

## ASIIN Seal Accreditation Report

Bachelor's Degree Programmes Information Technology High Quality Information Technology (Japanese)

Master's Degree Programme *Computer Science* 

Provided by The University of Danang – University of Science and Technology

Version: 8<sup>th</sup> December 2023

## **Table of Content**

Α	About the Accreditation Process	
B	Characteristics of the Degree Programmes5	
С	Peer Report for the ASIIN Seal	
	1. The Degree Programme: Concept, content & implementation7	
	2. The degree programme: structures, methods and implementation	
	3. Exams: System, concept and organisation28	
	4. Resources	
	5. Transparency and documentation	
	6. Quality management: quality assessment and development	
D	Additional Documents	
Ε	Comment of the Higher Education Institution:	
F	Summary: Peer recommendations (20.11.2023)45	
G	Comment of the Technical Committees47	
	Technical Committee 02 – Electrical Engineering/Information Technology (24.12.2023 47	3)
	Technical Committee 04 – Informatics/Computer Science (28.12.2023)	
Н	Decision of the Accreditation Commission (08.12.2023)	

## **A** About the Accreditation Process

Name of the degree pro- gramme (in original language)	(Official) English translation of the name	Labels applied for <sup>1</sup>	Previous accredita- tion (issu- ing agency, validity)	Involved Technical Commit- tees (TC) <sup>2</sup>		
Chương trình đào tạo Công nghệ thông tin trình độ đại học	Bachelor's degree programme in Infor- mation Technology	ASIIN	-/-	04, 02		
Chương trình đào tạo Công nghệ thông tin chất lượng cao Việt-Nhật trình độ đại học	Bachelor's degree programme in High Quality Information Technology (Japa- nese)	ASIIN	-/-	04, 02		
Chương trình đào tạo Khoa học máy tính trình độ cao học	Master's degree pro- gramme in Computer Science	ASIIN	-/-	04		
Date of the contract: 17.02.202	2					
Submission of the final version	of the self-assessment re	eport: 16.02.2023				
Date of the onsite visit: 1819.0	)5.2023					
at: University of Danang						
Expert panel:						
Prof. DrIng. Helena Szczerbicka	i, Leibniz University Hann	over				
Prof. DrIng. Moustafa Nawito, IU International University of Applied Sciences						
Prof. Dr. Paul Grimm, Hochschul	e Darmstadt University o	of Applied Sciences	S			
Dang Ngoc Hai, Branch Director	at Axon Active					
Tong Vo Anh Thuan, student at U University, Ho Chi Minh City	Jniversity of Information	Technology – Viet	nam National			

<sup>&</sup>lt;sup>1</sup> ASIIN Seal for degree programmes

<sup>&</sup>lt;sup>2</sup> TC: Technical Committee for the following subject areas: TC 02 - Electrical Engineering/Information Technology; TC 04 - Informatics/Computer Science.

Representative of the ASIIN headquarter: David Witt	
Responsible decision-making committee: Accreditation Commission for Degree Pro-	
grammes	
Criteria used:	
European Standards and Guidelines as of May 15, 2015	
ASIIN General Criteria, as of December 07, 2021	
Subject-Specific Criteria of Technical Committee 04 – Informatics/Computer Science as of March 29, 2018	
Subject-Specific Criteria of Technical Committee 02 – Electrical Engineering/Information Technology as of December 9, 2011	

## **B** Characteristics of the Degree Programmes

a) Name	Final degree (original/Eng- lish translation)	b) Areas of Spe- cialization	c) Corre- sponding level of the EQF <sup>3</sup>	d) Mode of Study	e) Dou- ble/Joint Degree	f) Duration	g) Credit points/unit	h) Intake rhythm & First time of offer
Ba Information Technology	B.Sc.		6	Full time	-/-	8 Semester	130 CP	Annually, 1992
Ba High Quality In- formation Tech- nology (Japanese)	B.Sc.		6	Full time	-/-	8 Semester	130 CP	Annually,
Ma Computer Sci- ence	M.Sc	- research ori- ented - application ori- ented	7	Full time	-/-	4 Semester	60 CP	Annually,

For the <u>Bachelor's degree programme Information Technology</u> the institution has presented the following profile in the self-assessment report:

"The training objective of the BAIT training program is to train students who, upon graduation, demonstrate: a good command of scientific and technical knowledge; an ability to master the principles and laws of nature and society; competence in doing research as well as in technological application and development in the field of Information Technology; soft skills; creativity; an ability to adapt to multi-disciplinary, multi-cultural, multi-national corporates and social and environmental contexts; ability to pursue lifelong learning; political and moral qualities; professional ethics and responsibility to the environment and society; a sense of service to community and good health. The POs and the PLOs of BAIT were promulgated in Decision No. 1947/QD-DHBK [...]. Graduates from the BAIT meet the PLOs at level 6 of the Vietnam National Qualifications Framework (VNQF). The study programme of BAIT include a specialised track of Data Science and Artificial Intelligence (BAIT-DSAI). The study programme covers basic knowledge in the field of data science including math, probability-statistics, artificial intelligence, machine learning, deep learning, data mining, big data processing/representation, blockchain, specialized professional knowledge, as

<sup>&</sup>lt;sup>3</sup> EQF = The European Qualifications Framework for lifelong learning

well as courses pertaining to innovation and entrepreneurship, etc. Students of the study programme can have internship at IT enterprises and do research with lecturers from their third year."

For the <u>Bachelor's degree programme High Quality in Information Technology</u> the institution has presented the following profile in the self-assessment report:

"Alongside the BAIT, FIT has developed collaborative training programmes with Japanese universities and corporations. The study programme was developed based on exchanges and information sharing between FIT and Japanese corporations, chief amongst which was the strong support of Framgia Viet Nam. DUT has established a committee to approve the Proposal for the establishment of BAIT-HQJA in 2016.

The study programme of BAIT-HQJA, apart from meeting all required learning outcomes intended for the BAIT, is expected to achieve further objectives and learning outcomes as shown [under criterion 1.1]."

For the <u>Master's degree programme Computer Science</u> the institution has presented the following profile in the self-assessment report:

"The general objectives of the Master's Programme in Computer Science is to train graduates with good political qualities and professional ethics; high professionalism; solid indepth knowledge, good practical skills; integrated and systematic thinking methods, ability to organize and solve scientific and technical problems well in the field of Computer Science; competence in doing independent and creative research; autonomy and professional responsibility; awareness of serving the community, meeting the requirements of socioeconomic development; capability in adapting to the globalized socio-economic environment and international integration; ability to pursue lifelong learning and higher education [...].In the improved version of the Master's curriculum as of 2022, students can enrol for one of the two tracks:

- Master's Programme in Computer Science (Research) (MACS-Re)
- Master's Programme in Computer Science (Applied) (MACS-App)"

## **C** Peer Report for the ASIIN Seal

## 1. The Degree Programme: Concept, content & implementation

Criterion 1.1 Objectives and learning outcomes of a degree programme (intended qualifications profile)

#### Evidence:

- Module handbooks for all degree programmes
- Curricula for all degree programmes
- Self-Assessment Report
- Diploma Supplements
- Websites for all degree programmes
- Objective-module-matrix for each degree programme
- Discussions during the audit

#### Preliminary assessment and analysis of the peers:

The experts base their assessment of the learning outcomes on the information provided in the module descriptions, on the websites, the Diploma Supplements, the objective-module-matrices and in the Self-Assessment Report of the <u>three degree programmes</u> under review. For all three programmes, DUT has described programme objectives (POs) as well as programme learning outcomes (PLOs). The POs and PLOs are published on the programme's website. and easily accessible for students as well as other stakeholders. Furthermore, there are regular revision processes in place that take into account feedback by external and internal stakeholders.

The experts refer to the Subject-Specific Criteria (SSC) of the Technical Committees Informatics/Computer Science and Electrical Engineering/Information Technology and use the objective-module-matrix and the module descriptions as a basis for judging whether the intended learning outcomes correspond with the competences as outlined by the SSC.

The experts note that the development of PLOs of the study programmes involves both internal and external stakeholders so that the curricula can be adapted and modified according to the needs of the industry and the graduates on a regular basis. For example, DUT

regularly conducts surveys, through which the different stakeholders get the chance to assess the programmes and their main objectives and adapt them if necessary. Internal stakeholders include all of DUT members (students, teaching staff, and non-academic employees), while the external stakeholders include the industry, alumni, the government, and society.

For the <u>Bachelor's degree Information Technology</u>, DUT defines the following programme objectives:

#### "1.1. General Program Objective

The general objective of the Information Technology undergraduate program, University of Science and Technology - The University of Danang is to train learners with political and ethical qualities; have scientific and technical knowledge, professional practice skills; have research, application and development capacity in the field of Information Technology commensurate with their training level; capable of lifelong learning; have creative ability and professional responsibility, adapt to the corporate, social and multi-disciplinary, multi-cultural and multinational working environment; to have a healthy body; consciously serving the community, meeting the requirements of socio-economic development, ensuring national defense and security.

#### 1.2. Specific Program Objectives

Graduates of the Information Technology undergraduate program at the University of Science and Technology - The University of Danang:

1. Have comprehensive professional knowledge, mastering the principles and laws of nature - society;

2. Have basic practical skills; have the ability to apply techniques and technologies to solve problems in the field of Information Technology;

3. Have ability to work independently and creatively; capable of implementing information technology systems to meet socio-economic needs;

4. Have ability to work effectively in a team as a team member or leader; Ability to communicate in a multicultural and multinational environment. "

Learning outcomes:

1. Ability to apply knowledge of Mathematics, basic science and technology to solve and research problems in the field of Information Technology.

2. Ability to apply principles in computing as well as in related disciplines to analyze problems, design, implement and evaluate Information Technology solutions.

3. Ability to think critically, creatively, entrepreneurially, and professionally.

4. Ethical, professional responsibility in the field of Information Technology.

5. Able to communicate effectively in an international and multicultural environment; have foreign language proficiency TOEIC 450 or higher or equivalent.

6. Ability to conceptualize, select, design, integrate, evaluate and administer information technology systems in business, social and environmental contexts.

7. Ability to plan and manage IT projects."

DUT states that graduates of this study programme are capable of working in several areas as programmer (software product development, business analysis, software design, software programming, software testing, information technology project management), as network system administrator, and as "specialist in information system administration about databases, enterprise information systems, data analysis and mining."

For the <u>Bachelor's degree High Quality Information Technology</u>, DUT defines the following programme objectives:

#### "General Program Objective

The general objective of the Information Technology undergraduate program, University of Science and Technology - The University of Danang is to train learners with political and ethical qualities; have scientific and technical knowledge, professional practice skills; have research, application and development capacity in the field of Information Technology commensurate with their training level; capable of lifelong learning; have creative ability and professional responsibility, adapt to the corporate, social and multi-disciplinary, multi-cultural and multinational working environment; to have a healthy body; consciously serving the community, meeting the requirements of socio-economic development, ensuring national defense and security. [...]

Graduates the High-quality Information Technology (Japanese) undergraduate program at University of Science and Technology - The University of Danang have the ability to:

1. Apply knowledge of Mathematics and basic science to solve and research problems in the field of Information Technology.

2. Apply principles in computing and programming as well as in related disciplines to analyze problems, design, implement and evaluate Information Technology solutions.

3. Think critically, think creatively, think entrepreneurially, behave professionally in the Japanese corporate environment; have ethics, professional responsibility.

4. Work in a team when participating in Information Technology projects; ability to communicate effectively in an international environment, especially in Japanese businesses; have a foreign language level of N3 or higher or equivalent.

5. Form ideas, select, design, integrate, evaluate and administer information technology systems in the context of business, society and environment.

6. Plan and manage information technology projects."

DUT states that graduates of this study programme are capable of working in several areas as "in the information technology department or needing to apply information technology of all units in need (administrative and non-business, banking, telecommunications, aviation, construction, ...)", "in domestic and foreign software outsourcing and manufacturing companies, especially Japanese one", and in "consulting companies on proposing solutions, building and maintaining information systems, network and communication systems, embedded systems."

For the <u>Master's degree Computer Science</u>, DUT defines the following programme objectives:

#### "2.1. General Program Objective

The Master's program in Computer Science of the University of Technology, University of Danang (DUT-UD) is designed to provide students with political and ethical qualities; high professional qualifications, in-depth knowledge and good practical skills; systematic thinking; ability to solve scientific and technical problems in the field of Computer Science; independent and creative research skills; strong self-study ability; a sense of professional responsibility and community service; ability to meet the requirements of socio-economic development; adaptability to the global socio-economic environment and international integration; and ability to pursue training programs at higher levels.

#### 2.2. Specific Program Objectives

#### a) The research-oriented training program

The research-oriented master's program in Computer Science of DUT-UD aims to provide learners with:

1. A broad professional knowledge to be able to work independently and be able to adapt well to different jobs in the field of Computer Science.

2. Professional and personal skills, professionalism, management skills, social knowledge, appropriate approaches and problem-solving skills to address different aspects of society.

3. Organizational, leadership and teamwork skills, English language competence to work effectively in a multi-disciplinary and international environment.

4. Capability of self-training, self-updating knowledge, doing scientific research and studying at the doctoral level; ability to conceptualize scientific ideas, discover, and test new knowledge in the field of Computer Science

b) The application-oriented training program

The application-oriented Computer Science master's program of aims to provide learners with:

1. A broad professional knowledge to be able to work independently and be able to adapt well to different jobs in the field of Computer Science.

2. Professional and personal skills, professionalism, management skills, social knowledge, appropriate approaches and problem-solving skills to address different aspects of society.

3. Organizational, leadership and teamwork skills; English language competence to work effectively in a multi-disciplinary and international environment.

4. Capability of self-training, self-updating knowledge; ability to apply professional knowledge and absorb new scientific and technical achievements to design and develop products, propose solutions to practical problems in the field of Computer Science.

2.3. Program learning outcomes of master's degree program

a) The research-oriented training program

Graduates of the research-oriented master's program in Computer Science of DUT-UD are expected to:

1. Apply knowledge of Mathematics, science and technology to solve new and complex technical problems in the field of Information Technology.

2. Analyze complex computational problems and effectively apply specialized and related knowledge to build and develop IT systems, products, and technical solutions.

3. Exhibit a mastery of and an ability to analyze and synthesize the in-depth knowledge of Computer Science in academic research; to research and develop intelligent systems, products, solutions and potential use of Information Technology.

4. Demonstrate critical and creative thinking, entrepreneurship, professional behaviors, professional ethics and responsibility; the ability to independently research, detect and solve problems with high efficiency.

5. Demonstrate adaptability and career self-directedness; acquire and apply new knowledge; adopt appropriate learning strategies; and master knowledge imparting skills.

6. Show an ability to organize, lead and work in a team; demonstrate synthesis, systematic analysis and critical skills; professional communication in an international and multicultural environment; effective presentations and dialogues at work.

7. Show an ability to conceptualize, select, design, integrate, and administer information technology systems based on the need analysis of users and businesses in the social and environmental context.

8. Demonstrate self-learning, self-updating knowledge and independent research skills; have the ability to explore practical problems, apply specialized knowledge to research, propose and evaluate technical and technological solutions for IT systems and products; display the capability to continue studying for a PhD program.

b) The application-oriented training program

Graduates of the application-oriented master's degree program in Computer Science, DUT-UD are expected to:

1. Apply knowledge of Mathematics, science and technology to solve new and complex technical problems in the field of Information Technology.

2. Analyze complex computational problems and effectively apply specialized and related knowledge to build and develop IT systems, products, and technical solutions.

3. Exhibit a mastery of and an ability to analyze and synthesize the in-depth knowledge of Computer Science in academic research; to research and develop intelligent systems, products, solutions and potential use of Information Technology.

4. Demonstrate critical and creative thinking, entrepreneurship, professional behaviors, professional ethics and responsibility. 5. Demonstrate adaptability and career self-directedness; acquire and apply new knowledge; adopt appropriate learning strategies; and master knowledge imparting skills.

6. Show an ability to organize, lead and work in a team; demonstrate synthesis, systematic analysis and critical skills; professional communication in an international and multicultural environment; effective presentations and dialogues at work.

7. Show an ability to conceptualize, select, design, integrate, and administer information technology systems based on the need analysis of users and businesses in the social and environmental context.

8. Demonstrate self-learning, self-updating knowledge and independent research skills; have the ability to explore practical problems, apply specialized knowledge to research, propose and evaluate technical and technological solutions for IT systems and products."

DUT states that graduates of this study programme are capable of working in several areas as researcher, teacher, "senior IT Specialists in state management agencies, research institutes, domestic and foreign enterprises".

In the experts' opinion, the intended qualification profiles of all <u>three degree programmes</u> are clear, plausible and allow students to take up an occupation, which corresponds to their qualification. They learn that the graduates of DUT are much sought after in the labour market. The representatives of industry emphasize the high quality of the graduates of all three programmes under review and students as well as graduates are satisfied with and well aware of their good job perspectives.

In summary, the experts confirm that the degree programmes adequately reflect level 6 and level 7 of the European Qualification Framework (EQF). The programme learning outcomes of both programmes are consistent with the respective ASIIN Subject-Specific Criteria of the Technical Committees of Informatics/Computer Science and Electrical Engineering/Information Technology. They aim at the acquisition of specific competences and are well-anchored, binding and easily accessible to all stakeholders.

#### Criterion 1.2 Name of the degree programme

#### Evidence:

- Self-Assessment Report
- Diploma Supplements

#### Preliminary assessment and analysis of the peers:

The experts confirm that the English translation and the original Vietnamese names of the Bachelor's and Master's degree programmes correspond with the intended aims and learning outcomes as well as the content of the respective degree programme.

#### Criterion 1.3 Curriculum

#### Evidence:

- Self-Assessment Report
- Study plan of each degree programme
- Module descriptions
- Webpage DUT
- Discussion during the audit

#### Preliminary assessment and analysis of the peers:

The curricula of the <u>three degree programmes</u> are designed to comply with the programme objectives and learning outcomes and they are subject to constant revision processes (cf. chapter 1.1). As such, the curricula are reviewed regularly and commented on by students and teachers as well as by external stakeholders such as alumni or partners from government and the private sector. Regular changes are made to ensure that the curricula are up to modern standards (every two years). In the Self-Assessment Report and the curriculum for each programme, DUT describes how the POs and PLOs of each programme are to be achieved in the individual modules and thus explains the significance of each module for the programme as a whole. The curricula are reviewed by the experts in order to identify whether the described learning objectives can be achieved by the available modules. Course descriptions as well as matrices matching the general learning objectives and the module contents were provided for a detailed analysis.

The curriculum of <u>both Bachelor's degree programmes</u> under review are structured for eight semesters and 130 Vietnamese Credits need to be achieved by the students. The <u>Master's degree programme Computer Science</u> has a duration of four semesters and 60 Vietnamese Credits need to be achieved. Both Bachelor's degree programmes are divided into the following six areas: "(1) Maths and natural science; (2) technical core; (3) specialization; (4) project, internship and graduation; (5) general knowledge; (6) supportive knowledge." The university describes the content of each in its Self-Assessment report as follows: "Maths and natural science domain aim to provide students with foundation knowledge for their development of thinking capacity, competence, and outlook. This domain includes courses such as maths and natural science; general knowledge (environment and social science); supportive knowledge (English, soft skills); physical education and national defence education. The two English courses are offered to help students achieve the minimum English proficiency after each academic year as well as the TOEIC-450 score or equivalent upon graduation. However, these English courses are not required for students who have a degree in English Language, obtain Level-2 English certificate (or above) according to the Vietnamese Foreign Language Proficiency Framework, or get an equivalent international English certificate. Technical core domain covers a wide range of fundamental technical courses. The courses in this domain are all compulsory and intended for students' achievement of programme learning outcomes. Students are equipped with essential knowledge for their self-study and research which supports their life-long learning competence. The content of this domain is very necessary for the major of BAIT and BAIT-HQJA. Specialization domain includes required and elective courses providing necessary knowledge and skills applicable to BAIT and BAIT-HQJA majors. Experiment, PBL, internship and graduation thesis aim to expose students to opportunities for practicing their knowledge and essential soft skills to be ready for graduation. General knowledge domain introduces to students the basic knowledge of laws, environment, history, politics, and philosophy which facilitates their comprehensive development of knowledge, skills, and attitudes. Supportive knowledge domain is related to the profession and aimed at building students' foreign language competence."

The following tables summarizes the structure of both Bachelor's degree programmes:

Knowledge clusters	Number of credits	Number of ECTS	Required (Credits)	Required (ECTS)	Elective (Credits)	Elective (ECTS)
1. Mathematics, Basic Sciences	32	50.39	32	50.39	0	0
2. Engineering and Specialized fundamentals	39	62.26	33	52.26	6	10
3. Disciplinary knowledge	14	23.33	8	13.33	6	10
4. Projects, Internships and Graduation	23	38.37	19	31.70	4	6.67

Bachelor's degree programme Information Technology:

5. General knowledge	13	20.92	13	20.92	0	0
6. Complementary knowledge	9	13.25	13	13.25	0	0
Total	130	208.52	118	181.85	16	26.67

#### Bachelor's degree programme High Quality Information Technology:

Knowledge clusters	Number of credits	Number of ECTS	Required (Credits)	Required (ECTS)	Elective (Credits)	Elective (ECTS)
1. Mathematics, Basic Sciences	29	44.08	29	44.08	0	0
2. Engineering and Specialized fundamentals	33.5	54.29	29	47.62	4	6.67
3. Disciplinary knowledge	21.5	35.08	18	28.41	4	6.67
4. Projects, Internships and Graduation	24	40	24	40	0	0
5. General knowledge	13	18.92	13	18.92	0	0
6. Complementary knowledge	09	15.58	09	15.58	0	0
Total	130	207.95	122	194.61	8	13.34

In discussions with students of the <u>Bachelor's degree programmes</u>, they say that they would like to have the opportunity to specialise at an earlier stage. They describe how almost all students have to take the same courses in the first three years and only have the opportunity to specialise in the fourth year. However, as the graduation thesis is completed in the eighth semester, there are relatively few courses in which students can specialise before then. They would therefore like to be able to choose their major at the beginning of the third year so that they have three semesters to deepen their knowledge in a particular area. The experts understand this well and are also of the opinion that the possibility of an earlier specialisation makes sense. Although care must still be taken to ensure that certain basics and topics are taught, it should be possible to take the first elective courses from the third year onwards. The experts therefore recommend considering enabling earlier specialisation.

During the discussions, the experts want to know how the different stakeholders assess the practical skills of the students. It turns out that practical parts are only included in only some of the courses The industry representatives explain that they are generally satisfied with the practical skills of the students taught but would support a higher proportion of practical exercises. This opinion is also confirmed by the discussion round with the students, who are also in favour of more practical parts. The expert group concludes that especially both Bachelor's degree programmes would benefit from an increased emphasis on practical components. They

propose that enhancing practical elements within the Bachelor's degree programmes would foster a more comprehensive understanding and application of theoretical concepts, ultimately producing graduates with a more robust skill set aligned with industry demands.

The Master's degree programme Computer Science is divided in the four areas "General and supportive knowledge", "Specialized knowledge", "projects/research topics" respectively "internship" (depending on specialization) and the "graduation thesis". "General and supportive knowledge domain includes compulsory courses providing learners with knowledge in management and research methods. Specialised knowledge domain focuses on advanced professional knowledge." This area consists mostly of "elective courses, giving students choices of suitable knowledge for their research projects or applied projects." The area "project/research topics" is part of the research-oriented programme and is about "the implementation of projects and research topics with supervision of lecturer in charge." The area "internship" is part of the application-oriented programme and requires "students to spend more time at the internship establishments conducting and specifying their applied projects or topics." At the end of their studies, students in both specializations have to conduct a graduation thesis "where students of [the research-oriented programme] conduct research-oriented graduation theses with high scientific content whereas [students of the application-oriented programme] have graduation theses with higher applicability."

In discussions with the lecturers, the experts learnt that although there is a systematic, regular revision of the entire curriculum, it is more difficult to adapt the content of individual modules at short notice. However, as topics develop rapidly, particularly in the field of computer science and information technology, the lecturers would like to be able to make (small) changes to the course content more flexibly in order to be able to offer this content to students more quickly. This is supported by the experts. They also believe that a faster adaptation of the curriculum ensures that students are exposed to the latest research, methods and technologies. This is particularly important at Master's level, where students are expected to contribute to and drive innovation in the field.

Finally, the experts ask how the teaching staff and the prospective employers evaluate the soft skills of the students. They learn that the students from DUT are particularly resilient in many respects: both in terms of competition and in terms of their perseverance. In spite of this, the industry representatives also underline that specific soft skills as teamwork, public speaking as well as presentation and communication skills and entrepreneurship could still be improved. This is also confirmed by the students. Consequently, the experts recommend to strengthen the soft skills of the students of <u>all three degree programmes</u> through designated course-work or integration into existing coursework, e.g. by increasing the number of teamwork and team projects.

Overall, the experts are satisfied with the curricular structure of the <u>three degree pro-</u><u>grammes</u>. They see that the programmes are well structured and that the modules build on each other in a reasonable way, enabling the students to effectively reach the learning outcomes as laid down for each programme as a whole. Furthermore, the experts gains the impression that the students are well prepared for entering the labour market and can find adequate jobs or for further academic careers. However, the experts see some minor room for improvement with regard to the adaptability of curricula, soft skills, practical experience, and earlier specialization.

#### **Criterion 1.4 Admission requirements**

#### Evidence:

- Admission Regulations
- Webpage DUT
- Self-Assessment Report
- Discussion during the audit

#### Preliminary assessment and analysis of the peers:

Danang University of Science and Technology (DUT) is a member university of the University of Danang (UD). Next to DUT, the UD consists of five other member universities, namely the (Danang) University of Economics, (Danang) University of Science and Education, (Danang) University of Foreign Language Studies, (Danang) University of Technology and Education, as well as the Vietnam-Korea University of Information and Communication Technology.

The UD annually handles the admission process and operates as the centre for all admissions across its member universities, institutions or units. Each year, the UD assigns and delegates an admission quota to all its member institutions based on societal needs and available resources, and subsequently reports to the Ministry of Education and Training. This admission quota for each member university is based on three primary factors: the student-lecturer ratio, the ratio of the gross floor area of all university buildings to the number of students, and lastly, the societal demand for human resources for each programme. The admissions council is set up annually with DUT's approval and disbands once the admission task has been fulfilled. This council is responsible for planning, managing, and overseeing the admissions process at DUT.

Admission processes for <u>Bachelor's degree programmes</u> are held annually before September. DUT publishes detailed information about the admissions process through its website,

faculty and division pages, brochures, flyers, as well as through online admission counselling sessions for high-school students. During the latter, candidates are also informed about scholarships and post-graduation job opportunities.

High school graduates can apply to degree programmes offered by DUT through one of six available admission methods. The admission council determines and approves the admission conditions for each admission method. These methods include

- Direct admission in accordance with the regulations of the Ministry of Education and Training for candidates with notable e.g. civil, educational, or military achievements, with disabilities or who come from disadvantaged backgrounds;
- Admission based on the University's unique procedure for candidates with excellent high school performance and student competitions;
- Admission based on scores from the National high school graduation examination and additional criteria outlined annually by DUT;
- Admission based on scores from the National Ho Chi Minh City University competency assessment test,
- Admission based on scores from the Hanoi University of Science and Technology thinking assessment test, and
- Admission based on high school study results or transcript reviews.

To assist applicants from economically disadvantaged families, ethnic minorities, individuals with disabilities and applicants from different regions, priority points are granted during the application process. Foreign applicants can secure direct admission into DUT's degree programmes if their competence in knowledge and Vietnamese language proficiency meets the criteria set by the Ministry of Education and Training.

"The admission to the master's degree in Computer Science is conducted twice a year. Similar to the undergraduate programme, the admission procedure for the master's programme comprises the following steps: registration - admission review / admission tests admission result announcement. Pursuant to the circular promulgated by MOET and the regulations of master's degree admission No. 1609/QD-DHBK by DUT. [...] The admission criteria for national and foreign students are implemented following regulations No. 30/2018/TT-BGDDT on the management of foreigners studying in Vietnam." For the <u>Master's degree programme</u>, the candidates must meet the following conditions: they must "hold a bachelor's degree of correlative majors (Information Technology or Informatics) or to take additional courses before submitting their application [...]. At the same time, candidates of the K44 enrolment in 2022 and later need to meet the entry foreign language proficiency requirement of B1 level. [...] In case students enter from close or equivalent disciplines, there are clear regulations on knowledge compensation that are clearly and publicly communicated at the admission period. The list of close majors as well as the amount of supplementary/ compensated knowledge is explicitly controlled by FIT and DUT council."

In summary, the experts find the terms of admission to be binding and transparent. They confirm that the admission requirements support the students in achieving the intended learning outcomes

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 1:

The experts consider criterion 1 to be fulfilled.

## 2. The degree programme: structures, methods and implementation

#### **Criterion 2.1 Structure and modules**

#### Evidence:

- Self-Assessment Report
- Study plan for each degree programme
- Module descriptions
- Academic Handbook
- Discussions during the audit

#### Preliminary assessment and analysis of the peers:

As detailed in Chapter 1.3, the programmes under review are structured transparently into sensible curricular sections and modules. They do so following the Vietnamese National Qualification Framework and DUT's "Curriculum Development Guidelines". The curriculum of the Bachelor's degree programmes are designed for eight semesters. The Master's degree programme has a length of four semesters. An academic year is structured into two main semesters, with each semester encompassing fifteen weeks of study and four weeks allocated for assessments. The third summer semester, which takes place between the two regular semesters, allows students to repeat courses they have failed or take courses in advance to shorten their overall study time. "The detailed plan of course registration is

communicated to students before the semester begins, and there is one week after the semester start for adjustment of the study plan."

Students of the Bachelor's programmes are required to carry out an internship of 6 weeks, which is awarded with credit points. The final project can be carried out either at DUT or in cooperation with a company. A mandatory internship is also part of the application-oriented profile in the Master's programme. In the research-application track, students are completing their Graduate thesis in the form of a research project at DUT. The experts find that the internships are well integrated in both study programmes and support the achievement of the respective programme learning outcomes.

In summary, the peers confirm that all degree programmes under review are divided into modules and that each module is a sum of coherent teaching and learning units. They can see that the modules are structured in a way that ensures that the learning outcomes can be reached.

#### International Mobility

The experts learn that the university provides various mobility opportunities for students. These include semesters abroad, short programmes, internships and international conferences. To foster these, there are cooperation agreements with a number of partner institutions worldwide, with a certain focus on Asia (for instance Korea, Singapore, Japan), but also including institutions in Europe and United States. Partly due to the COVID-19 pandemic, the number of students participating in mobility programs between 2020 and 2022 was relatively low, but is expected to markedly increase again after the pandemic. An international office has been established in order to coordinate DUT's efforts and to support the students in the planning and administration of international mobility. Moreover, the university provides scholarships for international mobility programmes and manages various external scholarships sponsored for instance by the Vietnamese government.

According to a regulation from the Ministry of Education and Training, a course taken at an international university can be considered equivalent to a course at the home university by a Scientific Academic Committee. Before a stay abroad, the university concludes a learning agreement with the respective student to ensure that the courses taken are relevant to the study programme and can thus be recognised.

During the audit discussions, the experts inquire the reasons for the low numbers of student mobility. Especially the number of Bachelor's students who participate in international exchange programmes is still low despite students' high interest. In recent years, there have been a few incoming students from European and Asian countries. At the same time, a small number of students went abroad during their studies. The programme coordinators explain that tuition fees at foreign universities are too high for most Vietnamese students and that DUT has only a limited budget to support students abroad. Therefore, they are currently trying to increase mobility options within Vietnam to enable all students to spend an exchange semester. For example, a Memorandum of Understanding (MoU) between different Vietnamese universities aims to strengthen student mobility within Vietnam. The experts welcome the efforts of DUT to increase national mobility options. However, they also see the need for more international exchange opportunities. During the audit discussions, students express a clear interest in more places and better endowed scholarships for long and short-term stays abroad. The number of available places in the exchange programmes is still limited. DUT can only provide limited travel grants, while the demand from students is rising. The lack of financial support hinders students from joining the outgoing programmes. The experts can understand these wishes and recommend to increase the efforts to further internationalise DUT by establishing more international cooperations, conferences and publications as well as exchange programmes, by offering more and better-endowed scholarships and by better communicating the existing offers to the students.

The experts appreciate the efforts undertaken by the university to foster student mobility and they are – besides the mentioned, small restriction – satisfied with the structures and support mechanisms for international mobility.

#### **Criterion 2.2 Work load and credits**

#### Evidence:

- Self-Assessment Report
- Programme Specifications of all degree programmes
- Module Handbooks for all degree programmes
- Curricula for all degree programmes
- Instruction: Converting credit equivalents of University of Science and Technology the University of Danang to the European Credit Transfer and Accumulation System (ECTS)
- Student and graduate survey forms and results
- Audit Discussions

#### Preliminary assessment and analysis of the peers:

Both Bachelor's programmeseach account for a total of 130 credits, the Master's programme in Hydraulic Engineering accounts for 60 credits. As per the applicable regulations, one credit at DUT equates to 50 hours of workload; encompassing attendance in lectures, self-study, experiential learning, and assessments. One semester typically encompasses 15 course weeks. A typical module consists of 2-3 Vietnamese Credits. Each classroom period lasts for 50 minutes; self-study is measured in hours of 60 minutes. One credit of 50 hours of workload can be obtained through varying compositions of in-class attendance, self-study, practical or project work; depending on the course type. The workload calculation presented by the University is depicted in the following table:

Learning time / 1 credit	In-class periods	Self-study	Total
Lecture	15	30	45
Practice, experiment, discussion	30	30	60
Essay, assignment	45	30	75
PBL	30	60	90
Project, graduation thesis	45	75	120
Internship	60	30	90

Taking the European Credit Transfer System (ECTS) with one ECTS credit equalling 30 hours of work as comparison, one credit at Da Nang University of Technology (DUT) is equivalent to (42.5/30 =) 1.42 ECTS credits for theoretical lectures, (55/30 =) 1.83 ECTS credits for practical applications and experiments, and (50/30 =) 1.67 ECTS credits for internships and projects.

DUT has rules regarding the maximum and minimum credits students can undertake each semester. This allows students to select and plan their study regime in order to complete their degree programme in a timely manner. Students who fail to accrue sufficient credits within each semester will face expulsion.

During the audit, the students emphasise that they consider the workload high but manageable and that it is possible to finish the degree programmes within the expected four or two years.

In conclusion, the experts recognise that a credit point system is established that accounts for the workload required from students, encompassing both attendance-based learning and self-study. This includes all compulsory subject-related elements of the degree.

#### **Criterion 2.3 Teaching methodology**

#### **Evidence:**

- Self-Assessment Report
- Programme Specifications for all degree programmes
- Module Handbooks for all degree programmes
- Curricula for all degree programmes
- Discussions during the audit

#### Preliminary assessment and analysis of the peers:

Teaching staff at DUT apply various teaching and learning methods, which are outlined in the module handbooks and linked narrowly to the respective course learning outcomes. According to them, various teaching and learning methods (including lectures, computer training and classroom and lab exercises, individual and group assignments, seminars and projects, etc.) have been implemented. Structured activities include tutorials, homework, assignments (reading or problem exercises) and practical activities. Group project assignments are given in some courses to develop students' skills in teamwork, communication, and leadership. The assignments and exercises should help students to develop their abilities with respect to critical thinking, written/oral communication, data acquisition, problem solving, and presentations. The DUT provides tables matching the "Teaching-Learning Strategies and Methods" with the programmes' learning outcomes:

Teaching-Learning Strategies and Methods	PLC	Ds				
	1	2	3	4	5	6
I. Direct Instruction						
1. Explicit Teaching	x	Х				х
2. Lecture	х	х	Х	х	х	х
3. Guest Lecture				Х	х	
II. Indirect Instruction						
4. Inquiry		Х				
5. Problem Solving		Х	х		х	
6. Case Study	x	х	х	x	x	x

Matrix between PLOs and Teaching Methods of BAIT programmes

III. Experiential Learning						
7. Models						
8. Field Trip				х	х	
9. Experiment		х				
10. Teaching Research Team	х	х	х	х	х	х
IV. Interactive Instruction						
11. Debates			х		х	
12. Discussions			х		х	
13. Peer Learning			х		х	
V. Independent Study						
14. Homework Assignment	х		х	х	х	х

Matrix between PLOs and Teaching Methods of MACS-Re, MACS-App programmes

Teaching-Learning Strategies and Methods	ng-Learning Strategies and Methods PLOs					
	1	2	3	4	5	6
I. Direct Instruction						
1. Explicit Teaching	Х					х
2. Lecture	х	Х	Х	Х	Х	
3. Guest Lecture				Х	х	Х
II. Indirect Instruction						
4. Inquiry		Х			Х	
5. Problem Solving		Х	Х		х	
6. Case Study		Х	Х		х	Х
III. Experiential Learning						
7. Models						

8. Field Trip				х	Х	
9. Experiment						
10. Teaching Research Team	х	х	х	х	х	х
IV. Interactive Instruction						
11. Debates			х		Х	
12. Discussions			х		Х	
13. Peer Learning			Х		Х	
V. Independent Study						
14. Homework Assignment	x		х	x	Х	

The most common method of learning is class session. Lecturers generally prepare presentations to aid the teaching process. With individual or group assignments, such as discussions, presentations, or written tasks, students are expected to improve their academic as well as their soft skills. Laboratory work covers laboratory preparation, pre- or post-tests, laboratory exercises, reports, discussions, and presentations.

To help students achieving the intended learning outcomes and to facilitate adequate learning and teaching methods, DUT has developed a student information system (DUT-SIS), where students and teachers can interact.

In summary, the expert group considers the teaching methods and instruments to be suitable to support the students in achieving the intended learning outcomes. In addition, they confirm that the study concept of all three programmes under review comprise a variety of teaching and learning forms as well as practical parts that are adapted to the respective subject culture and study format. It actively involves students in the design of teaching and learning processes (student-centred teaching and learning).

#### Criterion 2.4 Support and assistance

#### **Evidence:**

- Self-Assessment Report
- Audit Discussions

#### Preliminary assessment and analysis of the peers:

DUT offers a comprehensive range of student services from enrolment to graduation, involving its Department of Student Affairs, Faculty members, student unions, and academic supervisors.

Students have access to student accommodation, sports facilities and well as medical and psychological care. DUT moreover supports students' engagement in various activities through the establishment of clubs that cater to diverse interests, ranging from culture and art to sports, science, technology, and start-ups. Students are also encouraged to participate in social initiatives like green campaigns, blood donations, charity work in disadvantaged areas, and visits to underprivileged children.

The Center for Student Support and Business Relations (CSSBC) facilitates the link between students and businesses by providing career counselling and job opportunities.

Scholarships are awarded to high-performing students by DUT's Academic Affairs Office as an incentive and financial aid. The scholarship policy is widely communicated to students through various channels. Furthermore, financial assistance is available to students facing financial difficulties through tuition waivers and extensions on tuition payments.

During their exchange with the auditor group, students confirm the availability of financial assistance, including scholarships made available offered by the university based on students' grade point average (GPA) as well as such offered by industries based on specific criteria.

The experts conclude that sufficient resources are available to provide individual assistance, advice and support for all students. They judge that the support systems help students to achieve the intended learning outcomes and to complete their studies successfully.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 2:

The experts consider criterion 2 to be fulfilled.

### 3. Exams: System, concept and organisation

#### Criterion 3 Exams: System, concept and organisation

#### Evidence:

- Self-Assessment Report
- Module Handbooks for all degree programmes
- Exam regulations
- Regulations On Evaluation Of Academic Performance Of Undergraduate Students, Graduate Students
- Audit Discussions

#### Preliminary assessment and analysis of the peers:

Each course has to determine objectives, which support the achievement of the Programme Learning Outcomes of the respective programme. Accordingly, each course must assess whether all defined learning outcomes stated in the module descriptions have been achieved. For this purpose, DUT utilizes various types of examination.

In each course, short class assignments/quizzes, a mid-term and a final examination are employed. There are different assessment methods in the programmes, such as quizzes, written tests, practical performances, report writing, small projects and presentations or a combination of these. In most courses, mid-term and final exam consist of written tests and additional quizzes or assignments are used. However, the other assessment methods are also used to a certain degree. Via the Academic Calendar, the students are informed about mid-term and final exams. The form and length of each exam is mentioned in the module descriptions that are available to the students via the student information system (DUT-SIS). It is common to hold small quizzes every two or three weeks, but there are generally no unscheduled tests.

The final grade of each module is calculated based on the score of these individual kinds of assessment, whereby the lecturer determines the ratio between them in accordance with the Academic Guidelines. The exact formula is given in the module handbooks. At the first meeting of a course, the students are informed about what exactly is required to pass the module and about how the final grade is determined through the teaching and learning plan. Students who miss out on more than 20% of the course may be declined participation in the final exam. Internships are assessed through a committee of lecturers based on students' provided internship reports and a presentation and Q&A to be held by the students, as well as students' ability to work in groups. To ensure that students observe standards of academic writing, a plagiarism checking software is utilised at the Faculties.

Grades are initially given on a 10-point scale, then translated into a 4-point scale and a letter grade (A+, A, B+, B, C+, C, D+, D and F, where a D (equivalent to a Grade Point of 1) is necessary to pass a module. Students failing a course must retake the course. Students who have successfully passed a course may re-enrol to improve their grades. If students cannot attend the exam due to unavoidable reasons (such as illness, accident, death of family members, etc.), they can log into their academic personal account and register for exam postponement. In these cases, students will take the final exam in the next semester without repeating the whole course. The reason, why there are no re-sits of the final exam is that the final grade depends on the assessment of the learning activities that will be carried out continuously through the semester and not only on the final exam. Students who fail a course must attend the course again in the next semesters. The number of repetitions is unlimited. The experts appreciate that corresponding rules are in place.

Students who underperform will receive academic warnings. The warning system has three levels: "Academic warning level 1", "Academic warning level 2", and "Suspension". The academic warning is issued if the student violates one of the regulations, such as not affording the minimum number of required credits, finishing the semester with the average grade less than 3.0 (scale 10) or less than 4.0 in the last two consecutive semesters. Students who already have received "Academic warning level 1" would receive "Academic warning level 2" if their performance does not improve in the following semester. In those cases, the students will be suspended. As the student's academic advisor receives the notifications during the course as well, help and support can be given in time to improve the student's academic performance.

The experts discuss with the students how many and what kind of exams they have to take each semester. They learn that for most courses there is one mid-term exam and one final exam in every semester. Usually, there are additional practical assignments or quizzes. The students confirm that a variety of assessment methods is used, ranging from traditional methods to presentations or project reports. The final grade is the sum of the sub exams. Although this means that the total number of tests taken during a semester is comparatively high, the students do not complain about this workload and instead appreciate that there are several short exams instead of one big exam as this requires them to continuously study during the entire semester and not having to solely work for one final exam at the end of the semester. The students also confirm that they are well informed about the examination schedule, the examination form and the rules for grading. The experts appreciate their perception.

As their final study performance, students have the option to structure their graduation thesis around either a capstone project, a scientific research project. Students undertake these graduation projects within the faculty under the supervision of lecturers. On the Master's level, students may either write their thesis within the faculty or in partnership with the industry depending on whether they have chosen the research-oriented or applicationoriented track. Supervision of theses is accordingly conducted through academic and industry supervisors.

During the on-site visit, the experts had access to a selection of exams and final projects. They confirm that these represent an adequate level of knowledge as required by the EQF level 6 for the two Bachelor's programmes and 7 for the Master's programme. The forms of exams are oriented in-line with the envisaged learning outcomes of the respective courses, and the workload is allocated in an acceptable way.

The experts conclude that the criteria regarding the examinations system, concept, and organization are fulfilled and that the examinations are suitable to verify whether the intended learning outcomes are achieved or not.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 3:

The experts consider criterion 3 to be fulfilled.

### 4. Resources

#### Criterion 4.1 Staff

#### Evidence:

- Self-Assessment Report
- Staff Handbooks for all degree programmes including CVs of all teachers
- Audit discussions

#### Preliminary assessment and analysis of the peers:

At DUT, the staff members have different academic positions. There are professors, associate professors, and lecturers. The academic position of each staff member is based on research activities, publications, academic education, supervision of students, and other supporting activities.

According to the self-assessment report, there are 25 full-time lecturers, 18 visiting lecturers, and 1 secretarial staff for the Faculty of Information Technology:

Category	Μ	F	Total	Assoc. Prof.	PhD	Percentage of PhDs
Full-time lecturer	19	6	25	1	12	48%
Visiting lecturer	15	2	17	0	13	76%
Specialist from the In- dustry	13	1	14	0	0	0%

The Faculty also has additional staff members who support the Dean in terms of administration, student work, undergraduate and postgraduate training management.

All fulltime members of the teaching staff are obliged to be involved in teaching/advising, research, and administrative services. However, the workload can be distributed differently between the three areas from teacher to teacher and also depends on the academic position. For example, full professors spend more time on research activities and less on teaching than associate professors or lecturers. DUT expects staff members to conduct research activities and has issued a policy, which offers some financial support for publishing papers in international journals. In addition, students are encouraged to participate actively in scientific research activities.

Every year, associate professors or lecturers can apply for promotion to associate professor or full professor, respectively. The candidates are considered based on three main criteria such as: years of working, hours of teaching graduate students, quantity and quality of scientific published papers.

With regard to the absence of full professors in both faculties, the experts learn from the programme coordinators that this is a common situation in many degree programmes in Vietnam, because the appointment of a full professor position is not only under the authority of the university. The academic position of each staff relies on regulations by the Vietnamese Ministry of Education that determines certain standards for reaching the next level. In Vietnam, in order to be promoted to the position of full professor, it is necessary to satisfy the state-required standards and be evaluated by the State Council of Professors. The satisfaction of these standards is time-consuming and includes complex administrative procedures. Every year nationwide, only a few candidates in the field of the three degree programmes under review meet the standards and are granted full professor's certificates from the State Council of Professors. The experts understand these circumstances.

The experts confirm that the composition, scientific orientation and qualification of the teaching staff are suitable for successfully implementing and sustaining the degree programmes.

#### **Criterion 4.2 Staff development**

#### **Evidence:**

- Self-Assessment Report
- Staff Handbooks for all degree programmes
- Regulation: On Internal Expenditure of University of Science and Technology
- Audit discussions

#### Preliminary assessment and analysis of the peers:

According to the self-assessment report and the discussions during the on-site audit, DUT encourages the continuing professional development of its staff. For this purpose, various opportunities are provided. Faculty members regularly participate in didactic training that encompasses curriculum design, teaching material, and innovative teaching and learning methods. Moreover, workshops related to subject-specific fields are held to refresh and to deepen various didactic competences in each semester. The lecturers can also regularly participate in external didactical trainings offered and funded by the government. New academic staff is required to complete compulsory teacher training.

DUT particularly encourages its academic staff to enhance their professional qualifications through scholarships for doctoral projects. The general rule at the DUT is that lecturers must have started their doctoral project three years after taking up their position as a lecturer at the DUT (unless they already have a doctorate); otherwise they will be asked to leave the DUT. Therefore, most of the teaching staff possesses a PhD. Furthermore, DUT encourages its staff members to pursue a PhD abroad and offers scholarships as an incentive. As a result, a number of lecturers have earned their doctorates abroad.

The teaching staff is encouraged to participate in international research projects and conferences in order to enhance their knowledge, increase their English proficiency and to build international networks. However, in discussions with teachers, the experts note that there is not always enough budget, for example to attend conferences. For example, many teachers were able to take part in several conferences during corona (for the first time) because they took place online. However, as this is no longer the case, the budget is not always sufficient. However, the lecturers emphasise that there has already been a good development in this area in recent years and that the DUT is doing a lot to support the them. The experts recognise the development that the DUT has already undergone, particularly in terms of research. However, they can well understand the lecturers' desire for a higher budget for research and conferences. At the same time, they understand that the budget is limited. Nevertheless, the experts want to recommend increasing the budget for staff development as far as possible, especially for research and conferences. Finally, the experts inquire in the audit to what extent teachers are in contact with the industry and how they receive up-to-date information about new developments in the industry. The teachers state that they are regularly invited by the companies to visit them and learn about the newest technologies and processes. By supervising student projects carried out in companies, the teachers also establish contacts with various companies and occasionally start their own projects with them. In addition, many teachers also work in industry alongside their teaching activities. The experts appreciate the teachers' contact with the local industry.

In summary, appreciate the university's efforts in the further development of its employees and consider the support mechanisms for the continuing professional development of the teaching staff adequate and sufficient.

#### **Criterion 4.3 Funds and equipment**

#### Evidence:

- Self-Assessment Report
- On-site visit of participating institutes and laboratories
- Audit Discussions

#### Preliminary assessment and analysis of the peers:

As of 2022, the Ministry of Education and Training designated DUT as being responsible for financing its regular expenditures. To ensure sufficient operational funds, DUT has developed a financial plan and has adjusted the tuition fees for the 2022-2023 academic year in compliance with the state's regulations for universities.

The primary funding sources of DUT are government funding, tuition fees from students, and industry funding. The figures presented by the university show that the faculties' income is stable and the funding of the degree programmes is secured. The academic staff emphasise that from their point of view, all three programmes under review receive sufficient funding for teaching and learning activities as well as research, which results in facilities that are equipped according to the standard and good access to literature, databases and modern software. The students confirm this positive impression and state their satisfaction with the available resources.

In the self-assessment report, DUT gives an extensive overview of the available learning spaces and libraries. Moreover, they list detailed information of all laboratories available per study programme. During the on-site visit, the peers take a look at some central facili-

ties, relevant research and teaching facilities and, in particular, a selection of different laboratories available for the three study programmes. The DUT main campus houses 133 classrooms, 12 computer rooms and 2 multimedia classrooms. In addition, students and staff can use the Learning Resource and Communication Centre with 4 conference rooms and 8 seminar rooms for discussions and seminars. The Faculty of Environment has 2 laboratories and the Environment Protection Research Center (EPRC) serving experimental, practical, and research modules. The Faculty of Project Management has equipped a simulation laboratory with 40 computers that offer students access to licensed software. The university has licensed Microsoft Office and other standard software and provides the students full access to this software.

During the audit, the experts find that the facilities and laboratories are adequate and contain everything necessary for the programme's objectives. However, they note that some parts of the equipment in the laboratories, while still functioning, is slightly outdated. As the improvement of the research environment is one of the seven goals formulated in the university's strategic plan, the experts propose to gather more funds from industry in order to improve the research facilities at DUT. Moreover, they observe that outdated equipment in the laboratories can limit students' access to new technology and that the small space of the laboratories can limit the number of students participating in scientific research. Therefore, they recommended to increase the investment into laboratories, meaning of space, technology and equipment.

With regard to library capacities, DUT is connected to the University of Danang's Academic Library Network, connecting ten libraries of UD's affiliated network. The general catalogue provides access to 200,000 titles, including books, serials, theses, scientific reports and more, in addition to digital and electronic databases. Additionally, the library website provides access to a range of online publishing databases. During the audit, students express their satisfaction with the respective programmes' facilities as well as with the library capacities and available literature.

In summary, the expert group judges the available funds, the technical equipment, and the infrastructure (laboratories, library, class rooms etc.) – besides the mentioned, small restriction – to comply with the requirements for adequately sustaining the degree programmes.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 4:

The experts consider criterion 4 to be fulfilled.

## 5. Transparency and documentation

#### **Criterion 5.1 Module descriptions**

#### Evidence:

- Module handbooks for all degree programmes
- Self-Assessment Report
- Discussions during the audit

#### Preliminary assessment and analysis of the peers:

The experts observe that the module descriptions contain the necessary information about the persons responsible for each module, the Vietnamese credit points awarded, the intended learning outcomes, the applicability, the admission and examination requirements, the forms of assessment, and details explaining how the final grade is calculated. However, the experts realise that the module descriptions of some modules, as for instance the thesis and the internship module, are missing for <u>Master's degree programme</u> under review. For those reasons, it is necessary that DUT submits the complete and latest version of the corresponding module descriptions and makes them accessible for students and teaching staff.

The experts are also of the opinion that although the module handbooks are very comprehensive, however the content of each individual module is described quite briefly. They therefore recommend that the university describe the content of each individual module in more detail in the module handbooks.

#### **Criterion 5.2 Diploma and Diploma Supplement**

#### Evidence:

- Sample Diploma Supplement for each degree programme
- Sample Diploma for each degree programme
- Self-Assessment Report

#### Preliminary assessment and analysis of the peers:

The experts confirm that the students of the three degree programmes under review are awarded a Diploma and a Diploma Supplement after graduation. The Diploma consists of a Diploma Certificate and a Transcript of Records. The Transcript of Records lists all courses that the graduate has completed, the achieved credit points, grades, and cumulative GPA. The Diploma Supplements contain all necessary information about the degree programmes.

#### **Criterion 5.3 Relevant rules**

#### **Evidence:**

- All relevant regulations as published on the university's webpage
- Self-Assessment Report
- Discussion during the audit

#### Preliminary assessment and analysis of the peers:

The experts confirm that the rights and duties of both DUT and the students are clearly defined and binding. The students receive all relevant course material in the language of the degree programme at the beginning of each semester. All rules and regulations are published on the university's Vietnamese website and hence available to all stakeholders.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 5:

As part of its comments, DUT has submitted the latest and complete versions of the module handbooks, so that descriptions for the internship and the final thesis are now also available. The criterion can therefore be regarded as fulfilled.

The experts consider criterion 5 to be fulfilled.

## 6. Quality management: quality assessment and development

#### Criterion 6 Quality management: quality assessment and development

#### Evidence:

- Self-Assessment Report
- Development Strategy Of University Of Science And Technology The University Of Danang To 2025 With A Vision Towards 2035
- Student and graduate survey forms and results
- Survey Form On Graduate Quality And Educational Programme For Employers
- Audit Discussions

#### Preliminary assessment and analysis of the peers:

The experts discuss the quality management system at DUT with the programme coordinators and the students. They learn that DUT has an extensive quality management system, which is aimed at constantly improving the quality of the degree programmes and the experience of students and faculty members. The central units responsible for quality management are the Educational Quality Assurance Council and the Scientific and Educational Council. These bodies report their findings to the Board of Rectors, i.e. the Rector and Vice-Rector responsible for quality assurance. The members of the Educational Quality Assurance Council are informed by evaluations conducted by the Department of Educational Testing & Quality Assurance. At the Faculty level, the faculty-specific Scientific and Educational Quality Assurance Councils carry out surveys, assess quality, and consult with the Faculty Board of Directors.

In terms of internal quality assurance mechanisms, DUT primarily relies on a range of surveys conducted with all stakeholders. In line with this, the auditors discern during their exchanges with students, alumni and industry representatives that regular feedback surveys are conducted both on course and programme levels. Both groups present during the audit confirmed their satisfaction with the conducted surveys, and that they feel their voices are generally heard for the purpose of programme development. In addition, students confirm that they have already experienced how criticisms have been taken on board by the teaching evaluations and have led to direct improvements. The auditors welcome that the evaluation results are used effectively.

In terms of external quality management, the university adopts several sets of quality management standards, which include domestic quality accreditation standards for degree program assessment from the Ministry of Education and Training (MOET), and international quality accreditation standards from the likes of CTI (France), AUN-QA, and ASIIN. To evaluate the effectiveness of its internal quality assurance system, the University has invited both domestic (MOET) and international (HCERES) institutions for reviews in the past years. Furthermore, the University has resorted to international accreditation bodies, such as CTI, AUN-QA, and ASIIN, to review its degree programmes.

All in all, the peers are content with the University's quality management system, which they find to be multi-layered and effective.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 6:

The experts consider criterion 6 to be fulfilled.

## **D** Additional Documents

Before preparing their final assessment, the panel ask that the following missing or unclear information be provided together with the comment of the Higher Education Institution on the previous chapters of this report:

No additional documents needed.

## **E** Comment of the Higher Education Institution:

Standards	Feedback
1. The Degree	
Programme:	
Concept, con-	
tent & imple-	We absolutely agree with the auditors' comments about the development
mentation	of PLOs of the study programmes. To ensure the continuous alignment
	of our programs with industry needs and graduate expectations, we have
	conducted surveys involving key stakeholders, including students,
	alumni, employers, lecturers, and school officials. This survey is con-
	ducted every 2 years to gather insights and facilitate the adjustment of
	the PLOs. Looking ahead, we are committed to enhance our engagement
	with industry and government agencies by sending surveys to gather
	feedback that will enable us to refine the PLOs according to government
	priorities and evolving industry trends.
	We appreciate your understanding and confirmation that our degree pro-
	grams are in full alighment with Levels 6 and 7 of the European Quali-
	fications Framework (EQF).
	Thank you for your thoughtful consideration.
	Thank you for your recommendations. We completely agree with these
	valid insights. When delivering our information technology training pro-
	grams, we consistently prioritise the agumentation of practical elements.
	This involves facilitating students internship at businesses, arranging ad-
	ditional seminars conducted by industry professionals, and actively en-
	gaging in practical teaching and PBL instruction.

Standards	Feedback
	We will continue to improve PLOs and course content by shortening the theoretical content and enhancing labs and exercises so that students can self-study, understand and apply knowledge into practice.
	We will also focus on strengthening soft skills for students so they can be proactive when entering the labour market. Moreover, we consist- ently strive to improve the tranning programs to provide the best possi- ble learning environment for our students and ensure they aligns with the demands of the labor market.
	Thank you for your positive assessment of our students' preparedness. We agree with some areas for improvement. Specifically, we plan to enhance our curriculum by incoporating the ability to adapt to learners, and staying aligned with current technology trends. To facilitate this, we will actively promote initiatives such as student-business exchange, job fairs, and internships. These activities will contribute to the development of not only teachnical skills but also soft skills, practical experience, and specialied expertise among our students.
	Thank you sincerely for your understanding regarding the admission challenges in the broader context of Vietnam.
Standard2.TheDegreeProgramme:Structures,Methods & Implementation	Thank you for the auditors' positive feedback. We fully agree with the suggestion to create more opportunities for international exchange. To address this, we plan to establish more international cooperation initiatives, organize international conferences, publish research papers, and expand exchange programs.
	International Conference ( <i>https://www.thefdse.org/2023/</i> ), with the par-

Standards	Feedback
	ticipation of many international professors. We have also secured com-
	mitments for scholarship support, foreign internships, and research sup-
	port for ITstudents and lecturers.
	We will colloborate with foreign universities to facilitate exchange ac- tivities between the two sides, encompassing both offline and online in- ternational exchanges, with the aim of fostering student mobility. In September 2023, our DUT organized the Learning Express (LEX) pro- ject VI between students of Polytechnic University - University of Danang (DUT) and students of Singapore Polytechnic (SP) ( <i>https://dut.udn.vn/Phong/Taichinh/Thongbao/id/8530</i> ).
	Thank you for the auditors' positive comments.
	Thank you for the auditors' positive comments. We will persit in em- ploying many different forms of teaching and learning to engage stu- dents actively in co-designing the educational process.
	We appreciate the auditors' positive remarks confirming the availability of ample resources to offer individual assistance, advice and support for all students.
Standard 3. Ex- ams: System, Concept & Or- ganisation	

Standards	Feedback
	We would like to thank the experts for their understanding and appreci-
	ation that the respective rules are in place and the students are well in-
	formed of the examination regulations.
	We also thank the experts for confirming that the knowledge in the ex-
	ams and final projects represent an adequate level of knowledge required
	by the EQF level 6 for the two Bachelor's programmes and 7 for the
	Master's programme.
Standard / Ro-	
sources	
	Thank you very much for understanding the challenges of appointment
	in the practical context of Vietnam.
	We would like to thank and completely agree with the experts' com-
	ments. In fact, this year our DUT has announced a number of policies to
	increase the budget for staff development and especially for research and
	conferences.

Standards	Feedback
	We also thank the experts for who acknoledged our endeavors to foster
	the connection between teachers and the local industry.
	Thank you very much for the recommendation from the board of audi-
	tors. We fully agree on the necessity of the mentioned equipment for
	research activities. However, the procurement of equipment is subject to
	DUT's annual budget and procurement plan. As for the degree programs
	the lecturer staff are actively seeking research funding from both domes-
	tic and foreign sources to proactively invest in equipment based on each
	phase and the specific requirements of our research projects
	phase and the specific requirements of our research projects.
Standard 5.	
Transparency	
and Documen-	
tation	Thank you for the recommendations from the auditors; we fully
	acknowledge and take into account these opinions. We would like to
	attach a file describing the detailed outline of the graduation project
	module and the graduate-level internship module in the appendix of this
	document. A description of the graduate program's modules is in the link
	<u>5.1.B6</u> .
	We acknowledge the opinion that the module handbooks are described
	quite briefly, and we will provide the complete module handbooks in
	which the content of each individual module is described in more detail
	in the link 5.1 B7
	We appreciate the comments from the auditors Regarding the Diploma
	Supplement, we would like to confirm that the standardized format is
	consistently implemented university-wide at DUT This format adheres
Standard 5. Transparency and Documen- tation	Thank you very much for the recommendation from the board of audi tors. We fully agree on the necessity of the mentioned equipment fo research activities. However, the procurement of equipment is subject to DUT's annual budget and procurement plan. As for the degree programs the lecturer staff are actively seeking research funding from both domes tic and foreign sources to proactively invest in equipment based on each phase and the specific requirements of our research projects. Thank you for the recommendations from the auditors; we fully acknowledge and take into account these opinions. We would like to attach a file describing the detailed outline of the graduation projec module and the graduate-level internship module in the appendix of this document. A description of the graduate program's modules is in the link <u>5.1.B6</u> . We acknowledge the opinion that the module handbooks are described quite briefly, and we will provide the complete module handbooks in which the content of each individual module is described in more detai in the link <u>5.1.B7</u> .

Standards	Feedback
	to the regulations for Diploma Supplement stipulated by the Ministry of Education and Training.
	Thank you for the recommendations from the auditors. We fully acknowledge and take into account these opinions.
Standard 6. Quality Man- agement: Qual- ity Assessment and Develop- ment	We appreciate the practical suggestions offered by the auditors. Our IT faculty have applied several sets of quality management stand- ards. It is indeed an honor for us to participate in international accredi- tation, marking our inaugural involvement with the esteemeed interna- tional organization ASIIN. We highly value the contributions made by the auditors, and will con- sider appropriate improvements in acccordance with the auditor's sug- gestions, taking into account our practical conditions.

## F Summary: Peer recommendations (20.11.2023)

Taking into account the additional information and the comments given by the experts summarize their analysis and **final assessment** for the award of the seals as follows:

Degree Programme	ASIIN Seal	Maximum du- ration of ac- creditation	Subject-spe- cific label	Maximum dura- tion of accredi- tation
Ba Information Tech- nology	Without requi- rements	30.09.2029	_	
Ba High Quality Infor- mation Technology	Without requi- rements	30.09.2029	_	
Ma Computer Science	Without requi- rements	30.09.2029	_	

#### Recommendations

#### For all degree programmes

- E 1. (ASIIN 1.3) It is recommended to improve the soft skills (teamwork, communication, presentation) of the students, e.g. by increasing the number of teamwork and team projects.
- E 2. (ASIIN 1.3) It is recommended to allow for faster adaptations of the curriculum in order to keep up with developments in the field of Computer Science/Information Technology.
- E 3. (ASIIN 2.1) It is recommended developing a mobility strategy in order to increase student mobility.
- E 4. (ASIIN 4.2) It is recommended to increase the budget for staff development, e.g. budget for research and conferences.
- E 5. (ASIIN 5.1) It is recommended to describe the content of each module in more detail in the module handbooks.

#### For both Bachelor's degree programmes

- E 6. (ASIIN 1.3) It is recommended to consider allowing for earlier specialization.
- E 7. (ASIIN 1.3) It is recommended to increase the practical parts in the curriculum.

## **G** Comment of the Technical Committees

## Technical Committee 02 – Electrical Engineering/Information Technology (24.12.2023)

Assessment and analysis for the award of the ASIIN seal:

The TC discusses the case and follows the vote of the experts without change.

The Technical Committee 02 – Electrical Engineering/Information Technology recommends the award of the seals as follows:

Degree Programme	ASIIN Seal	Maximum du- ration of ac- creditation	Subject-spe- cific label	Maximum dura- tion of accredi- tation
Ba Information Tech- nology	Without requi- rements	30.09.2029	_	
Ba High Quality Infor- mation Technology	Without requi- rements	30.09.2029	_	
Ma Computer Science	Without requi- rements	30.09.2029	_	

## Technical Committee 04 – Informatics/Computer Science (28.12.2023)

Assessment and analysis for the award of the ASIIN seal:

The TC discusses the case and follows *the* vote of the experts without change.

The Technical Committee 04 – Informatics/Computer Science recommends the award of the seals as follows:

Degree Programme	ASIIN Seal	Maximum du- ration of ac- creditation	Subject-spe- cific label	Maximum dura- tion of accredi- tation
Ba Information Tech- nology	Without requi- rements	30.09.2029	_	
Ba High Quality Infor- mation Technology	Without requi- rements	30.09.2029	_	
Ma Computer Science	Without requi- rements	30.09.2029	_	

# H Decision of the Accreditation Commission (08.12.2023)

#### Assessment and analysis for the award of the subject-specific ASIIN seal:

The AC discusses the procedure and in particular the closing of the feedback loop. In this procedure, students appear to be informed about the results, but the AC has learned from the other clusters that this is not institutionalised throughout the university. Therefore, the AC is in favour of an additional recommendation (E6) to institutionalise the practice already implemented in order to ensure a permanent closure of the feedback loop.

Degree Programme	ASIIN Seal	Maximum du- ration of ac- creditation	Subject-spe- cific label	Maximum dura- tion of accredi- tation
Ba Information Tech- nology	Without requi- rements	30.09.2029	_	
Ba High Quality Infor- mation Technology	Without requi- rements	30.09.2029	_	
Ma Computer Science	Without requi- rements	30.09.2029	_	

The Accreditation Commission decides to award the following seals:

#### Recommendations

#### For all degree programmes

- E 1. (ASIIN 1.3) It is recommended to improve the soft skills (teamwork, communication, presentation) of the students, e.g. by increasing the number of teamwork and team projects.
- E 2. (ASIIN 1.3) It is recommended to allow for faster adaptations of the curriculum in order to keep up with developments in the field of Computer Science/Information Technology.
- E 3. (ASIIN 2.1) It is recommended developing a mobility strategy in order to increase student mobility.

- E 4. (ASIIN 4.2) It is recommended to increase the budget for staff development, e.g. budget for research and conferences.
- E 5. (ASIIN 5.1) It is recommended to describe the content of each module in more detail in the module handbooks.
- E 6. (ASIIN 6) It is recommended to establish an institutionalized closure of the feedback loop.

#### For both Bachelor's degree programmes

- E 7. (ASIIN 1.3) It is recommended to consider allowing for earlier specialization.
- E 8. (ASIIN 1.3) It is recommended to increase the practical parts in the curriculum.

## Appendix: Programme Learning Outcomes and Curricula

According to the Diplpoma Supplement the following **objectives** and **learning outcomes** (intended qualifications profile) shall be achieved by the Bachelor degree programme Information Technology:

"Graduates of the High-quality Information Technology (Enterprise Cooperation) undergraduate program at the University of Science and Technology - The University of Danang have the ability to:

1. Apply knowledge of Mathematics and basic science to solve and research problems in the field of Information Technology.

2. Apply principles in computing and programming as well as in related disciplines to analyze problems, design, implement and evaluate Information Technology solutions.

3. Think critically, think creatively, think entrepreneurially, behave professionally; have ethics, professional responsibility.

4. Work in a team; ability to communicate effectively in international and multicultural environments; have a TOEIC 600 foreign language level or higher.

5. Form ideas, select, design, integrate, evaluate and administer information technology systems in the context of business, society and environment.

6. Plan and manage information technology projects."

The following **curriculum** is presented:

	Course Name			Module type				
No.		Cred its		Com pulso ry	Manda tory electiv es	Free electiv e	Sem este r	Note s
A.	Mathematics, Basic Sciences (32 credits)							
1	Calculus 1	4		Х			1	
2	Linear algebra	3		Х			1	
3	Physics 1	3		Х			2	
4	Physics Lab 1	1		Х			3	

5	PBL1: Computational Programming Project	2		Х			2	
6	Discrete mathematics	3		Х			2	
7	Numerical Method	3		Х			2	
8	Calculus 2	4		Х			3	
9	Statistical probability	3		Х			4	
10	Applied mathematics for information technology	3		Х			5	
11	Data Science	3		Х			6	
B.	Engineering and Specialize	d fund	ament	als (39	credits)			
1	Programming techniques	3		Х			1	
2	Introduction to Engineering	2		Х			1	
3	Computer Architecture and Microprocessor	2		Х			2	
4	Data structure	2		Х			2	
5	Object-oriented programming	2.5		Х			3	
6	Databases	2		Х			3	
7	Algorithm analysis and design	2		Х			3	
8	Operating system principle	2.5		Х			3	
9	Computer networks	2		Х			4	
10	Object-oriented analysis and design	2		Х			4	
				N	lodule ty	pe	C	
No.	Course Name	Cred		Com	Manda tory	Free	Sem este	Note s
L		105		ry	electiv es	electiv	r	2
11	.NET Programming	2.5		ry X	electiv es	electiv	<b>r</b> 4	5
11 12	.NET Programming Java Programming	2.5 2.5		ry X X	electiv es	e	<b>r</b> 4 4	
11 12 13	.NET Programming Java Programming Specialized fundamental Elective No.1 (choose 1 of 3 modules)	2.5 2.5 2		ry X X	electiv es X	e	<b>r</b> 4 4 4	
11 12 13	.NET Programming Java Programming Specialized fundamental Elective No.1 (choose 1 of 3 modules) <i>Computer graphics</i>	2.5 2.5 2 2		ry X X	electiv es X	electiv e X	<b>r</b> 4 4 4 4 4	
11       12       13	.NET Programming Java Programming Specialized fundamental Elective No.1 (choose 1 of 3 modules) <i>Computer graphics</i> <i>Formal Languages</i>	2.5       2.5       2       2       2       2       2       2		ry X X	electiv es X	electiv e X X X	r 4 4 4 4 4 4	
11       12       13	.NET ProgrammingJava ProgrammingSpecialized fundamental Elective No.1 (choose 1 of 3 modules)Computer graphicsFormal LanguagesHuman-machine interface	2.5       2.5       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2       2		ry X X	electiv es X	electiv e X X X X	r 4 4 4 4 4 4 4	
11       12       13       14	.NET ProgrammingJava ProgrammingSpecialized fundamentalElective No.1 (choose 1 of 3 modules)Computer graphicsFormal LanguagesHuman-machine interfaceCompiler	2.5       2.5       2		ry X X X X	electiv es X	electiv e X X X X	r 4 4 4 4 4 4 5	

16	Specialized fundamental Elective No.2 (choose 1 of 3 modules)	2			Х		5	
	Linux Programming	2				Х	5	
	Data Communications	2				Х	5	
	Cloud computing	2				Х	5	
17	Microcontroller	2		Х			6	
18	Specialized fundamental Elective No.3 (choose 1 of 4 modules)	2			Х		6	
	Embedded System Programming	2				Х	6	
	Mobile programming	2				Х	6	
	Applied Digital Techniques	2				Х	6	
	Python Programming	2				Х	6	
C.	Disciplinary knowledge (14	credit	s)					
1	Software Engineering	2		Х			4	
2	Network programming	2		Х			5	
3	Web Technology	2		Х			5	
4	Artificial Intelligence	2		Х			6	
	Major Elective (choose 1 of 5 majors)	10						
	Major in Software Engineering							
5	Service-oriented architecture	2		Х			7	
				N	Iodule ty	pe	Com	
No.	Course Name	Cred its		Com pulso ry	Manda tory electiv es	Free electiv e	este r	Note s
6	Software Testing	2		Х			7	
7	Software Engineering Speciali- sation Elective (choose 1 of 3 modules)	2			X		7	
	Specialized course in Software Engineering	2				X	7	
	Open Source	2				Х	7	
	Technology topics	2				Х	7	

	Major in Information System						
8	Enterprise architecture	2	Х			7	
9	Foundations of Infor- mation Systems	2	X			7	
10	Information System Speciali- sation Elective (choose 1 of 3 modules)	2		Х		7	
	Data mining	2			Х	7	
	E-commerce	2			Х	7	
	Service-oriented architecture	2			Х	7	
	Major in Information Security						
11	Network Information Security	2	Х			7	
12	Cryptography and Cryptology	2	X			7	
13	Information Security Speciali- sation Elective (choose 1 of 6 modules)	2		Х		7	
	Specialized courses in Information Security	2			Х	7	
	Penetration Testing	2			Х	7	
	Digital Forensics	2			Х	7	
	Blockchain Technology	2			Х	7	
	Network Administration	2			Х	7	
	Malware analysis	2			Х	7	
	Major in Computer Networks & Com- munications						
14	Network Administration	2	Х			7	
			N	Iodule ty	pe	C	
No.	Course Name	Cred its	Com pulso ry	Manda tory electiv es	Free electiv e	Sem este r	Note s
15	Network Information Security	2	Х			7	
16	Computer Networks & Com- munications Specialisation Elective (choose 1 of 4 mod- ules)	2		Х		7	

	Specialized course in Computer Networks and Communications	2				Х	7	
	Distributed system	2				Х	7	
	Advanced network programming	2				Х	7	
	Parallel processing	2				Х	7	
	Major in Computer Engineering							
17	IoT Application Development	2		Х			7	
18	Computer vision	2		Х			7	
19	Computer Engineering Specialization Elective (choose 1 of 4 modules)	2			Х		7	
	Specialized course in Computer Engineering	2				Х	7	
	Real-time systems	2				Х	7	
	Speech processing	2				Х	7	
	Pattern recognition	2				Х	7	
D.	Project, Internship and Gra	aduatio	on (23	credits	)		X       7         X	
1	PBL2: Programming Base Project	2		Х			3	
2	PBL3: Software Engineering Project	3		X			4	
3	PBL4: Computer Networks and Operating Systems Project	3		Х			5	
4	PBL5: Computer Engineering Project	3		Х			6	
5	PBL6: Specialized Project No.1 (choose 1 of 5 Special- ized Projects according to ma- jor)	4			Х		7	
	PBL6: Specialized Project No.1 Software Engineering	4				Х	7	
	PBL6: Specialized Project No.1 Information Systems	4				Х	7	
				N	Iodule ty	pe	S	
No.	Course Name	Cred its		Com pulso ry	Manda tory electiv es	Free electiv e	sem este r	Note s
	PBL6: Specialized Project No.1 Information Security	4				Х	7	

	PBL6: Specialized Project No.1 Computer Networks & Communications	4			Х	7	
	PBL6: Specialized Project No.1 Computer Engineering	4			Х	7	
6	Graduate Internships	2		Х		7	
7	Graduation Project	6		Х		8	
E.	General Knowledge (13 cre	dits)					
1	Marxist-Leninist Philosophy	3		Х		1	
2	Marxist-Leninist Political Economy	2		Х		3	
3	Scientific Socialism	2		Х		5	
4	History Of The Communist Party Of Vietnam	2		Х		6	
5	General Law	2		Х		7	
6	Ho Chi Minh's Thought	2		Х		7	
F.	Supplementary knowledge	(9 cred	lits)				
1	English A2.1	3		Х		1	
2	English A2.2	4		Х		2	
3	Information Technology Project Management	2		Х		6	
	Total	130					

According to the Diploma Supplement the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme <u>High</u> <u>Quality Information Technology</u>

"Graduates of high-quality training programs in Information Technology (Japanese) undergraduate program at the University of Science and Technology - The University of Danang have the ability to:

1. Apply knowledge of Mathematics and basic science to solve and research problems in the field of Information Technology.

2. Apply principles in computing and programming as well as in related disciplines to analyze problems, design, implement and evaluate Information Technology solutions.

3. Think critically, think creatively, think entrepreneurially, behave professionally in the Japanese corporate environment; have ethics, professional responsibility.

4. Work in a team when participating in Information Technology projects; ability to communicate effectively in an international environment, especially in Japanese businesses; have a foreign language level of N3 or higher or equivalent.

5. Form ideas, select, design, integrate, evaluate and administer information technology systems in the context of business, society and environment.

6. Plan and manage information technology projects."

				Module ty	pe		
No.	Course name	Cre dit	Comp ulsory	Mandato ry elec- tives	Free elective	Seme ster	Notes
А.	Mathematics and Natural Scien	nces (	29 credi	its)			
1	Calculus 1	4	x			1	
2	Linear algebra	3	X			1	
3	Physics 1	3	X			2	
4	Calculus 2	4	х			2	
5	Discrete mathematics	3	X			2	
6	Numerical Methods	3	X			2	
7	Physical experiment 1	1	X			3	
8	Statistical probability	3	X			3	
9	Information theory	2	x			3	
10	Applied mathematics for information technology	3	X			3	
B.	Engineering and Specialized fu	ndan	nentals (	33.5 credi	ts)		
1	Programming techniques	3	X			1	
2	Introduction to IT Engineering	2	X			1	
3	Computer Architecture and Microprocessor	2	X			1	
4	Data structure	2	x			2	

The following **curriculum** is presented:

5	Object-oriented programming	3	X			3	
				Module ty	ре		
No.	Course name	Cre dit	Comp ulsory	Mandato ry electives	Free elective	Seme ster	Notes
6	Databases	2	X			3	
7	Operating system principle	2.5	X			3	
8	Algorithm analysis and design	2	X			4	
9	.Net Programming	2.5	X			4	
10	Java Programming	2.5	X			4	
11	Computer networks	2	X			4	
12	Artificial Intelligence	2	X			5	
13	Microcontroller	2	х			5	
14	Engineering fundamentals Elective No.1	2		X		5	Choos e from
15	Engineering fundamentals Elective No.2	2		Х		5	electives
16	Mobile programming				х	5	
17	Compiler				X	5	2 credit/
18	Computer graphics				X	5	course
19	Programming on Linux				X	5	
20	Web Technology				Х	5	
21	Cryptography and Cryptology				Х	5	
22	Network system design				Х	5	
23	Applied Digital Techniques				х	5	
24	Data Communications				х	5	
25	Cloud computing				х	5	
26	Python Programming				х	5	
C.	Majors (21.5 credits)						
	Digital signal processing	2	х			6	
	Object-oriented design analysis	2	X			6	
	Computer network programming	2.5	X			6	
	Embedded system programming	2	X			6	

	Software Engineering	2	X			6	
5	Network Administration	3	X			7	
				Module ty	pe		
No.	Course name	Cre dit	Comp ulsory	Mandato ry electives	Free elective	Seme ster	Notes
6	Machine learning and applications	2	X			7	
7	Software Testing	2	х			7	
8	Specialized fundamentals Elective No.1	2		X		7	Choos e from
9	Specialized fundamentals Elective No.2	2		X		7	electives
10	Multimedia systems				х	7	
11	Information Safety and Security				Х	7	2 credits
12	Technology topic				X	7	/couse
13	Parallel and distributed processing				Х	7	
14	Advanced Computer network programming				x	7	
15	Real-time systems				x	7	
16	Service-oriented architecture				х	7	
17	Malware analysis				х	7	
18	Computer vision				х	7	
19	Distributed system				Х	7	
20	Data mining				Х	7	
D.	Project, Internship and Gradua	ation	(24 cred	lits)			
1	Project 1: Computational Programming Project	2	x			2	
2	Project 2: Programming Base Project	2	X			3	
3	Project 3: Application Programming Project	3	X			4	
4	Project 4: Smart System Project	3	X			5	
5	Project 5: Software Engineering Project	3	x			6	

6	Project 6: Specialized Project No.1	3	X			7	
7	Graduate Internships	2	Х			7	
8	Graduation Project	6	X			8	
E.	General Knowledge (13 credits	)					
		_		Module ty	ре	~	
No.	Course name	Cre dit	Comp ulsory	Mandato ry electives	Free elective	Seme ster	Notes
1	Marxist-Leninist philosophy	3	х			1	
2	Marxist-Leninist political economy	2	X			2	
3	Scientific socialism	2	х			4	
4	General Law	2	Х			5	
5	History of the Communist Party of Vietnam	2	X			5	
6	Ho Chi Minh's Thoughts	2	Х			6	
F.	Supplementary Knowledge (9 c	redit	s)				
1	Japanese 1	1	х			1	
2	Japanese 2	1	х			2	
3	Japanese 3	1	X			3	
4	Japanese 4	1	X			4	
5	Japanese 5	1	X			5	
6	Japanese 6	1	X			6	
7	Japanese 7	1	X			7	
8	Information Technology Project Management	2	X			6	
	Total	130					

According to the Diploma Supplement the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Master degree programme <u>Computer Science</u>

"Graduates of the application-oriented master degree program in Computer Science at University of Science and Technology, The University of Danang have abiity to:

1. Apply knowledge of Mathematics, science and technology to solve new and complex technical problems in the field of Information Technology

2. Analyze complex computational problems and effectively apply specialized knowledge as well as in related industries to build and develop systems, products and technical solutions Information technology believe.

3. Master and analyze and synthesize in-depth knowledge of the field of environmental science in research, application and development of intelligent systems, products, solutions and potential uses of Information Technology.

4. Think critically, creatively, start-up, and behave professionally; ethical, professional responsibility

5. Adapt and self-direct in-depth careers; ability to acquire and apply new knowledge; use appropriate learning strategies; knowledge transfer skills.

6. Organize, lead and work in a team; synthesis, system analysis and critical skills; intensive communication in an international and multicultural environment; effective presentations and dialogues at work;

7. Form ideas, select, design, integrate and administer information technology systems based on analysis of user and business requirements in the context of society and the environment

8. Self-training, self-updating knowledge and doing scientific research; propose and evaluate technical and technological solutions for Information Technology products and systems."

The following curriculum is presented:

Sem ester	Course Title	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO
1	Scienctific research methods		L		Н	М		М	М
1	IT applied Mathematics	Н	М						
1	Artificial Intelligence	М	Н		L				
1	Data science	М	Н		L				

#### 1. The research-oriented training program

1	IT project management		L	Н		М		
1	Service-oriented architecture		L	Н		М		
1	Software testing		L	Н		М		
1	Specialised elective course 01		Н	М			L	
1	Enterprise architecture		Н	М			L	
1	Information assurance		Н	М			L	
1	Encryption and cryptography		Н	М			L	
1	IoT application develo- pment		Н	М			L	
1	Computer vision		Н	М			L	
2	Software architecture		L	Н		М		
2	Information safety and security	Н		М	L			
2	Specialised elective course 02	L	М	Н		М		
2	Image processing	L	М	Н		М		
2	Mathematics in compu- ter science	L	М	Н		М		
2	Natural language processing	L	М	Н		М		
2	Big data storage and processing	L	М	Н		М		
2	Geometric modeling	L	М	Н		М		
2	Web data mining	L	М	Н		М		

2	Advanced artificial intelligence	Н		М		L	
2	Advanced data science	Н		М		L	
2	IoT technology		Н	М	L		
2	Specialised elective course 03		М	Н		L	
2	Advanced knowledge technology		М	Н		L	
2	Network technology		М	Н		L	
2	High performance com- puting		М	Н		L	
2	Smart systems		М	Н		L	
2	Decision support system		М	Н		L	
3	Topic onsoftwaretechnology1(Advancedsoftwaretesting)		М		Н	L	М
3	Topic on software tech- nology 2 (Computational Intelligence in Soft- ware Engineering)		М		Н	L	М
3	Topic on software tech- nology 3 (Software ar- chitecture)		М		Н	L	М
3	Topic on information		М		Н	L	М
	assurance 1 (Advanced network technology)						

3	Topic on information assurance 2 (AI appli- cation in cyber secu- rity)		М		Н		L	М
3	Topic on information assurance 3 (High per- formance computing)		М		Н		L	М
3	<i>Topic on data science</i> <i>1</i>		М		Н		L	М
3	Topic on data science 2 (Data visualisation)		М		Н		L	М
3	Topic on data science 3 (Data mining and processing)		М		Н		L	М
4	Graduation thesis			М	Н	М	Н	Н

## 2. The application-oriented training program

Sem ester	Course Title	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
1	Scienetific research me- thods		L		Н	М		М	М
1	IT applied mathematics	Н	М						
1	Artificial intelligence (AI)	М	Н		L				
1	Data science	М	Н		L				
1	IT project management			L	Н		М		

1	Service oriented archi- tecture		L	Н		М		
1	Software testing		L	Н		М		
1	Specialised elective course 01		Н	М			М	
1	Enterprise archi- tecture (EA)		Н	М			М	
1	Information assurance		Н	М			М	
1	Encryption and crypto- graphy		Н	М			М	
1	IoT application develo- pment		Н	М			М	
1	Computer vision		Н	М			М	
2	Software architecture		L	Н		М		
2	Information safety and security	Н		М	L			
2	Specialised elective course 02	L	М	Н		М		
2	Image processing	L	М	Н		М		
2	Mathematics in compu- ter science	L	М	Н		М		
2	Natural language pro- cessing	L	М	Н		М		
2	Big data storage and processing	L	М	Н		М		
2	Geometric modeling	L	М	Н		М		
2	Web data mining	L	М	Н		М		

2	Advanced artificial in- telligence	Н		М			М	
2	Advanced data science	Н		М			М	
2	IoT technology		Н	М	L			
2	Specialised elective course 03		М	Н			М	
2	Advanced knowledge technology		М	Н			М	
2	Network technology		М	Н			М	
2	High performance com- puting		М	Н			М	
2	Smart systems		М	Н			М	
2	Decision support system		М	Н			М	
2	Internship (Master's)		М	М		Н	М	
3	Topic on Software tech- nology (Computational intelligence in software technology)		М	Н			М	М
3	Topic on Information safety (AI application in cyber security)		М	Н			М	М
3	Topic on data science (Data mining and		М	Н			М	М
	processing)							
3	Topic on technology (Multimedia technol- ogy)		М	Н			М	М

4	Graduation thesis (Mas- ter's)			М	Н	М	М	Н	Н
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