS is 39% and TCS is 38%.

D.5 Graduated students

Table D.5
Number of graduated students (cumulative) after excluding the dropouts after the first year.

cohort:	2015	2016	2017	2018	2019
≤ 3 years	40%	54%	40%	41%	48%
≤ 4 years	80%	75%	71%	78%	
≤5 years	90%	79%	91%		
> 6 (+) years	90%	83%			

Figure D.5
Table D.5 as a graph



The percentage of students that graduate is stable and approximately 80% graduate within four years. However, the percentage of students that graduate within three years is less than desired. We started the pedagogical redesign of the Programming line in 2020, and the results are satisfactory: the pass rate improved from 38% (2019) to stable 70% in 2020, 2021, and 2022. This could lead to some improvements already in 2023. However, we observed a relevant drop in the mathematics line pass rate (approx. 10-15% depending on the course) starting from 2021. The mathematics line was slightly redesigned in 2018 and we expected to see improvements instead. We are investigating the reasons for this sudden drop in the mathematics line results. At the same time, we asked our QA team to coordinate a relevant redesign in the mathematics line following feedback from our students through the formal instruments of quality assurance (SEQ, CEEP Panels). Since these two learning lines have a strong influence on the BSA, it consequently affects the dropout rates in the first year and the time needed to graduate (for those who obtain the BSA). The reasons listed above motivated the redesign of the mathematics line, which is listed as an action point in Section 2.10.

D.6 External Advisory Board

Table D.6
External Advisory Board.
See for more details the info at the www [9]

Name	Company
Dick Pauw (Chair)	Self-employed
Mathilde Stelloo-Oude Velthuis	OV Software
Rik Goslinga	Paypal
Ton van Rhijn	CZ
Jan-Laurens Lasonder	University of Twente
Floor de Jong	Shell
Hans Lesscher	Odin Group

Since it started in 1993, the BIT programme has always kept close contact with the industry. The BIT Advisory Board has been established already in 1996, and consists of representatives of the industry of relevance to the BIT programme. Twice a year, the Programme Management meets with the BIT Advisory Board to discuss the BIT programmes. Members of the Advisory Board have senior positions in organisations that are relevant for the BIT Bachelor and Master programmes (currently KPMG, OVSoftware, ATKearney, Odin group and CZ insurance) and provide solicited and unsolicited valuable feedback on issues like the contents and quality of the curricula, skills development and inflow and output of students. Furthermore, the Programme Management makes use of the professional network of the board members for educational ends, e.g., to ask for guest lecturers and project proposals.

D.6 Staff of the programme

Information about the programme staff is given in Table D.7. The majority of the lecturing staff is dedicated to two programmes, therefore their teaching time should be considered as half the usual (50/2=25%). The overview in Table D.7 concerns the BIT contributors of both EEMCS and BMS faculties.

Table D.7
Programme staff (Spring 2023)

	#	%	
Total staff (persons)	104	100%	HL: 8% , UHD: 15%, UD: 54%, docent: 17%, guest: 2%, researcher: 3%, OHL*: 1%
Female	33	32%	HL: 6%, UHD: 15%, UD: 58%, docent: 18%, OHL: 3%
Total staff (fte)	90,8		
Qualifications			
PhD	97	93%	4 Lecturers & 2 researchers are doing their PhD / 1 guest lecturer has an MSc. Degree
UTQ Completed	48	46%	
UTQ Started	28	27%	
Exemption	21	20%	Diploma equivalent to UTQ, decided by CES
UTQ no obligation	1	1%	Decided by dean, historically >20 years experience with teaching
Total UTQ	98	94%	
UTQ not started	6	6%	
English C1, C2 level	98	94%	
Docent	18	17%	Staff members with the main task of teaching

More detailed information about the staff is available for the committee on a password-protected web page.

Most of the lecturers of the programme are permanent staff members or tenure trackers of research groups within the EEMCS and BMS faculties (2% of guest lecturers, 3% of researchers). All faculty members on a professorship or lecturership must get the language certification within one month of their appointment for a position at the University of Twente. That's why the percentage of BIT teachers with language certification is 94% . Additionally, in most cases, researchers and guest lecturers must also provide a language certificate before their appointment, although we don't compute this into our calculation (we count them as not certified).

D.7 Student–staff ratio BIT

The basic assumption in calculating the student/staff ratio is that the teaching time of each lecturer is shared with another programme. While the lecturers of EEMCS often teach also at the Computer Science Programme, the lecturers of BMS faculty often teach at the Industrial Engineering & Management Programme. Therefore, considering our faculty members should dedicate at least 50% of their time to teaching activities, we apply a default rate of 25% of the FTE's of each faculty member in a professorship role (Assistant, Associate, or Full Professors). For the lecturerships (docent), it is expected a greater proportion of their time (70%) to be dedicated to teaching activities. Therefore, for the faculty members following a lecturership career, we consider the dedication to BIT as half their dedication to teaching, hence 35% .

Based on the data of Table D.7 we computed the student/staff ratio as follows:

- The adjusted FTEs dedicated to teaching in the BIT Programme is 25,83,
  - this number is based on the data of Table D.7, in which the total FTEs of our programme's staff is 90.8. The same table shows a 25% rate for the professorship faculty members' FTEs and 35% of lecturership members', which results in an adjusted FTE of 25,83.
- The number of active students (B-BIT + M-BIT) is 395,
- The student–staff ratio is: 395/25,8 = 15,3.

Index

References

[1] Self Evaluation (this report)
https://visitationbit.utwente.nl/2023/doc/B_BIT_2023.pdf

[2] Website of this vistation
https://visitationbit.utwente.nl/2023/

[3] Positive audit (28 April 2020
https:
//visitationbit.utwente.nl/2023/doc/007799_21PH_Universiteit_Twente_ITK_Besluit_2020.pdf

[4] NVAO report 22 March 2020
https:
//visitationbit.utwente.nl/2023/doc/007799_21PH_Universiteit_Twente_ITK_Rapport_2020.pdf

[5] Quality Assurance Framework for Student Assessment UT
https://www.utwente.nl/en/examination-board/Policy-rules-guidelines/
quality-assurance-framework-student-assessment-ut-12-dec-2016.pdf

[6] EEMCS faculty assessment policy
https://visitationbit.utwente.nl/2023/doc/Assessment_Policy_EEMCS.pdf

[7] Assessment Framework NVAO 2018
https://visitationbit.utwente.nl/2023/doc/Assessment-Framework-NVAO-2018.pdf

[8] Domain-Specific Frame of Reference
https://visitationbit.utwente.nl/2023/doc/DSFRBACHELORS-is2020.pdf

[9] External Advisory Board (EAB)
https://visitationbit.utwente.nl/2023/doc/AdvisoryBoardBIT.pdf

[10] Inter-Actief
https://www.inter-actief.utwente.nl

[11] ENIAC
https://eniacalumni.wordpress.com

[12] Education and Examination Regulations (EER)
https://visitationbit.utwente.nl/2023/doc/eemcs-b-eer-2022-bit.pdf

[13] Osiris
https://osiris.utwente.nl/student/OnderwijsCatalogusZoekCursus.do

[14] Criteria for Academic Bachelor's and Master's Curricula, also known as the Meijers criteria
https://visitationbit.utwente.nl/2023/doc/Meijers.pdf

[15] Summary of the Meijers criteria
https://visitationbit.utwente.nl/2023/doc/Meijers_summarised.pdf

[16] Dublin Descriptors
https://visitationbit.utwente.nl/2023/doc/DublinDescriptors.pdf

[17] Entry requirements UT website
https://www.utwente.nl/en/education/bachelor/programmes/business-information-technology/
enrolment/admission/

[18] Entry requirements
https:
//visitationbit.utwente.nl/2023/doc/AdmissionrequirementsBusinessInformationTechnology.pdf

[19] Information for propspective students
https://www.utwente.nl/en/education/bachelor/programmes/business-information-technology/

[20] Statement of the rectores of all Dutch universities
https://visitationbit.utwente.nl/2023/doc/Agooduniversityisaninternationaluniversity.pdf

[21] Twente Educational Model
https://visitationbit.utwente.nl/2023/doc/tom-brochure-2017-final.pdf

[22] Online Teaching
https://www.utwente.nl/en/learning-teaching/Expertises/online-lectures/

[23] Mobility–Online
https://www.utwente.nl/en/educational-systems/about-the-applications/mo/

[24] Wet op het hoger onderwijs en wetenschappelijk onderzoek (WHW), 2017. [Online].
http://wetten.overheid.nl/BWBR0005682/2017-09-01

[25] EEMCS Faculty Regulations document
https://visitationbit.utwente.nl/2023/doc/ewi191061-faculty-regulations-eemcs.pdf

[26] BIT Quality Control
https://visitationbit.utwente.nl/2023/doc/quality-control-bit.pdf

[27] Senior University Examination Qualification
https://www.utwente.nl/en/examination-board/Expertise_SKE/

[28] Overview of the subcommittees
https://www.utwente.nl/en/eemcs/education/examination-board/

[29] University Teaching Qualification (UTQ)
https://www.utwente.nl/en/ces/celt/utq/

[30] EEMCS Rules & Guidelines
https://visitationbit.utwente.nl/2023/doc/RulesAndGuidelines21-22-final.pdf

[31] Plagiarism
https://www.utwente.nl/en/educational-systems/about-the-applications/plagiarism-check/

[32] Netherlands Code of Conduct for Research Integrity
https:
//visitationbit.utwente.nl/2023/doc/NetherlandsCodeofConductforResearchIntegrity2018.pdf

[33] Questionairy to check for potential issues due to Corona
https://visitationbit.utwente.nl/2023/doc/Corona-related-Issues.pdf

[34] Netherlands Code of Conduct for Research Quality Assurance Workflow
https://visitationbit.utwente.nl/2023/doc/quality-control-bit.pdf

[35] National Student Enquiry (NSE 2023)
https://visitationbit.utwente.nl/2023/doc/NSE2023-BBIT-Report(56066).pdf

[36] Fraud
https://www.utwente.nl/en/eemcs/education/examination-board/fraud/

[37] Twente Student Conference on IT)
https://sites.google.com/utwente.nl/tscit35/

[38] Student–staff ratios
https://visitationbit.utwente.nl/2023/doc/Studentengroei.pdf

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