# ASIIN Seal & European Labels

# Accreditation Report

**Bachelor's Degree Programmes**
***Computer Science (Jakarta / Bandung / Malang)***

**Master's Degree Programme**
***Computer Science***

**PhD Programme**
***Computer Science***

Provided by
**Bina Nusantara (BINUS) University**

Version: 08 December 2023

# Table of Content

# A About the Accreditation Process

| **Name of the degree programme (in original language)** | **(Official) English translation of the name** | **Labels applied for** [1] | **Previous accreditation (issuing agency, validity)** | **Involved Technical Committee (TC)**[2] |
|---|---|---|---|---|
| Sarjana Komputer (S.Kom.)<br>*(Anggrek Campus, Jakarta)* | Bachelor of Computer Science | ASIIN, Euro-Inf® | 1. Board of National Accreditation for Higher Education (BAN-PT), Valid until 14 May 2024<br>2. ASEAN University Network - Quality Assurance (AUN-QA), valid until August 2024 | 04 |
| Sarjana Komputer (S.Kom.)<br>*(Bandung Campus)* | Bachelor of Computer Science | ASIIN, Euro-Inf® | Board of National Accreditation for Higher Education (BAN-PT), Valid until 1 December 2024 | 04 |
| Sarjana Komputer (S.Kom.)<br>*(Malang Campus)* | Bachelor of Computer Science | ASIIN, Euro-Inf® | Board of National Accreditation for Higher Education (BAN-PT), Valid until 2 July 2024 | 04 |
| Magister Komputer (M.Kom.) | Master of Computer Science | ASIIN, Euro-Inf® | Board of National Accreditation for Higher Education (BAN-PT), Valid until 2 December 2026 | 04 |
| Doctor (Dr.) pada program studi Ilmu Komputer | Doctor in Computer Science | ASIIN | Board of National Accreditation for Higher Education (BAN-PT), Valid until 12 December 2027 | 04 |
| **Date of the contract:** 17.02.2022<br>**Submission of the final version of the self-assessment report:** 21.07.2023<br>**Date of the on-site visit:** 03.-04.10.2023 | | | | |

[1] Seal for degree programmes; Euro-Inf®: Label European Label for Informatics
[2] TC: Technical Committee for the following subject areas: TC 04 - Informatics/Computer Science.

| | |
|---|---|
| **at: Bina Nusantara (BINUS) University, Campus Anggrek, School of Computer Science**<br>**Location:** Jakarta, Indonesia. | |
| **Expert panel:**<br>Prof Dr Heribert Vollmer, Leibniz University of Hannover<br>Prof Dr Andreas Schwill, University of Potsdam<br>Mr Wilfridus Handaya, tuwuhwutuh.id<br>Mr Kadek Gemilang Santiyuda, student at Universitas Gadjah Mada | |
| **Representative of the ASIIN headquarter:** Christian Daniels | |
| **Responsible decision-making committee:** Accreditation Commission for Degree Programmes | |
| **Criteria used:**<br>European Standards and Guidelines as of May 15, 2015<br>ASIIN General Criteria, as of December 07, 2021<br>Subject-Specific Criteria of Technical Committee 04 – Informatics/Computer Science as of March 29, 2018<br>ASIIN Additional Criteria for Structured Doctoral Programmes as of March 15, 2021 | |

# B Characteristics of the Degree Programmes

| a) Name | Final degree (original/English translation) | b) Areas of Specialization | c) Corresponding level of the EQF[3] | d) Mode of Study | e) Double/Joint Degree | f) Duration | g) Credit points/unit | h) Intake rhythm & First time of offer |
|---|---|---|---|---|---|---|---|---|
| Ba Computer Science (Jakarta) | Sarjana Komputer (S.Kom.) / Bachelor of Computer Science | 1. Software Engineering<br>2. Intelligent System<br>3. Interactive Multimedia<br>4. Database Technology<br>5. Network Technology<br>6. Mobile Application & Technology<br>7. Game Application & Technology<br>8. Cyber Security<br>9. Data Science<br>10. Internet of Things<br>11. Digital Creative Technology | Level 6 | Full-time | — | 4 years / 8 semesters | 146 SKS equivalent to 215 ECTS | Annually in September; first offered in September 1991 |
| Ba Computer Science (Bandung) | Sarjana Komputer (S.Kom.) / Bachelor of Computer Science | | Level 6 | Full-time | — | 4 years / 8 semesters | 146 SKS equivalent to 215 ECTS | Annually in September; first offered in September 2017 |
| Ba Computer Science (Malang) | Sarjana Komputer (S.Kom.) / Bachelor of Computer Science | | Level 6 | Full-time | — | 4 years / 8 semesters | 146 SKS equivalent to 215 ECTS | Annually in September; first offered in September 2016 |
| Ma Computer Science | Magister Komputer (M.Kom.) / Bachelor of Computer Science | 1. Data Science<br>2. Information Security Management | Level 7 | Full-time | — | 1½ years / 3 semesters | 42 SKS equivalent to 67 ECTS | March, June, September & November; first offered in September 2009 |
| PhD Computer Science | Doctor (Dr.) pada program studi Ilmu Komputer / Bachelor of Computer Science | 1. Computer Science<br>2. Information System | Level 8 | Full-time | — | 3 years / 6 semesters | 42 SKS equivalent to 81 ECTS | Biannually in March & September; first offered in September 2014 |

**BINUS University**, officially known as Universitas Bina Nusantara, is a private educational institution situated in Indonesia. The University has its roots in a computer training institute stablished in 1974. It progressively evolved and was officially founded as a university in 1996. It is recognized as one of the top private universities in Jakarta, Indonesia. As per its

[3] EQF = The European Qualifications Framework for lifelong learning

vision statement, the University aims to become “a World-class university, fostering and empowering the society in building and serving the nation”.

BINUS University consists of a network of nine campuses spread across six cities. All in all, the University offers 48 Bachelor’s and Diploma programmes, 6 Master’s programmes, and two PhD programmes through its various faculties and schools, including the School of Information Systems, School of Informatics Engineering, Faculty of Engineering, School of Business and Management, Faculty of Economics and Communication, School of Design and the Faculty of Humanities. As a means of fostering a common identity, the University has coined the term “BINUSIAN” as a reference to all students, lecturers, staff, and alumni affiliated with its institutional network.

According to the information provided by the University, BINUS has more than 45.000 active students and over 140.000 alumni as per the writing of this report.

The history of the Computer Science programmes at BINUS University began in Jakarta in 1987 with the establishment of the Bachelor of Computer Science programme, which was followed by the introduction of the Master of Computer Science programme in 2009, and the launch of the Doctor of Computer Science programme in 2014. In 2016, the University expanded its Bachelor of Computer Science programme to Malang, followed by the opening of similar undergraduate program in Bandung in 2017. Almost 10.000 students out of the abovementioned total student body are enrolled in the programmes under review.

For the **Bachelor’s degree programmes** in Computer Science, BINUS University has presented the following profile in their self-assessment report:

**“A. Objective**

**A.1 Computer Science Undergraduate Program**

Computer Science undergraduate programs are under the School of Computer Science Bina Nusantara University and operating in three different campuses: Jakarta Campus, Malang Campus, and Bandung Campus. (…) “A world-class study program by providing excellent educational experiences in Computer Science, which focuses on developing creative technology solutions, fostering and empowering the society in building and serving the nation” is the vision of the **Jakarta** Computer Science Program as the main Campus. The mission of Computer Science Program is to contribute to the global community through the provision of world-class education by:

1. Educating students to effectively apply their educational experiences in developing creative solutions in computer science, to solve real-world problems.
2. Preparing graduates to develop exemplary soft skills and technical skills required as computer science professionals, leaders, and entrepreneurs in global market.
3. Promoting high impact computer science research that contributes to the nation.

4. Fostering BINUSIAN as computer science lifelong learners through self-enrichment.
5. Empowering BINUSIAN to continuously improve society's quality of life through knowledge in computer science.

In 2016, the Computer Science program expanded to Malang City, East Java. The vision of the Computer Science Program in **Malang** campus is "A world-class study program by providing excellent educational experiences in computer science, fostering and empowering the society in building and serving the nation through digital technology and technopreneur". Malang campus focuses on the *digital technology and technopreneurship* area to support local businesses. The mission of Computer Science Program at **Malang Campus** is to contribute to the global community through the provision of world-class education by:

1. Educating students to effectively apply their educational experiences in computer science to solve real-world problems through digital technology and technopreneur approach.
2. Preparing our graduates to develop examplary soft skills & technical skills required as ICT professionals, leaders, and entrepreneurs in global market.
3. Promoting high impact research that contributes to the nation in digital technology themes.
4. Fostering BINUSIAN as lifelong learners through self-enrichment.
5. Empowering BINUSIAN to continuously improve and society's quality of life through digital technology and technopreneur approach.

The following year in 2017, Computer Science Program also expanded to **Bandung** City, West Java, which vision is "A world-class study program by providing excellent educational experiences in computer science, fostering and empowering the society in building and serving the nation through digital and smart technology." The focus of Computer Science Program at Bandung Campus is in the *digital and smart technology*. The missions of Computer Science Program at **Bandung Campus** are as follow:

1. Educating students to effectively apply their educational experiences in computer science to solve real-world problems focus on smart technology and designpreneur approach.
2. Preparing our graduates to develop exemplary soft skills & technical skills required as ICT professionals, leaders, and entrepreneurs in the global market.
3. Promoting high impact research that contributes to the nation in smart technology themes.
4. Fostering BINUSIAN as lifelong learners through self-enrichment.
5. Empowering BINUSIAN to continuously improve and society's quality of life through smart technology and designpreneur approach.

All the computer science undergraduate programs are under the supervision of the Dean of School of Computer Science and share the same Program Objectives as follow:

1. Graduates will become successful professionals in ICT fields.
2. Graduates will obtain employment in global companies or become entrepreneurs.
3. Graduates will obtain professional certification or continue their study to the postgraduate level.

(…)

## B. Learning Outcomes

### B.1 Computer Science Undergraduate Program

The Computer Science Undergraduate Program at Jakarta, Malang, and Bandung Campus have the same learning outcomes as shown below:

1. Able to analyse a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2. Able to design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of computer science.
3. Able to communicate effectively in a variety of professional contexts.
4. Able to recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Able to function effectively as a member or leader of a team engaged in activities appropriate to computer science.
6. Able to apply computer science theory and software development fundamentals to produce computing-based solutions.

(…)

### C. Qualification Profile

### C.1 Computer Science Undergraduate Program

After completing the program, the graduates of Computer Science Undergraduate Program are expected, but not limited to, to become: Analyst, Developer, Entrepreneur, or Researcher."

For the **Master's degree programme** in Computer Science, BINUS University has presented the following profile in their self-assessment report:

### "A. Objective

### A.2 Computer Science Master Program

Computer Science Master Program is managed by BINUS Graduate Program where its vision is ''an ICT graduate program that fosters a world class environment for ICT leaders to thrive intellectually and professionally in building and serving the nation.'' The missions of Computer Science Master Program are:

1. Educating BINUSIAN through ICT curriculum that meets global standards and industrial needs to promote continuous improvement of science and technology
2. Generating innovative ICT technologies through high impact research to resolve the nation's issues
3. Fostering BINUSIAN as lifelong learners through self-enrichment to stay abreast with advancement in ICT technology by leveraging on available resources
4. Empowering BINUSIAN with knowledge and skills in ICT technology to contribute in improving society's quality of life as the vision.

The objectives of the program are:

1. To provide students with ICT best practices in order to increase their competitive advantage by applying the leading technologies.
2. To provide students with advanced knowledge in innovation, technology, and leadership in order to pursue efficient as well as effective business processes.
3. To provide students with international experience in research and development in order to improve humanity as well as environmental aspects.

(…)

## B. Learning Outcomes

### B.2 Computer Science Master Program

The Computer Science Master Program learning outcomes are the following:

1. Able to propose solutions to the problems with implementing Information Technology in a dynamic and complex environment in the form of innovative work tested through the research and development of information technology in accordance with scientific study and professional practice.
2. Able to develop software applications to solve the problems that can be solved with Information Technology in the complex and dynamic environment using Scientific research approach.
3. Able to develop methods and Information Technology using inter and multidisciplinary research approaches to produce tested innovative work and commercialized applicative potential in the information technology field.
4. Able to design and analyse Information Technology project also manage Information Technology Infrastructure effectively based on good governance.
5. Able to develop science and Information and Communication Technology using artificial intelligence method to produce innovative products that can be applied in various fields.
6. Able to develop science and Information and Communication Technologies using governance method with security system of the infrastructure network to produce blueprint strategy and Information and Communication Technology in an organization with a service-oriented approach.

(…)

## C. Qualification Profile

### C.2 Computer Science Master Program

After completing the study, the graduates of computer science master program are expected to become: IT specialist, IT Lecturer, Data analyst & researcher, Data scientist, Data architect, Data engineer, Computer network architect, IT security analyst, IT Business Creator, IT Consultant, IT Solution or System Integrator."

For the **PhD programme** in Computer Science, BINUS University has presented the following profile in their self-assessment report:

**"A. Objective**

**A.3 Computer Science Doctoral Program**

Computer Science Doctoral Program is also under the administration of BINUS Graduate Program. The program's vision is ''to become one of the globally recognized scientific research and development study programs in the disciplines of information systems and computer science.''

The missions of the Computer Science Doctoral Program are as follow:

1. Improving the welfare of society through word-class high quality education in Information Technology and Information Systems to produce qualified, professional, and competent graduates according to current and future needs of the nation.
2. Creating outstanding leaders for global community who participate in an important role in computer science and technology development which answer the society's needs.
3. Improving the quality of life of Indonesians and the international community through contribution in economic and industrial development with continues innovation and improvement based on computer science.
4. Conducting professional services through introduction, diffusion, and dissemination of relevant knowledge with an emphasis on application of knowledge to the society.
5. Recognizing and rewarding the most creative and value-adding talents.

The objectives of the Computer Science Doctoral Program are:

1. To increase the productivity of graduates in Computer Science with international recognition.
2. To equip graduates with advanced Computer Science knowledge in order to be global leader in related field.
3. To provide Graduates with teaching and research activity to achieve quality indicator and objectives of Doctoral Program of Computer Science.

(…)

**B. Learning Outcomes**

**B.3 Computer Science Doctoral Program**

The Computer Science Doctoral Program's learning outcomes are as follow:

1. Able to lead research in the areas of information systems and computer science with a multidisciplinary approach to develop innovative and verified works.
2. Able to adapt in the disciplines of information systems or computer science field development through various applied research that have implications to enhance the quality of life.
3. Able to disseminate study results in the disciplines of information systems or computer science field through publication in international seminars and journals as well as intellectual property.
4. Able to elaborate the theory and method to create an innovative model or framework in the

disciplines of information systems or computer science with fostering and empowering the society.

(…)

## C. Qualification Profile

### C.3 Computer Science Doctoral Program

After completing the study, the graduates are expected to become: Professor, Researcher, Principal Investigator, Leader of IT Consultant, Industry Research and Development Leader, or Higher Education Leader in Information Systems or Computer Science fields."

# C Expert Report for the ASIIN Seal[4]

## 1. The Degree Programme: Concept, Content & Implementation

**Criterion 1.1 Objectives and Learning Outcomes of a Degree Programme (Intended Qualifications Profile)**

**Evidence:**

- Self-Assessment Report
- Objective-Module Matrices (Modules to LOs, Modules to SSCs)
- University Website (here, here, here, here, here)
- Curriculum Documents, all programmes under review.
- Discussions with programme coordinators, lecturers, students, and industry representatives during the audit.

**Preliminary assessment and analysis of the experts:**

Learning Outcomes

At the programme level, the educational objectives of all study courses under review are established at multiple levels as elaborated in the self-assessment report and the *Curriculum* documents:

- **Programme Learning Outcomes** (see Appendix), which, in accordance with the Indonesian National Qualification Framework (*Kerangka Kualifikasi Nasional Indonesia*, KNNI), are distinguished as aspects of Attitude (*sikap*), Knowledge (*pengetahuan*), General Skills (*kemampuan umum*), and Special Skills (*kemampuan khusus*);

  as well as, based on these,

- **Student Outcomes** (see section B), which subsume the outlined programme learning outcomes in a more comprehensive manner,

  which, in turn, serve to implement the

[4] This part of the report applies also for the assessment for the European subject-specific labels. After the conclusion of the procedure, the stated requirements and/or recommendations and the deadlines are equally valid for the ASIIN seal as well as for the sought subject-specific label.

- **Programme Objectives,** through which the University has the defined the respective programmes' purpose,

  and which aim to realise the intended

- **Qualification Profiles** of the respective programmes' graduates.

Within the provided documentation, the University establishes tabular mappings of linkages between modules and programme LOs as well as modules and ASIIN's subject-specific criteria for all programmes under scrutiny.

In connection to this, the auditors also verified and confirm that the student and programme objectives for all five programmes are published on their respective websites.

On the module level, course learning objectives (CLOs) are defined in the respective module handbooks, where links to the defined programme learning objectives are moreover documented. In view of the above, the experts commend the detailed and multi-layered description of objectives in the programmes under review.

In the course of their assessment of the respectively documented programme and course learning outcomes, the experts assess that there are no major deficiencies. Based on this, the experts conclude that the learning outcomes of the programmes under review correspond to level 6 (Bachelor), level 7 (Master) and level 8 (PhD) of the European Qualification Framework (EQF), respectively. Moreover, the experts assess that the outlined objectives suffice the Subject-Specific Criteria of ASIIN's Technical Committee 04 for Computer Science. Further discussion of the curricula will follow in chapter 1.3.

Graduate Qualification Profiles

As outlined under section B, all three undergraduate programmes pursue slightly different foci in their curricula:

- Jakarta campus: creative technology solutions,
- Bandung campus: digital and smart technology,
- Malang campus: digital technology and technopreneurship.

During the experts' exchanges with students and alumni, high satisfaction with the programmes under review, the learning they impart as well as future job perspectives emerged; with multiple attendees emphasising that BINUS is considered amongst the leading institutions in the field of Computer Science higher education in Indonesia. Furthermore, students commended the geographical dispersion of BINUS' campuses, as well as the variety of streams offered across the respective programmes (see criterion 1.3).

On their part, industry representatives from both private and public institutions equally expressed their satisfaction with BINUS' Computer Science graduates, and also highlighted the University's overall strong reputation in the field. In particular, the industry partners confirmed their eagerness to take in students and graduates from the programmes under review, citing their overall good qualification, soft skills, attitude and ability to find creative solutions. In terms of the streams offered in the respective programmes, industry representatives particularly highlighted their appreciation of the cyber security-related streams offered in the Bachelor's and Master's programme.

Asked by the experts if there are any skills they would wish to see strengthened within the BINUS Computer Science graduates, various industry representatives stated that stronger business-related skills such as entrepreneurship skills, business acumen, customer focus and agile thinking would be desirable. The assessors accordingly suggest the University to consider this feedback.

In view of the provided student and industry feedback, the experts nevertheless gain the impression that the imparted qualification profiles satisfy expectations on all sides and allow the students to take up employment corresponding to their qualification following their graduation.

Review of Learning Outcomes

In its self-assessment report, the University states that learning outcomes and curricula are reviewed at least every 2 years, involving both internal and external stakeholders – the latter including industry representatives and professional organisations such as the Indonesian association for higher education in Informatics and Computer Science (APTIKOM) – as well as through benchmarking with other national and international universities. In agreement with this, the programme coordinators highlighted during the audit that focus group discussions with industry representatives take place every two to three years, and that various student and staff surveys are conducted for review and quality management purposes.

Based on the provided documentation, their exchanges during the audit, as well as the further discussion of the University's quality assurance mechanisms under criterion 1.3 and criterion 5 below, the experts gain the impression that appropriate, recurring review mechanisms concerning the learning outcomes of the programmes under review are in place.

## Criterion 1.2 Name of the Degree Programme

**Evidence:**

- Self-Assessment Report
- University Website (here, here, here, here, here)
- Decree Number No. 1785A/SK/K&KA/X/2013, Rector of BINUS University, regarding Curriculum and Academic Provisions, BINUS
- Curriculum Documents, all programmes under review
- Sample Diploma for each degree programme
- Sample Diploma Supplement for each degree programme
- Discussions with programme coordinators, lecturers, students, and industry representatives during the audit.

**Preliminary assessment and analysis of the experts:**
As outlined by the University in the self-assessment report, graduates of the undergraduate programme in Computer Science are conferred with the title S.Kom. (*Sarjana Komputer*, Bachelor of Computer Science), graduates of the Master's programme are awarded the title M.Kom. (*Magister Komputer*, Master of Computer Science). Doctoral programme graduates receive the title Dr. (*Doktor*, signifying Doctor in Computer Science).

During their perusal of the provided documentation and the University's website, the experts note that the Master's programme is occasionally referred to as "Master of Information Technology" (e.g. here, here, here) instead. The experts highlight that programme titles – including their translation into English – needs to be used consistently in all relevant documents, and hence ask the University to correct any such inconsistent designations.

Aside from the above, however, the experts confirm that the English translation and the original Indonesian names of the study programmes under review are appropriate and correspond to the programmes' intended aims and learning outcomes.

## Criterion 1.3 Curriculum

**Evidence:**

- Self-Assessment Report
- University Website (here, here, here, here, here)
- Decree Number No. 1785A/SK/K&KA/X/2013, Rector of BINUS University, regarding Curriculum and Academic Provisions, BINUS

- Curriculum Documents, all programmes under review.
- Discussions with programme coordinators, lecturers, students, and industry representatives during the audit.

**Preliminary assessment and analysis of the experts:**

The curricula, structure, and composition of the study programmes under review are presented in the University's provided "Curriculum Documents". As per the Faculty's self-assessment report, the programmes have been aligned with the Indonesian Qualification Framework and the standards set by the Association for Computing Machinery (ACM), and have benchmarked against both local and international universities, as well as current market trends.

**Ba Computer Science (Campus Jakarta, Bandung, Malang)**

The Bachelor's programmes in Computer Science under review are offered by the School of Computer Science, which in total offers six computer-related undergraduate programmes at Bina Nusantara (BINUS) University. All of the curricula consist of 146 Indonesian credits (*Satuan Kredit Semester*, SKS).

Structure of the Programmes

The expected study duration is eight semesters (four years). Each semester is equivalent to 14 weeks of learning activities. Besides these learning activities, there is one week for midterm exams and one week for final exams. The odd semester starts in September and ends in February, the even semester lasts from February to July. In addition, the School offers a so-called short (or "compact") semester in spanning July and August with the purpose of enabling students to retake failed courses or to advance with their studies.

The curricula of the undergraduate courses under review consist of university requirements, core courses, streams, enrichment courses, as well as an elective component. Moreover, all of the mentioned undergraduate programmes include the writing of a final Bachelor's thesis, along with a preparatory "pre-thesis" seminar.

| Course Group | Total Subjects | Total SCU | ECTS |
|---|---|---|---|
| Core courses | 19 subjects | 64 | 96 |
| University Courses | 10 Subjects | 14 | 21 |
| Streams/ Free elective/ Minor program | 5-9 subjects for each Streams / Free elective/ Minor program | 18 | 27 |
| Enrichment | 6-8 subjects for each program | 40 | 60 |

| | | | |
|---|---|---|---|
| Elective | 1 or 2 subjects | 4 | 6 |
| Thesis | 2 subjects | 6 | 9 |
| **Total** | | **146** | **219** |

*Composition of Bachelor's curricula. Source: Self-Assessment Report, BINUS.*

Contents

As outlined above, all of the three Computer Science undergraduate curricula under review consist of various course categories:

**University courses** consist of mandatory classes aiming to foster skills such as communication skills, management competencies, oral and written communication skills, business ethics, and the capacity for teamwork. They consist of modules such as

> *Pancasila, Civic Education, Entrepreneurship, English, Indonesian language*, and more.

**Core Courses** lay the foundational knowledge in Computer Science, emphasising practical and applied theory. They consist of subjects such as

> *Discrete Mathematics, Linear Algebra, Basic Statistics, Algorithm and Programming, Program Design Methods, Calculus, Scientific Computing, Computational Physics, Data Structures, Human and Computer Interaction, Algorithm Design and Analysis, Database Technology, Computer Networks, Artificial Intelligence, Computational Biology, Research Methodology in Computer Science, Software Engineering, Compilation Techniques,* and *Operating System*.

**Streams**, intended to be taken in the students' fourth and fifth semester, enable students to deepen their knowledge in their respective areas of interest, and hence to individualise their study path. Streams include a variety of topics, including Software Engineering, Intelligent Systems, Interactive Multimedia, Database Technology, Network Technology, Mobile Application & Technology, Game Application & Technology, Cyber Security, Data Science, Internet of Things, and Digital Creative Technology. They include courses such as

> **Stream: Software Engineering**
> *Code Reengineering, Pattern Software Design, Agile Software Development, Framework Layer Architecture, Object Oriented Analysis & Design;*
>
> **Stream: Intelligent Systems**
> *Natural Language Processing, Machine Learning, Speech Recognition, Computer Vision, Deep Learning;*
>
> **Stream: Interactive Multimedia**
> *User Experience, Multimedia System, Multimedia Programming Foundation, Computer Graphics, Game Design Programming;*

**Stream: Database Technology**
*Database Design, Big Data Processing, Distributed Cloud Computing, Geographical Information System, Data Mining;*

**Stream: Network Technology**
*Computer Security, Network and System Programming, Introduction to Cloud Infrastructure, Linux System Administration and Security, Popular Network Technology;*

**Stream: Mobile Application & Technology**
*Health Mobile Community Solution, Wearable Technology, Multimedia Programming Foundation, Embedded System and Internet of Things, Mobile Multimedia Solution, Web Design;*

**Stream: Game Application & Technology**
*Multimedia Programming Foundation, Game Programming, Game Animation, Fundamental in Game Balancing, 2D Game Art, Game Development Capstone Project, 3D Modelling for Games;*

**Stream: Cyber Security**
*Server and Network Administration, Software Security, Big Data Infrastructure and Technology, Mobile Penetration Testing, Computer Forensic, Network Penetration Testing, Secure Programming, Cyber Law;*

**Stream: Data Science**
*Data Mining and Visualization, Deep Learning, Big Data Infrastructure and Technology, Survey and Sampling Methods, Machine Learning, Data Management and Organization, Text Mining, Data Security;*

**Stream: Internet of Things**
*Embedded System, Multimedia & Mixed Reality, Mobile Programming, Computer vision in IoT, IoT Development and Architecture, Cyber Security in IoT;*

**Stream: Digital Creative Technology**
*Web Programming, Multimedia Systems, Popular Programming Technology, Big Data Analytics for Business, Mobile Application Programming, Data Visualization.*

As hinted by the programme coordinators during the audit and verified by means of the provided samples, students' chosen stream is also indicated on their transcript and diploma supplement.

**Enrichment courses**, envisaged for the students' sixth and seventh semester, implement the Indonesian government's "Independent Learning - Independent Campus" (*Merdeka Belajar - Kampus Merdeka*, MBKM) scheme, seeking to foster personal and skills' development by providing students with study-related real-world exposure outside the classroom. At BINUS, enrichment courses are clustered in to various tracks, namely the

“Certified Internship”, “Certified Research”, “Certified Entrepreneurship”, “Certified Community Development”, “Certified Study Abroad”, as well as more individualised tracks.

**Free electives**, while integrated in all study paths to a limited degree, may also replace the abovementioned streams, thus enabling students to attend a wide range of courses instead. Free electives include a large pool of courses from topics offered at neighbouring schools and departments such as

> *Accounting, Animation, Business Creation, Business Information Technology, Business Law, Business Management, Chinese Literature, Civil Engineering, Computer Engineering, Computer Science, Creative Advertising, Cyber Security, Data Science, English Literature, Film, Food Technology, Game Application and Technology, Industrial Engineering, Information Systems, Information Systems Accounting & Auditing, Interior Design, International Business Management, International Relations, Management, Marketing Communication, Mobile Application & Technology, New Media, Primary Teacher Education, Psychology,* and *Tourism*.

Elective subjects may moreover be clustered into predetermined **minors**, which focus on subjects such as

> *Human Capital in Digital Workplace, Sustainable Development, Cross Cultural Communication, Interactive & Users Experience Design, Data Analytics, Robotic Process Automation, Digital Business, Culinary, Digital Technopreneur, or Designpreneur.*

The final **thesis** consists of a “Pre-Thesis” course in which students learn to create and defend a proposal outlining a suitable project, as well as the furnishing of a written thesis.

With regard to the Bachelor’s curriculum, the expert group asked the programme coordinators for a number of clarifications: Concerning the existence of theoretical computer science within the undergraduate curricula, they learned that

- Language theory, semantics analysis, computability (including the halting problem) as well as different types of automata, including finite state machines, push-down acceptors, and Turing machines, are studied in the “Compilation Techniques” course in the students fifth semester, while
- Algorithmic paradigms and complexity theory are integral to the “Algorithm Design and Analysis” subject in the students’ third semester.
- In regard to functional programming, they learned that relevant contents are included in the “Scientific Computing” course offered during the second semester.

Upon further perusal of the syllabus for the "Algorithm Design and Analysis" module, the experts however note that, while in total covering an enormous scope of topics, specific

contents (such as complexity and decidability) often appear to be treated in a rather limited way within one course week only. In consequence, the experts assess that – while the present structure is suitable to equip students adequately for the general labour market – it does not appear sufficient to instil in-depth knowledge for more "ground-breaking" theoretical work. The experts hence recommend the University to consider strengthening the role of foundational knowledge within the Bachelor's curricula, also to achieve closer alignment with the Association for Computing Machinery (ACM) curriculum standards referenced by the University itself.

In this context, the experts were however also informed during the audit that alignment between the Bachelor's curriculum and the relevant ACM recommendations had been closer prior to the introduction of the government-mandated MBKM (*Merdeka Belajar - Kampus Merdeka*, "Independent Learning - Independent Campus") scheme, represented at BINUS through the so-called "Enrichment Programme". While the integration of such enrichment courses at BINUS actually preceded the government's introduction of the MBKM programme, its scope had to be extended to align with the new official policies, hence necessitating some subjects to be removed from the curriculum in turn, or to be integrated into other modules. Similarly, teaching staff reported to the experts during the audit that previous modules "Computability and Complexity" and "Automata and Formal Languages" had to be removed and basics of theoretical computer science such as complexity, decidability, Turing machines or automata have instead been integrated in other modules in the course of the previous curriculum restructuring process. In light of the provided elaborations during their exchanges on site, the experts find that an improved visibility of these reintegrated topics within the module descriptions would be desirable, and to not cover these important subjects in one course week each only.

With regard to the parallel offering of the undergraduate programme at the Jakarta, Bandung, and Malang campuses, the experts learn during audit that teaching materials are frequently imported from Jakarta to the other two campuses, with local staff then building on these to deliver the respective courses whilst adding own contents as needed. In this context, the lecturers stressed that delivery of courses is local, and not facilitated through online teaching.

All in all, based on the provided documentation and their discussions during the audit, the expert group attests that modules within the undergraduate programmes embody sensible teaching and learning units, respectively imparting distinct clusters of knowledge and competencies. Moreover, students are able to pursue individual study pathways through both the foci of offered programmes as well as their specialisations and elective components.

Internships

As outlined above, internships are integrated in the Bachelor's programmes through the "Certified Internship Track" of the so-called Enrichment Programme, accounting for two entire semesters of workload (40 SKS):

**1. CERTIFIED INTERNSHIP TRACK**

**Enrichment Program I**

| Group | Course | | SCU |
|---|---|---|---|
| MKB | COMP6777031 | Industrial Experience in Information Technology | 8 |
| | COMP6778031 | Information Technology Practice in Industrial Experience | 8 |
| | COMP6779031 | EES in Information Technology Industry | 4 |
| **Total SCU** | | | **20** |

**Enrichment Program II**

| Group | Course | | SCU |
|---|---|---|---|
| MKB | COMP6780031 | Professional Experience in Information Technology | 8 |
| | COMP6781031 | Information Technology Practice in Professional Experience | 8 |
| | COMP6782031 | Professional Development in Information Technology Industry | 4 |
| **Total SCU** | | | **20** |

*Outline of Internship Track within the Enrichment Programme at Bachelor's level. Source: Curriculum Documents, BINUS.*

To support the arrangement of students' internships within the "Certified Internship Track", BINUS employs a dedicated unit called the "BINUS Internship Center (IC)", which moreover facilitates preparatory trainings such as "soft skills enrichment workshops" or "internship expo" to introduce students to industrial partners and thus assist their placement process.

On their part, industry representatives highlighted to the experts during the audit that they see these internships as opportunities for long-term recruitment. Moreover, industry partners confirmed that University supervisors regularly conduct on-site visits to talk to the students in their internships environment as well as the host institution.

Mobility

In regard to academic mobility, students confirmed to the experts during the audit that BINUS promotes student mobility early in the Bachelor's students' journey, as far back as in the students' first semester. In agreement with this, multiple of the attending Bachelor's students confirmed that they either had conducted mobilities abroad (e.g. to partner universities of BINUS in the UK, Finland, or South Korea), or were planning to do so in the future based on an acceptance notification already received.

In terms of credit recognition, the experts were pleased to hear from multiple students that credit transfer from studies attended outside BINIUS is facilitated conveniently and reliably on the basis of learning agreements. As for funding opportunities to support students' mobilities abroad, both students and the programme coordinators confirmed that various scholarships can be applied for granted by BINUS itself or through the Indonesian International Student Mobility Awards (IISMA) scheme funded by the Ministry of Education, Culture, Research, and Technology.

Curriculum Review

As mentioned under criterion 1.1, the learning outcomes and curricula of the programmes under scrutiny are reviewed every 2-3 years, involving both student, staff, alumni, and industry feedback. As examples of outcomes of this process, the programme coordinators highlighted the introduction of the "Internet of Things" stream in the undergraduate programme, stronger attention to the topic of AI in courses across the curriculum, as well as the intended introduction of cloud computing as a further stream. In accordance with this, industry representatives confirmed their involvement in curriculum review processes to the expert group during the audit.

All in all, the experts are content with the provided information concerning the programmes' curricular review procedures.

**Ma Computer Science**

The Master's programme in Computer Science under review is offered by BINUS' Graduate Program, which administers a range of graduate and doctoral degrees of the University. The Master's curriculum consists of 42 Indonesian credits (*Satuan Kredit Semester*, SKS).

Structure of the Programmes

The expected study duration is three semesters (1 ½ years). Each semester is split into two terms equivalent to 10 weeks of learning activities, and one week for final exams. Terms start in March, June, September and November.

Besides its core curriculum, the programme features two specialisations in Data Science and Information Security Management, as well as a final thesis.

| Group | Number of Subjects | SCU | ECTS |
|---|---|---|---|
| Core Course | 6 subjects | 22 | 33 |
| Streaming | 4 subjects for each streaming | 16 | 24 |
| Thesis | 2 subjects | 4 | 6 |
| **Total** | | 42 | 63 |

*Composition of Master's curriculum. Source: Self-Assessment Report, BINUS.*

Contents

**Core Courses** in the Master of Computer Science programme consist of

> *Internet of Things (IoT), IT Risk Management and Audit, IT Research Methodology, Big Data Analytics, IT Strategic Planning & Enterprise Architecture.*

The **streams** of the graduate programme focus on the following topics:

> **Stream: Data Science**
> *Machine Learning, Deep Learning and Its Applications, Optimization and Computational Intelligence, Business Intelligence and Analytics;*
>
> **Stream: Information Security Management**
> *Network and Cyber Security, Enterprise Network, Fundamental of Cyber Security, Services Oriented Architecture.*

The **thesis** again includes a preparatory "Pre-Thesis" course, a colloquium, as well as the thesis itself. As per the University's Academic Guidebook for the Master's, Master's theses can be conducted based on theoretical research solely, in connection to an internship, or by conducting a case study.

All in all, based on the provided documentation and their discussions during the audit, the expert group attests that modules within the Master's programme embody sensible teaching and learning units which serve to deepen the knowledge and competencies obtained during the Bachelor's stage. Through the offered streams, students are moreover able to pursue individual study pathways.

**PhD Computer Science**

Discussed in section D 2 of the "Additional Criteria for Doctoral Programmes".

**Criterion 1.4 Admission Requirements**

**Evidence:**

- Self-Assessment Report
- Decree Number No. 1410A/SK/Kelulusan-UBN/VIII/2012, Rector of BINUS University, regarding Provisions for Graduation Requirements for Undergraduate and Diploma Four Students at Bina Nusantara University, BINUS
- Entry Examination Exam Procedure, 01/03/2020, BINUS
- University Website (here, here, here, here)
- Student statistics for all programmes under review, 2016-2022.

- Discussions with programme coordinators, lecturers, students, and industry representatives during the audit.

**Preliminary assessment and analysis of the experts:**
As a private university, BINUS implements admission procedures that are different from those of public Indonesian universities.

**Ba Computer Science**

Individuals aiming to join the undergraduate programmes in Computer Science need to have a qualifying secondary school diploma with a major in science, coming from either a high school or vocational school with a major in electronics engineering, informatics engineering, aircraft construction, electrical engineering, or graphics. Moreover, they are required to take a so-called "Study Success Potential Test" (TPKS) facilitated by BINUS.

This assessment is comprised of a logical reasoning and abstraction test, a verbal test, and diagnostic examination, in conjunction with the Bina Nusantara University English Proficiency Test (BUEPT). Applicants must demonstrate foundational competencies necessary for academic success as well as basic understanding of technological processes, particularly in informatics engineering.

Admission is possible annually with studies starting in September. As part of its self-assessment report, the University has provided the following enrolment numbers.

| BACHELOR OF COMPUTER SCIENCE (JAKARTA) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | Student Intake | Active Student | Student Resign / Student Drop Out | | Number of Graduate | Average GPA | Average Study Period | Foreign Student |
| | | Total | Total | % | Total | | | |
| 2021/2022 | 1871 | 7831 | 275 | 3.5% | 1592 | 3.35 | 4.05 | 19 |
| 2020/2021 | 1821 | 7506 | 325 | 4.3% | 1215 | 3.32 | 4.04 | 17 |
| 2019/2020 | 1875 | 6996 | 320 | 4.6% | 1008 | 3.32 | 3.96 | 36 |
| 2018/2019 | 1999 | 6467 | 310 | 4.8% | 1018 | 3.26 | 4.02 | 22 |
| 2017/2018 | 1576 | 5714 | 159 | 2.8% | 992 | 3.21 | 4.07 | 16 |
| 2016/2017 | 1374 | 5506 | 295 | 5.4% | 1107 | 3.13 | 3.96 | 5 |
| **BACHELOR OF COMPUTER SCIENCE (MALANG)** | | | | | | | | |
| Year | Student Intake | Active Student | Student Resign / Student Drop Out | | Number of Graduate | Average GPA | Average Study Period | Foreign Student |
| | | Total | Total | % | Total | | | |
| 2021/2022 | 132 | 388 | 7 | 1.8% | 32 | 3.54 | 4.00 | 1 |
| 2020/2021 | 125 | 276 | 6 | 2.2% | 18 | 3.52 | 3.94 | 1 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2019/2020 | 79 | 165 | 6 | 3.6% | 2 | 3.44 | 4.00 | 1 |
| 2018/2019 | 50 | 86 | - | 0.0% | - | - | - | - |
| 2017/2018 | 31 | 36 | - | 0.0% | - | - | - | - |
| 2016/2017 | 5 | 5 | - | 0.0% | - | - | - | - |
| **BACHELOR OF COMPUTER SCIENCE (BANDUNG)** | | | | | | | | |
| **Year** | **Student Intake** | **Active Student** | **Student Resign / Student Drop Out** | | **Number of Graduate** | **Average GPA** | **Average Study Period** | **Foreign Student** |
| | | **Total** | **Total** | **%** | **Total** | | | |
| 2021/2022 | 215 | 654 | 10 | 1.5% | 112 | 3.51 | 3.75 | - |
| 2020/2021 | 122 | 477 | 8 | 1.7% | 30 | 3.40 | 3.78 | - |
| 2019/2020 | 187 | 373 | 14 | 3.8% | - | - | - | - |
| 2018/2019 | 151 | 186 | - | 0.0% | - | - | - | - |
| 2017/2018 | 35 | 35 | - | 0.0% | - | - | - | - |
| 2016/2017 | | | | | | | | |

*Student Statistics at Bachelor's level. Source: Self-Assessment Report, BINUS.*

Upon further inquiry, the experts were informed by the University that applicants may also submit proof of notable individual national or international achievements, both of academic and non-academic nature, along with their application to apply for scholarships provided by BINUS. Moreover, they learn that BINUS seeks to attract top-performing high school students through competitively awarded scholarships.

## Ma Computer Science

For entry into the Master's programme in Computer Science, candidates should ideally possess an undergraduate degree in computer studies. Applicants from other backgrounds must successfully complete an interview, provide a motivational statement, as well as their curriculum vitae and academic transcripts. They must moreover have achieved a minimum GPA of 2.5 out of 4.00 in their undergraduate studies and demonstrate English proficiency with a minimum equivalent TOEFL score of 475.

As was also confirmed by the programme coordinators during the audit, admission is possible every quarter in March, June, September, or November. As part of its self-assessment report, the University has provided the following enrolment numbers.

| **MASTER OF COMPUTER SCIENCE** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Year** | **Student Intake** | **Active Student** | **Student Resign / Student Drop Out** | **Number of Graduate** | **Average GPA** | **Average Study Period** | **Foreign Student** |

| | | Total | Total | % | Total | | | |
|---|---|---|---|---|---|---|---|---|
| 2021/2022 | 247 | 631 | 77 | 12.2% | 131 | 3.81 | 1.93 | 1 |
| 2020/2021 | 222 | 625 | 50 | 8.0% | 123 | 3.71 | 2.07 | 5 |
| 2019/2020 | 179 | 573 | 146 | 25.5% | 124 | 3.68 | 2.02 | 8 |
| 2018/2019 | 171 | 636 | 39 | 6.1% | 98 | 3.67 | 2.52 | 10 |
| 2017/2018 | 161 | 620 | 13 | 2.1% | 117 | 3.59 | 2.39 | 12 |
| 2016/2017 | 158 | 582 | 34 | 5.8% | 122 | 3.61 | 2.43 | 10 |

*Student Statistics at Master's level. Source: Self-Assessment Report, BINUS.*

In response to the expert panel's concern regarding the increasing dropout rates in the Master's programme, the programme coordinators explained that this was predominantly a consequence of the COVID-19 pandemic, due to families having lost their jobs, thus compelling students to abandon their studies.

**PhD Computer Science**

Applicants for doctoral studies in Computer Science at BINUS need to fulfil a number of prerequisites. Besides having a Master's degree in Computer Science as well as being registered in the Indonesian Education database PDDIKTI, they need to provide an IELTS score of a minimum of 5.5 or equivalent proof. Moreover, applicants must also achieve a score of at least 500 in a so-called Academic Potential Test (TPA) facilitated by BINUS, succeed in an interview with an academic panel, pass a logic and algorithm test, and submit the outline of a research proposal.

Admission is possible biannually in March and September. As part of its self-assessment report, the University has provided the following enrolment numbers.

| DOCTOR IN COMPUTER SCIENCE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | Student Intake | Active Student | Student Resign / Student Drop Out | | Number of Graduate | Average GPA | Average Study Period | Foreign Student |
| | | Total | Total | % | Total | | | |
| 2021/2022 | 33 | 145 | - | 0.0% | 14 | 3.80 | 4.96 | 2 |
| 2020/2021 | 24 | 127 | 3 | 2.4% | 13 | 3.72 | 4.77 | 1 |
| 2019/2020 | 26 | 111 | - | 0.0% | 7 | 3.74 | 4.57 | - |
| 2018/2019 | 21 | 92 | - | 0.0% | 7 | 3.73 | 3.43 | - |
| 2017/2018 | 27 | 74 | - | 0.0% | 3 | 3.92 | 3.00 | - |
| 2016/2017 | 25 | 49 | 2 | 4.1% | - | - | - | - |

*Student Statistics at PhD level. Source: Self-Assessment Report, BINUS.*

All in all, the auditors find the terms of admission for all degree programmes under review to be binding and transparent.

## Criterion 1.5 Workload and Credits

**Evidence:**

- Self-Assessment Report
- Curriculum Documents, all programmes under review
- Internal Guide of Credit Conversion: European Credit Transfer and Accumulation System (ECTS) and Sistem Kredit Semester (SKS), 01/09/2022, BINUS
- Credit conversion tables; all programmes under review
- Enrichment Program Stipulation Book, 21/02/2022, BINUS
- Academic Guidelines, all programmes under review
- Discussions with programme coordinators, lecturers, students, and industry representatives during the audit.

**Preliminary assessment and analysis of the experts:**
As per the University's self-assessment report and the provided "Internal Guide of Credit Conversion: European Credit Transfer and Accumulation System (ECTS) and Sistem Kredit Semester (SKS)" from September 2022, one credit unit at BINUS consists of a weekly course workload of

- one academic hour for scheduled face-to-face teaching delivery,
- one academic hour for structured assignments (e.g. reading materials, videos, or supplementary content provided through BINUS' learning management system, "BinusMaya"),
- as well as one academic hour for independent study.

Lecturers in charge of each module organise the student workload in a semester learning plan (*Rencana Pembelajaran Semester*, RPS), which is shared and discussed with the students during the initial course session.

According to the University's self-assessment report, BINUS aims to ensure that workload is appropriate and not excessive through transparent information in the semester learning plan, as well as through recurring surveys and feedback meetings between students and the University leadership. Upon inquiry of the expert panel during the on-site visit, the programme coordinators confirmed that student workload is monitored through student surveys and lecturer feedback. On their part, students did not report any critical imbalances or excessive workload during the audit; stating that they had sufficient time left to engage in extracurricular competitive activities such as hackathons and programming competitions.

Students are required to attend their classes in line with established regulations. They must be present for at least 75% of lectures, unless defined otherwise for a specific course. If a student's attendance falls below 75% (or a specified other threshold), they are not allowed to attend the final examination.

The maximum study duration is 5 years (ten semesters) for Bachelor's students, 3 years (six semesters) for Master's students, and again 5 years (ten semesters) for PhD students. Also, upon their further inquiry, the auditors learn that comprehensive regulations for the transfer of credits obtained outside of BINUS exist.

For the University's conversion of Indonesian credits to the European Credit Transfer and Accumulation System (ECTS), BINUS equates 25 hours of workload to 1 ECTS, which is within the range (i.e. 25-30 hours) permitted by the ECTS Users' Guide.

In view of the above and the provided documentation, however, the assessors make various observations:

- Given the University's own definition of one academic hour as 50 minutes in the mentioned documents, one credit accordingly appears to equal 3 academic hours, i. e. 150 minutes of weekly workload. This appears to deviate from the Indonesian national standard, which assumes 170 minutes of weekly workload per credit.
- Furthermore, the University's own documentation appears to state conflicting numbers of course weeks the above weekly workload would need to be multiplied with on the Bachelor's level. In the SAR, the University states that "[e]ach course runs for *16* weeks in one semester, including mid and final exams" and that "[t]he course typically runs *14* lecture sessions". In its "Internal Guide of Credit Conversion", yet, the University states "one credit is covered in *13* regular sessions".
- In addition to this, the experts note that it is unclear how the University's suggested calculation would apply for the Master's and PhD programmes under review. Looking at the academic calendar for Master's programmes provided on the University's website – and given that graduate programmes at BINUS seem to be based on a term basis instead of semester basis – it seems that one term (or period) only equates to *ten* course weeks, plus the final exam. For the doctoral programme, the relevant Academic Guidebook indicates "[t]he number of course meetings with a weight of 3 credits is *12x*".

In light of the above, the experts ask the University for a detailed explanation of the assumed time-wise workload per credit (SKS) per week at BINUS at each programme level (Bachelor, Master, PhD), as well as of the number of course weeks per semester/term applicable at each programme level, before making their final assessment.

In response to the expert panel's observation of seemingly low credit allocation for the final Bachelor's and Master's theses, the programme coordinators explained that the actual thesis writing process is respectively complemented by various preceding courses, such as pre-thesis and research methodology courses; and that the total thesis workload should be seen in this light. In view of the above statement and noting that the experts found the theses samples provided for their perusal during the audit to be of good quality and an adequate scope, they nevertheless recommend the University to look into verifying that the credits awarded match the respective total thesis workload.

All in all, and the above request for clarification aside, the experts assess that a credit system, which is centred around student workload, is in place; that this workload encompasses both contact hours and self-study time, and that credits are granted in accordance with the associated workload.

**Criterion 1.6 Didactic and Teaching Methodology**

**Evidence:**

- Self-Assessment Report
- Academic Guidelines, all programmes under review
- Training Handbook 2022, BINUS Corporate Learning & Development (CBL&D)
- University Website (here, here, here, here, here, here)
- Discussions with programme coordinators, lecturers, students, and industry representatives during the audit.

**Preliminary assessment and analysis of the experts:**

As described by the University in their self-assessment report and the provided module handbooks, teaching staff in the five programmes under review utilise a variety of both teacher- and student-centred learning methods in alignment with the respective module contents. They include lectures, class/group discussions, individual/group exercises, problem-based learning, laboratory practice, tutorials, presentations, project-based learning, role-plays, and computer-based simulations.

Prior to each semester, the school organises refresher courses for lecturers to revise the learning outcomes their courses are expected to impart, following which lecturers finalize the learning contract, semester learning plan, grading rubric, and course materials for their modules.

As stated by students during the audit, the overall classroom language is Bahasa Indonesia, with course material and exam questions provided in English (yet answerable in Bahasa Indonesia).

As described by the University and confirmed by students during the audit, students are moreover regularly encouraged to participate in national and international competitions to challenge their skills. During the audit, the University displayed an impressive range of statistics and examples of national as well as international competitions its Computer Science students participated in, such as the International Collegiate Programming Contest (ICPC), the ASEAN Data Science Explorers, or the ICStar Hackathon. In connection to this, the experts were moreover informed during the audit that BINUS covers related expenses for registration and participation (including – where necessary – travel and lodging) of teams in such competitions.

Moreover, the School undertakes efforts to expose students to relevant external parties through seminars by industry experts, internships offers, and partnerships with foreign institutions.

During the audit, the expert panel seeks clarification on how teaching is infused with current research at the university. In response, lecturers of the programmes under review explained that students have opportunities to attend colloquia and other formats where lecturers discuss their current research findings. Additionally, lecturers incorporate insights from their current research into their teaching materials such as presentation slides to inform students. As a concrete example, the programme coordinators elaborated that research conducted at BINUS on developing transformer models for machine translation between Bahasa Indonesia and the regional languages Sundanese and Madurese has been incorporated into courses covering artificial intelligence.

Asked by the auditors how students are familiarised with the principles of scientific work and academic writing, teaching staff responded that all programmes under review include courses on research methodology, where students - as appropriate on the respective academic level - are guided on how to develop, write, and publish a paper, thesis or dissertation. To prevent plagiarism, there is a subscription to Turnitin accessible to every lecturer. Likewise, Bachelor's and Master's students can request their documents to be checked via Turnitin through the library, with PhD students having access of their own (see also criterion D 5).

In terms of support mechanisms, students are assigned to an academic advisor at the start of the first semester, who acts as a go-to person for advice on academic as well as personal matters. Furthermore, the School collaborates with the Student Advisory and Support Center (SASC) to appoint mentors for those requiring assistance with their coursework or thesis, as well as with the Computer Science Students Association (HIMTI) to establish tutorial classes designed to prepare students for their upcoming examinations.

In summary, the expert group considers the range of teaching methods and instruments applied to be suitable to support the students in achieving the intended learning outcomes. They confirm that the study concepts of all programmes under scrutiny comprise a variety of teaching and learning forms as well as practical parts that are adapted to the respective subject culture. Finally, they attest that the imparting of academic research skills is sufficiently ensured.

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

The experts thank the University for the provided statements concerning criterion 1.

***Fostering of business-related skills***

The experts recognise the various activities conducted by BINUS to foster business and entrepreneurship skills within its students, e.g. through the *Entrepreneurship: Ideation* module and the "Entrepreneurship Track" within the enrichment programme of the Bachelor's, as well as through the BINUS Incubator facilities at the University's various campuses (as also listed under criterion 3.2). The experts hence do not see further need for a recommendation in this regard.

***Consistent usage of Master's programme title***

The experts thank the University for its swift action, and attest that the inconsistent usage of the Master's programme's title has been corrected in the instances that had been detected. The experts hence do not see further need to issue a requirement in this regard, however ask the University to pay attention to the consistent usage of the programme's title in its English translation also in the future.

***Basics of theoretical computer science and alignment with ACM recommendations***

In regard to the above matter, the experts take note of the further explanations and video documentation provided concerning the Bachelor's modules *Compilation Techniques* as well as *Algorithm Design and Analysis* modules, the additional course materials provided in these, and recognise the University's hints concerning its outcome measurements and student success. While the experts acknowledge the programmes' success and contents in the field of theoretical computer science, they nevertheless perceive that further potential remains untapped – especially in view of the provided staff composition overview, which shows significant staff capacities in the field of Theory of Computation. The assessors hence recommend the University to implement the ACM curriculum guidelines more closely through a more in-depth immersion into theoretical computer science at the Bachelor's level.

***Conversion of Indonesian Credits (SKS) to the European Credit Transfer System (ECTS) at BINUS***

As per the University's provided clarification (see section F), the following overview in regard to the students' workload and ECTS conversion emerges:

| Programme Level | Total Credits (SKS) | Number of course sessions [weeks] | Assumed weekly workload per 1 SKS | Total Workload (Total SKS x number of course sessions per SKS x assumed workload per SKS) | Calculated ECTS equivalent [25 hours = 1 ECTS] |
|---|---|---|---|---|---|
| **Bachelor** | 146 | 13 sessions / semester | 170 minutes (50 minutes face-to- face learning in class, 60 minutes of structured activities, and 60 minutes of independent study) | 322.660 minutes / ≈ 5378 hours | **≈ 215 ECTS** |
| **Master** | 42 | 10 sessions / term | 240 minutes (60 minutes face-to- face learning in class, 90 minutes of structured activities, and 90 minutes of independent study) | 100.800 minutes / 1680 hours | **≈ 67 ECTS** |
| **PhD** | 42 | 12 sessions / semester | 240 minutes (60 minutes face-to- face learning in class, 90 minutes of structured activities, and 90 minutes of independent study) | 120.960 minutes / 2016 hours | **≈ 81 ECTS** |

On the level of individual credits and typical course credits, the following picture emerges:

| Programme Level | Number of course sessions [weeks] | Assumed weekly workload per 1 SKS | Total Workload per 1 SKS (Number of course sessions per SKS x workload per SKS) | 1 SKS | 2 SKS | 3 SKS | 4 SKS | 5 SKS |
|---|---|---|---|---|---|---|---|---|
| **Bachelor** | 13 | 170 minutes) | 2.210 minutes / ≈ 37 hours | 1.47 ECTS | 2.9 ECTS | 4.4 ECTS | 5.9 ECTS | 7.4 ECTS |
| **Master** | 10 | 240 minutes | 2.400 minutes / 40 hours | 1.60 ECTS | 3.2 ECTS | 4.8 ECTS | 6.4 ECTS | 8 ECTS |
| **PhD** | 12 | 240 minutes | 2.880 minutes / 48 hours | 1.92 ECTS | 3.8 ECTS | 5.8 ECTS | 7.7 ECTS | 9.6 ECTS |

In view of the above, the experts thank the University for the already accordingly revised "Internal Guide of Credit Conversion: European Credit Transfer and Accumulation System (ECTS) and Sistem Kredit Semester (SKS)".

In connection to this, the experts encourage the programme coordinators to display precise ECTS equivalencies in the respective module descriptions next to the stated number of Indonesian credits awarded.

All in all and the abovementioned recommendations aside, yet, the experts see this criterion as fulfilled.

# 2. Exams: System, Concept and Organisation

**Criterion 2 Exams: System, Concept and Organisation**

**Evidence:**

- Self-Assessment Report
- Curriculum Documents, all programmes under review.
- Decree Number No. 1785A/SK/K&KA/X/2013, Rector of BINUS University, regarding Curriculum and Academic Provisions, BINUS
- Decree Number No. 1410A/SK/Kelulusan-UBN/Vlll/2012, Rector of BINUS University, regarding Provisions for Graduation Requirements for Undergraduate and Diploma Four Students at Bina Nusantara University, BINUS
- Academic Guidelines, all programmes under review
- Enrichment Program Stipulation Book, 21/02/2022, BINUS
- Samples of student work, enrichment projects, and theses, all programmes under review
- Sample Assessment Rubric
- Alignment Learning Outcomes, Courses, Teaching and Learning Strategy and Assessment
- Thesis Procedure, Ba Computer Science
- Thesis Writing Guidelines, all programmes under review.
- Exam Preparation Procedure, 19/09/2018, BINUS
- Procedure: Implementation Of The Survey, Qualitative And Quantitative, 07/08/2008, BINUS
- Procedure: Registration, Preparation & Implementation - Thesis Project & Final Project, 04/05/2018, BINUS
- Discussions with programme coordinators, lecturers, students, and industry representatives during the audit.

**Preliminary assessment and analysis of the experts:**

Forms of Examinations and Exam Schedule

According to the self-assessment report, the students' academic performance is evaluated through formative and summative assessments. Formative assessments are conducted in the form of short computer-based quizzes, take-home written assignments, projects and case studies. Summative assessments are conducted in the form of mid-term and final examinations with a duration of 100 minutes on both the Bachelor's and Master's level. During the audit, the programme coordinators moreover mentioned that some assessments are conducted as open-book exams, and stressed that there are no oral or multiple-choice examinations employed on the Bachelor's and Master's level.

Midterm examinations typically take place during the seventh and eighth sessions, with final examinations in the fifteenth and sixteenth. 'Quiet Periods' or 'Reading Weeks', in which no courses sessions take place, precede the examination weeks. On the PhD level, no mid-term examinations are conducted in the abovementioned general subject-matter courses, with the final examination taking up 200 minutes instead.

Lecturers are required to submit their intended exam questions to a so-called Subject Content Coordinator (SCC) and subsequently cleared by the respective Deputy Programme Head to ensure alignment of all exam items with the intended course learning outcomes.

All examinations and their conduct across the three qualification levels are governed by a range of university regulations.

The exam schedule for each module is provided to the students in the first course session as part of the Semester Learning Plan (*Rencana Pembelajaran Semester*, RPS) and made available through BINUS' learning management system, "BinusMaya". Through the latter, lecturers conduct quizzes and examination, and provide feedback on their assessments.

Asked by the experts how it is ensured that the amount and distribution of exams is not excessive and permit students adequate time to prepare for these, the programme coordinators highlighted that exam schedules are clear from the beginning of the semester as provided through the semester learning plan, as are the preparatory 'quiet weeks'. On the Bachelor's level, they clarify that students on average have 5-7 examinations per semester. On their part, students did not report any critical imbalances or excessive workload during the audit.

In cases of failed courses, students moreover highlighted that courses and exams can often be retaken as remedial examinations during BINUS' "compact semester", which takes place between summer and winter semester.

Upon the experts' inquiry concerning the assessment of students' internships, the programme coordinators informed the assessors that students are required to keep a logbook (based on a template), in which they need to document any soft and technical skills they have obtained, as well as to submit a final report. Assessment is made in collaboration between the students' host company internship supervisor and a staff member responsible for the internship module from the University's side, who also provides clarity on the criteria applied for the later assessment.

Following their perusal of papers, final theses, and assessments at various stages of all programmes under review, the experts judged that the level of difficulty was appropriate throughout at the respective academic levels. With regarding to the final theses and dissertations, they found these to be rather application-oriented, yet on an appropriate academic level nevertheless.

Grading and Graduation Requirements

At the Bachelor's level, modules as well as the final project are graded on a letter grade scale as displayed below. An A-F and "plus/minus" grading system is in operation, with credit conferred for grades A+ through D, and no credit for F. Students receiving a D may need to retake the course if it is considered a milestone ("quality assurance course") within the curriculum, or if their total GPA is below 2.00. An F is recorded if the student misses the final exam or has violated exam rules.

| Letter Grade / Status | Weight | Final Semester Score |
|---|---|---|
| A : *High Distinction* | 4 | 90 – 100 |
| A- : *High Distinction* | 3.67 | 85 – 89 |
| B+ : *High Distinction* | 3.33 | 80 – 84 |
| B : *Distinction* | 3 | 75 – 79 |
| B- : *Distinction* | 2.5 | 70 – 74 |
| C : *Pass* | 2 | 65 – 69 |
| D : *Near Pass* | 1 | 50 – 64 |
| E : *Fail* | 0 | 0 – 49 |
| F : *Incomplete* | 0 | 0 |

*Grading Scale at Bachelor's level. Source: Self-Assessment Report, BINUS.*

As per the provided academic guidebook for undergraduate studies, students need to attend a minimum of 80% of lectures and practical sessions to be allowed to take the final examination.

Instructors are required to complete the marking process within two weeks of the examination, and to enter the grades on BinusMaya. Students are entitled to challenge their grades within up to four days upon publication of the results.

Should students be unable to sit for midterms or finals due to exceptional circumstances such as emergencies, hospitalisation, or bereavement, they may apply for a make-up exam through BinusMaya whilst providing suitable evidence.

In order to graduate, Bachelor's students must have completed the required 146 credits with a minimum GPA of 2.00 without any E grades. They are also required to have completed 30 hours of community service and to have accumulated a certain amount of student activities.

Asked by the auditors how assessment criteria for examinations are made transparent to the students, students confirmed during the audit that the assessment criteria for the announced course examinations are made clear through the semester learning plan at the beginning of the course. Moreover, the students confirmed that - should they perceive grades received to be unfair - an appeal mechanism exists, which they can access through their electronic student portal.

At the Master's level, modules as well as the final project are graded on a letter grade scale as displayed below.

| Letter Grade | Range | Weight | Description |
|---|---|---|---|
| **A** | 90 – 100 | 4 | High Distinction |
| **A-** | 85 – 89 | 3.67 | Distinction |
| **B+** | 80 – 84 | 3.33 | Satisfactory |
| **B** | 75 – 79 | 3 | Pass |
| **B-** | 70 – 74 | 2.5 | Fail |
| **C** | 65 – 69 | 2 | |
| **D** | 50 – 64 | 1 | |
| **And** | 0 – 49 | 0 | |
| **F** | - | 0 | Incomplete |

*Grading Scale at Master's level. Source: Self-Assessment Report, BINUS.*

Graduate students in Computer Science must repeat courses if they receive grades of B-, C, D, E, or F and have not achieved the minimum required grade specified for the course, or if their total GPA is below 3.00. An 'F' grade is awarded if students are ineligible for the final exam due to insufficient attendance or lateness, if they fail to take the final exam, or if they are found to have violated rules during the exam. For Master's students, the

threshold is 75% attendance to qualify for final examinations, as specified in their relevant academic guidebooks.

To be permitted graduation, Master's students must have completed the required 42 credits with a minimum GPA of 3.00, and need to have obtained a TOEFL score of at least 475. Furthermore, publication of at least one paper in a Scopus-indexed or nationally accredited journal is required. Upon further inquiry concerning the latter, the expert panel was explained by the responsible programme coordinators during the audit that this is a government requirement. Master's students must appear in a Scopus-indexed international journal or in a national journal recognised and accepted by the government. However, the coordinators admitted that the associated review and acceptance process at times impacts the Master's students' ability to finish their studies on time.

Thesis

Students enrolled in any of the undergraduate, Master's, or doctoral programmes in Computer Science at BINUS University are required to complete a final thesis or dissertation. At each programme level, students can draw from a comprehensive thesis writing guideline for their orientation.

Bachelor's theses may be conducted individually or in groups of up to three, supervised by one or two lecturers. Two examiners then evaluate the thesis during the defence. Should a student not succeed in the initial thesis defence, they are permitted one further opportunity attempt.

During the audit, the expert panel asked how the assessment of thesis written in groups is facilitated, especially in terms of individual grading. In response, lecturers of the Bachelor's programme explained that one uniform grade is awarded for the written thesis at first, with students undergoing individual assessment during the subsequent oral defence, thus leading to a final individual thesis grade.

Master's theses are accompanied by a supervisor and two examiners. They must successfully pass both the proposal defence, which scrutinises the viability of their research, and the final thesis defence, which evaluates the research findings. A second attempt at both the proposal and the thesis defence is permitted, if needed. In this context, lecturers stressed during the audit that there are no group theses at the Master's or PhD level.

Further discussion concerning the PhD programme is provided in section D 4 of the "Additional Criteria for Doctoral Programmes".

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

In the absence of further comments or relevant additional evidence by the University, the experts confirm their above preliminary assessment and see this criterion as fulfilled.

# 3. Resources

**Criterion 3.1 Staff and Staff Development**

**Evidence:**

- Self-Assessment Report
- Staff Handbooks and Lecturer Profiles, all programmes under review
- Faculty Qualification Outlines, all programmes under review
- BINUS New Lecturer Induction Program, BINUS Corporate Learning & Development (CBL&D)
- Training Handbook 2022, BINUS Corporate Learning & Development (CBL&D)
- Employee Handbook 2022-2023, BINUS
- Pocket Book: Handling Students with Special Needs, January 2020, BINUS
- Procedures: Employee Benefits, Training Requests, Recruitment Full-Time Employee Non-Academic, Academic Level, BINUS
- Discussions with programme coordinators, lecturers, students, and industry representatives during the audit.

**Preliminary assessment and analysis of the experts:**

The academic staff in the study programmes under scrutiny consists of teaching staff as well as administrative staff.

| No | Study Program | Number of Faculty Members | | | | |
|---|---|---|---|---|---|---|
| | | Full Professor | Associate Professor | Assistant Professor | Lecturer | Total |
| 1 | CS Undergraduate Program (Jakarta) | 1 | 11 | 100 | 66 | **178** |
| 2 | CS Undergraduate Program (Bandung) | - | 1 | 13 | 8 | **22** |
| 3 | CS Undergraduate Program (Malang) | - | - | 12 | 5 | **17** |
| 4 | CS Master Program | 2 | 15 | 24 | 1 | **42** |
| 5 | CS Doctoral Program | 3 | 5 | 6 | - | **14** |
| **Total** | | | | | | **273** |

*Staff Composition by Academic Position. Source: Self-Assessment Report BINUS.*

At the undergraduate level, the faculty comprises individuals holding either doctorate or master's degrees, whereas those instructing at the graduate level, specifically within the Master's and PhD programmes, are exclusively doctoral graduates. A number of these lecturers are drawn from various industries, providing the study programmes with valuable insights on the latest industry-relevant knowledge.

During the on-site visit, the expert team asked for further clarification regarding staff recruitment and selection, particularly in regard to criteria and policies in place. In response, the programme coordinators responded that staff planning takes place annually, with units being asked to report any existing recruitment needs to the Rectorate, which decides upon the hiring of additional staff. In this context, the programme coordinators however also indicated that hiring on a Master's and PhD level in the field of Computer Science is - depending on the subject area – difficult, as the Indonesian market is limited and universities compete with each other and private companies.

During the audit, the experts moreover learned that 31 of the academic staff members in the programmes under review are currently pursuing PhD studies to advance their academic qualification.

| No | Study Program | Number of Faculty Members | | |
|---|---|---|---|---|
| | | Doctor | Master | Total |
| 1 | CS Undergraduate Program (Jakarta) | 22 | 156 | **178** |
| 2 | CS Undergraduate Program (Bandung) | 4 | 18 | **22** |
| 3 | CS Undergraduate Program (Malang) | 1 | 16 | **17** |
| 4 | CS Master Program | 42 | - | **42** |
| 5 | CS Doctoral Program | 14 | - | **14** |
| **Total** | | | | **273** |

*Staff Composition by Academic Qualification. Source: Self-Assessment Report BINUS.*

Teaching is the primary obligation of a faculty member. According to the University's relevant policy, a lecturer is usually not to exceed teaching 16 SKS. Following the experts' further inquiry in this regard during the on-site visit, the lecturers confirmed that their workload on average ranges between 12-16 credits per semester, and confirmed that BINUS has a monitoring system for staff workload in place.

Beyond lecturing, the faculty members undertake a multitude of responsibilities such as supervising student theses, offering counselling, aiding the student learning process, and executing certain administrative and technical duties.

Moreover, faculty members are expected to conduct research, to engage in community development services, as well as to pursue continuous learning to further their skills and knowledge. These four responsibilities (teaching, research, community service, self-development), are known as the *'Catur Dharma*' and are all subjects of the biannual staff evaluations.

Following further inquiry by the experts in this regard, the University furthermore stated that BINUS provides research grants for its faculty members, as well as incentives and funding for research publications.

Asked by the experts which opportunities for academic staff who wish to further develop their professional and teaching skills exist, the lecturers referred to BINUS' Corporate Learning and Development unit and stated that staff are required to attend two training courses a year. In general, the staff confirmed their satisfaction with the provided offering, and that the University circulates both surveys assessing training needs as well as information on available trainings of a regular basis. Moreover, lecturers stated that academic staff may take a sabbatical of up to four months, with some of them reporting guest lectureships in France and Japan.

In view of the multiple streams offered across the programmes under scrutiny, as well as the regular integration of new topics in the curricula following the outlined recurring reviews, the expert group inquired during the audit about measures in place to ensure adequate staffing for new contents within the study programmes. To this, the programme coordinators responded that relevant planning is made on a one to two-year horizon, to allow for sufficient time for recruitment. Also, they highlighted that the departments invite training sessions by industry partners to enhance the existing staff's knowledge, particularly when recruiting new personnel for specific topics poses a challenge. In agreement with this, industry representatives stated during the audit that they offer internships for lecturers of the University of up to three months.

Upon further inquiry, the experts also learned that most of the academic staff in the programmes under review had completed their undergraduate degrees at BINUS themselves, however had in many cases pursued Master's and PhD studies at other institutions before returning to BINUS.

For the sake of performance evaluation and as outlined under criterion 5, compulsory course evaluations are submitted by the students for each course. As confirmed by the programme coordinators during the audit, the outcomes of these evaluations contribute to the overall staff assessment, and poor evaluations may lead to additional mandatory training for the concerned staff members. Furthermore, they note that – while these evaluations do have an impact on salaries – the effect is relatively small.

In turn, BINUS incentives staff performance through various awards such as best teacher, best researcher, or best publication (both nationally and internationally) awards.

All in all, the experts preliminarily gain a positive impression regarding the composition and qualifications of the teaching staff in the programmes under review. In view of the great diversity of subjects and streams offered across the programmes, as well as the University's own reference to the Association for Computing Machinery, however, the experts ask the University to provide a structural overview of the involved teaching staff by their main area of teaching according to the top two levels of the ACM Computing Classification System of 2012 before making their final assessment.

**Criterion 3.2 Funds and equipment**

**Evidence:**

- Self-Assessment Report
- Samples of Collaboration Agreements / Memoranda of Understanding
- Visitation of participating institutes and laboratories on the Jakarta (Anggrek) campus during the audit
- Video documentation of the Bandung and Malang campus facilities
- Discussions with programme coordinators, lecturers, students, and industry representatives during the audit.

**Preliminary assessment and analysis of the experts:**

Funding

As per the University's self-assessment report and confirmed by the programme coordinators during the audit, tuition fees are the primary source of funding for the University, along with subsidies granted by associated foundations. In addition, BINUS generates income through research projects and professional services, such as training and workshop sessions, consultancy, and the development of learning modules. As a private institution, the University does not receive government funds.

Collaborations

As part of its self-assessment report, the University provided a wide array of collaboration agreements with both local and international universities as well as company partners. This was also reflected during the discussion round with industry representatives (with institutions such as Alibaba, Telkom Indonesia, and Tokopedia present) and the visitation of the facilities on site, where collaborations such as the "NVIDIA – Binus University AI R&D Center" or the "Apple Developer Academy" hosted at BINUS were highlighted.

During their visitation of the facilities and labs on the University's Jakarta (Anggrek) campus, the expert group moreover assured themselves of the following:

Equipment

Aside from financial contributions, the University moreover receives contributions in kind from its partners, such as NVIDIA® Jetson Nano™ 2GB Developer Kit for both research and educational purposes. On the doctoral level, students have access to high performance computing capacities through a GPU server and Raspberry Pi HPE systems.

During audit, staff moreover confirmed that classrooms are regularly equipped with multimedia facilities including large digital screens, projectors, PTZ cameras as well as whiteboards.


*Open student space (left) and Student Support Office (right), Jakarta campus, BINUS. Source: ASIIN.*

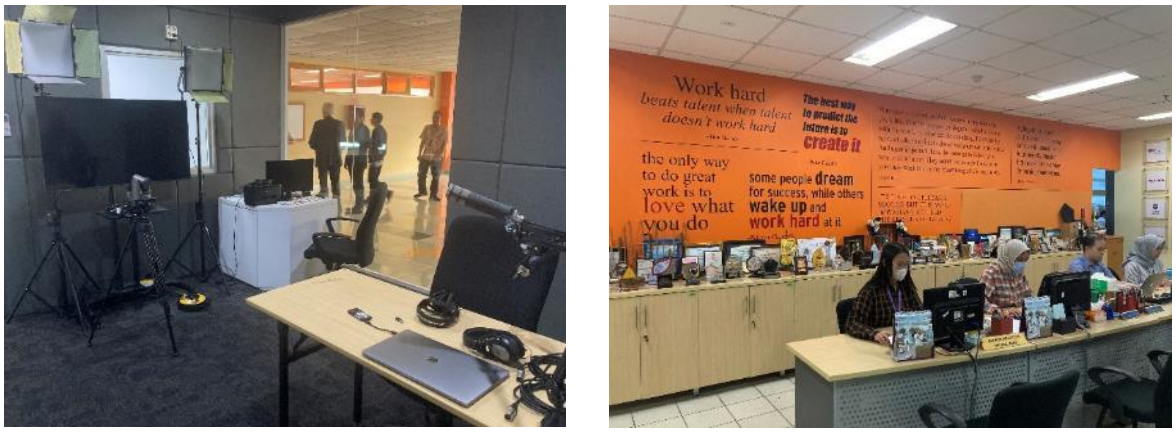
Facilities

During the audit, the expert group visited a range of facilities of the programmes under review, such as an audio studio, numerous classrooms, dedicated secretariats serving Bachelor's and Master's as well as PhD students, spaces allocated for student consultations and group work, several computer laboratories, as well as the Student Service Center (SSC) and the Library Knowledge Center also mentioned below. Moreover, the group was impressed by BINUS' Career Center, which serves both current students as well as alumni, and is charged with maintaining alumni relations, amongst them in regard to alumni-funded scholarships and emergency funds for students in need.

Supporting resources for staff

Asked by the expert panel during the audit about financial support available for academic staff, programme coordinators and teaching staff outlined that the University offers scholarships for staff to engage in PhD studies, both at BINUS and other institutions. In addition, staff can apply to have conference registration fees covered by the University. In

terms of research funds, staff pointed that there is an – quite competitive – internal research grant, as well as funding obtainable through industry partnerships. For junior or new faculty members, a dedicated grant is available to support their research endeavours.




*Media lab (left) and Career Center (right), Jakarta campus, BINUS. Source: ASIIN.*

Supporting resources for students

As mentioned previously, the BINUS moreover has a comprehensive Learning Management System called "BinusMaya" through which students have access to academic resources, student-lecturer interaction is facilitated, as well as for administrative processes. During the auditors' exchanges with students and alumni during the on-site visit, the latter also emphasised their satisfaction with BINUS' online services, including its mobile application.

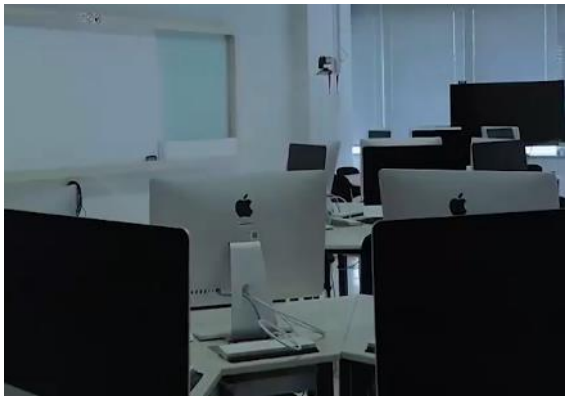
Besides the above, students can rely on several dedicated support units, such as the Student Service Center (SSC, for administrative services), the Library Knowledge Center (LKC, for literature access and plagiarism checking services using Turnitin) and the Student Advisory and Support Center (SCAC, for student counselling services). Furthermore, the Student Club and Activity Center (SCAC) and the Student Development Center (SDC), organise various events and developmental programmes for students to engage in outside the classroom.

During the experts' exchanges during the audit, students and alumni highlighted their satisfaction with the available facilities, and in particular commended the existence of support units for mental health counselling as well as the outlined high-performance computing capacities. Asked about any wishes they have in terms of provided facilities and resources, the students stated that access to the publications of the Institute of Electrical and Electronics Engineers (IEEE) would be desirable. Furthermore, they stated that they would be interested in keynote lecturers by tech speakers as well as further increased processing power. The experts encourage the Faculty to consider this feedback in the future.

**Facilities on the Bandung and Malang campuses**

By means of adequate video documentation provided by the University, the experts were moreover able to assure themselves of the facilities on the Bandung and Malang campuses, where the further undergraduate programmes in Computer Science under review are hosted. Amongst the facilities documented were:

- **on the Bandung campus:** Admission Office, Student Aid Center, Library and Knowledge Center incl. "Beebox" media lab, student meeting rooms, discussion spaces, reading rooms, recreational areas, Student Advisory Development Center (SADC), music room, counselling room, Global Employability and Entrepreneurship Office (incl. Incubator Office), Student and Lecturer Service Center (SLCS), classrooms (equipped with multimedia equipment as observed on the Jakarta campus), an iMac laboratory, audio & video lab, computer labs, creative spaces, mini auditorium, canteen, and a prayer room; as well as

*Student spaces (left) and iMac lab (right), Bandung campus, BINUS. Source: BINUS.*

- **on the Malang campus:** Admissions Office, music room, Library and Knowledge Center, student discussion rooms, reading rooms, "Beebox" media lab, Student Advisory Center incl. Counseling Room, Student Service Center, Student Development Center, Global Employability and Alumni office, Lecturer Service Center, various types of classrooms (regular, creative, smart, hybrid), Digital Technopreneur Laboratory, 3D printing lab, photography lab, Content Production lab, Incubator room, iMac lab, virtual reality and drone lab ("BINUS Digitec Valley"), a health center, and a prayer room.

*Classroom (left) and Digital Technopreneur Laboratory (right), Malang campus, BINUS. Source: ASIIN.*

Based on the provided documentation, their visitation of the facilities on site and further exchanges during the audit, the experts assess that funding for the facilitation of the programmes under review is sufficiently secured, and that the physical facilities are adequate on all campuses under review (Jakarta, Bandung, Malang).

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

The experts thank the University for the provided statements concerning criterion 3.

***Composition of Teaching Staff as per the ACM Computing Classification System of 2012***

Upon their perusal of the matrix provided by the University, the experts generally assess that all subject areas of relevance to the programmes under review are satisfactorily covered. With respect to the field "Theory of Computation" – which is of particular relevance to the discussion outlined under criterion 1.3 – the experts find an ambivalent picture: On the one hand, the abovementioned field appears to account for the highest number of staff in terms of main teaching expertise, however seemingly focussed on aspects of algorithms only. In turn, yet, no teaching staff with foci on other "Theory of Computation" sub-topics such as formal languages and automata theory, computational complexity and cryptography or semantics and reasoning are indicated in the chart. In light of this, the experts re-emphasise their perspective that there is room for strengthened alignment with the ACM recommendations in this regard, and that further space should be made by the University in the Bachelor's curriculum for students to immerse more in-depth in the field of theoretical computer science.

On a side note, the experts moreover observe that a strengthened staff profile in the sub-field of Software and its engineering → Software organization and properties would be desirable.

All in all and the above recommendation aside, yet, the experts see this criterion as fulfilled.

# 4. Transparency and Documentation

**Criterion 4.1 Module Descriptions**

**Evidence:**

- Self-Assessment Report
- University Website (here, here, here, here, here)
- Module Descriptions, all programmes under review
- Discussions with programme coordinators, lecturers, students, and industry representatives during the audit.

**Preliminary assessment and analysis of the experts:**
The module descriptions provided for both programmes under review are found to contain all of the required information, and to be presented in a visually clear format.

This being said, following their perusal of University's provided documentation and their exchanges during the audit, the experts observed that – while all module descriptions on the Bachelor's and Master's level indicate a midterm examination – this however appears not to be factually correct, as programme coordinators stated that not all subjects have mid-term exams. The auditors hence ask the programme coordinators to revise the columns "Assessments and Evaluation" and "Study and examination requirements and forms of examination" of the relevant module handbooks in this regard.

Moreover, the experts observe that the module handbooks provided appear to be unavailable through the respective programmes' websites. To ensure accessibility to all interested stakeholders, however, the revised module descriptions need to be made publicly accessible in full.

**Criterion 4.2 Diploma and Diploma Supplement**

**Evidence:**

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

**Preliminary assessment and analysis of the experts:**
The experts confirm that the students of both degree programmes under review are awarded a Diploma and a Diploma Supplement after graduation, the latter called the *Dokumen Pendamping Ijazah* (DPI). The Diploma consists of a Diploma Certificate and a Transcript of Records. The Diploma Supplement contains all necessary information about

the degree programme as per the applicable template for Diploma Supplement issued by Ministerial Conference of the European Higher Education Area (EHEA) in May 2018 and the ECTS Users' Guide from 2015.

**Criterion 4.3 Relevant Rules**

**Evidence:**

- Self-Assessment Report
- Academic Guidelines, all programmes under review
- Decree Number No. 1785A/SK/K&KA/X/2013, Rector of BINUS University, regarding Curriculum and Academic Provisions, BINUS
- Decree Number No. 1410A/SK/Kelulusan-UBN/Vlll/2012, Rector of BINUS University, regarding Provisions for Graduation Requirements for Undergraduate and Diploma Four Students at Bina Nusantara University, BINUS
- Decree Number No. No. 1426/SK/PTTKK-UBN/VII/2016, Rector of BINUS University, regarding Campus Life Code of Conduct, BINUS
- Thesis Procedure, Ba Computer Science
- Thesis Writing Guidelines, all programmes under review.
- Exam Preparation Procedure, 19/09/2018, BINUS
- Procedure: Registration, Preparation & Implementation - Thesis Project & Final Project, 04/05/2018, BINUS
- Training Handbook 2022, BINUS Corporate Learning & Development (CBL&D)
- Employee Handbook 2022-2023, BINUS
- Pocket Book: Handling Students with Special Needs, January 2020, BINUS
- Procedures: Employee Benefits, Training Requests, Recruitment Full-Time Employee Non-Academic, Academic Level, BINUS
- Procedure: Implementation Of The Survey, Qualitative And Quantitative, 03/10/2019, BINUS

**Preliminary assessment and analysis of the experts:**

The auditors confirm that the rights and duties of both BINUS and the students are defined clearly and bindingly. The assessors especially commend the comprehensive *Academic Guidelines, Thesis Writing Guidebook*, and *Curriculum Documents*. This being said, the experts again observe that documents such as the abovementioned appear to be unavailable through the respective programmes' websites. To ensure accessibility to all

interested stakeholders, however, crucial relevant documentation needs to be made publicly accessible.

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

The experts thank the University for the provided statements concerning criterion 4.

***Assessment-related information and availability of module descriptions***

The experts attest the revised information regarding the individual modules' examination requirements and forms in the module descriptions, and that the module handbooks have been made publicly available on the webpages of the respective programmes (Ba Computer Science (Jakarta): here, menu: Programs → Computer Science; Ba Computer Science (Malang): here, menu: Information → Course Outline); Ba Computer Science (Bandung): here, menu: Programs → S1 Computer Science); Ma Computer Science: here, menu: Academics → Curriculum); PhD Computer Science: here, menu: Academics → List of Course Outline (CO).

The experts hence do not see further need to issue requirements in this regard, however emphasise again that *full* module descriptions do not only need to be available to students and staff (e.g. through the BINUSMAYA platform), but to *all* interested stakeholders, such as potential applicants or industry partners.

***Availability of study regulations***

Upon consultation of the Faculty's additional statement and verification of the provided links, the experts confirm that the applicable Student Handbooks and Thesis Guidelines have been made publicly available on the webpages of the respective programmes.

The experts hence do not see further need to issue requirements in this regard, however emphasise again that central study regulations should not be available to students and staff (e.g. through the BINUSMAYA platform) only, but to *all* interested stakeholders, such as potential applicants or industry partners as well.

# 5. Quality management: quality assessment and development

**Criterion 5 Quality management: quality assessment and development**

**Evidence:**

- Self-Assessment Report
- Quality Management System Handbook, 2022, BINUS
- Procedure: Implementation Of The Survey, Qualitative And Quantitative, 03/10/2019, BINUS
- Samples of Student Experience Surveys, 2019-2021
- Results of Teacher Learning Evaluation
- Discussions with programme coordinators, lecturers, students, and industry representatives during the audit.

**Preliminary assessment and analysis of the experts:**
Bina Nusantara (BINUS) University employs an ISO 9001:2015 certified internal quality assurance system. The governance of the quality assurance system resides with the formal Quality Control Bureau, established in 1997, which evolved into the University' Quality Management Centre (QMC) in 2010.

In 2000, the university implemented the Total Quality Management (TQM) philosophy and has obtained various further quality certifications in the following, amongst them the IWA 2:2007 for educational organisations.

Responsibility for the Quality Assurance System at the faculty and programme level lies with the Deans and the programme coordinators. Within the School of Computer Science, quality assurance is overseen by an Academic Assurance Manager and a Quality Coordinator at the programme level. All of the Bachelor's, Master's, and PhD programmes in Computer Science under review are subject to annually recurring Internal Quality Audits (AMI) which draw from a range of sources, such as regular assessments of student satisfaction regarding academic processes and facilities, as well as assessments of lecturer performance through end-of-semester surveys.

The existence of such structured, mandatory, and anonymous course evaluation surveys was confirmed by both programme coordinators, students and lecturers of the respective programmes during the audit. Moreover, students from the Bandung campus stated that monthly forum discussions are offered by the Faculty to interested students. Additionally, the institution provides a platform for direct communication with its leadership through

the 'Talk to Rector' programme. This initiative gathers students from various cohorts to engage with the Rector, offering them the chance to pose questions, make suggestions, and discuss aspects related to lectures, facilities, and services.

Students of all qualification levels moreover confirmed that summaries of the course evaluation feedback are shared with the students through the University's Quality Management Center (QMC). On their part, teaching staff explained that course evaluation results are relayed to the individual lecturers by the QMC. In cases of substantially negative evaluations, the QMC follows up with the relevant staff, who may be assigned additional suitable training as a consequence.

Aside such internal quality assurance mechanisms, recurring external accreditations of all study programmes at BINUS are conducted every five years in alignment with government regulations. For the programmes under review, accreditation through the National Accreditation Body for Higher Education (Badan Akreditasi Nasional-Perguruan Tinggi, BAN-PT) as well as the ASEAN University Network's Quality Assurance body (AUN-QA) has been awarded in the past.

In terms of tracer studies, the programme coordinators confirmed during the audit that alumni surveys are shortly after graduation, as well as six months and one year after. Asked by the experts about the representation of students at the University governance level, the coordinators stated that there are multiple student Associations as well as a student advisory board at BINUS, however that students are not present in decision-making organs such as the Faculty Board. The experts suggest the decision makers response to consider such integration of student representatives in decision-making structures at the Faculty level as a means for providing students with an appropriate voice within the development of their programmes.

The above consideration aside, the expert group in summary assesses that the study programmes undergo regular and comprehensive internal and external quality assurance processes involving all relevant stakeholders and drawing from a wide range of surveys and student statistics.

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

The experts thank the University for the provided statements concerning criterion 5.

***Student representation at Faculty level***

The expert group acknowledges and commends the University's various efforts to ensure consideration of student feedback by means of a range of surveys and meeting formats

involving the Rector, Deans, Heads of Study Programmes, students and their parents. The assessors moreover appreciate the issued decrees regarding appointed student representatives at the Faculty/School level. The experts hence do not see further need to issue a recommendation in this regard.

# D Additional Criteria for Structured Doctoral Programmes

**Criterion D 1 Research**

**Evidence:**

- Self-Assessment Report
- Samples of student dissertations and publications
- Discussions with programme coordinators, lecturers, students, and industry representatives during the audit.

**Preliminary assessment and analysis of the experts:**
As outlined under section B, the doctoral programme in Computer Science at BINUS aims to qualify for research in the areas of information systems and computer science which answers society's needs.

To this end, students of the doctoral programme in Computer Science at BINUS are encouraged to conduct transdisciplinary research that pursues application of computer science across diverse sectors such as agriculture, medical science, education, and more. In agreement with this, multiple PhD graduates stated to the expert group during the audit that the contexts of their dissertation topics had ranged from transportation (autonomous vehicles) to green energy.

All in all, the expert panel sees this criterion as fulfilled.

**Final assessment of the experts after the comment of the Higher Education Institution regarding criterion D 1**

In the absence of further comments or relevant additional evidence by the University, the experts confirm their above preliminary assessment and see this criterion as fulfilled.

**Criterion D 2 Duration and Credits**

**Evidence:**

- Self-Assessment Report
- Academic Guide: Doctor of Computer Science 2022, BINUS
- Discussions with programme coordinators, lecturers, students, and industry representatives during the audit.

**Preliminary assessment and analysis of the experts:**
The PhD programme in Computer Science under review is offered by BINUS' Graduate Program, which administers a range of graduate and doctoral degrees of the University. The PhD curriculum also consists of 42 Indonesian credits (*Satuan Kredit Semester*, SKS).

Structure of the Programmes

The expected study duration is six semesters (3 years), starting in March and September, respectively. The programme is offered in two streams, Information Systems and Technology as well as Computer Science. Doctoral candidates are required to engage in research and publication throughout their period of study, and must complete certain courses during the first year of the programme.

In regard to the above, the experts are moreover informed during the audit by the programme coordinators that, while the government allows up to seven years as a maximum duration for PhD studies, BINUS University implements a limit of five years. Extensions can however be granted for up to two additional semesters if justified by circumstances such as illness or financial difficulties.

Addressing the expert panel's concerns about workload, a former PhD student confirmed during the audit that the workload is manageable, allowing them to maintain a balance between work and studies.

Contents

**General courses** in the PhD Computer Science programme largely represent its research and publication components:

> *Research Methodology, Philosophy of Science, Proposal Dissertation, Research Colloquium (Seminar), Dissertation I (Qualification Exam), Research Publication I, Dissertation II (Research Result Examination), Research Publication II, Dissertation III (Closed Exam), Research Publication III, Dissertation IV (Open Exam).*

The **Streams** of the doctoral programme, to be taken in the first two semester, focus on the following topics:

**Stream: Information Systems & Technology**
*Recent Trends in Information Systems, Advanced System & Architecture Enterprise, Advanced Knowledge System, Advanced Information Technology Governance, e-Business & e-Government;*

**Stream: Computer Science**
*Software Metric and Quality, Knowledge and Information Retrieval, Advanced Computer Security, Advanced Softcomputing, Multimedia Computation.*

During the audit, the coordinators of the doctoral programme moreover clarified that coursework in the PhD course seeks to distinguish itself from that found at the Bachelor's and Master's levels by emphasising emerging trends and technologies, such as blockchain and cybersecurity.

All in all, based on the provided documentation and their discussions during the audit, the expert group attests that modules within the PhD programme serve to achieve the intended academic qualification. Through the offered streams, students are moreover able to individualise their doctoral journey. The expert panel thus sees this criterion as fulfilled.

**Final assessment of the experts after the comment of the Higher Education Institution regarding criterion D 2:**

In the absence of further comments or relevant additional evidence by the University, the experts confirm their above preliminary assessment and see this criterion as fulfilled.

**Criterion D 3 Soft Skills and Mobility**

**Evidence:**

- Self-Assessment Report
- Examples of doctoral student mobilities
- List of international collaborations on PhD level
- Dissertation Supervision Data
- Discussions with programme coordinators, lecturers, students, and industry representatives during the audit.

**Preliminary assessment and analysis of the experts:**
As part of their studies, doctoral students are exposed to a number of industry, guest lecture as well as networking events with the aim of fostering their research capacities and publication skills. During the audit, the University displayed various examples of such “Scientific Talk series” and “Industry Talk series” events, which featured representatives

from various Canadian, Japanese, European and US universities, as well as industry representatives from companies such as Intel.

PhD students are moreover encouraged to pursue mobilities abroad facilitated through the "BINUS Global" office, amongst other through Erasmus funding.

All in all, the expert panel sees this criterion as fulfilled.

**Final assessment of the experts after the comment of the Higher Education Institution regarding criterion D 3:**

In the absence of further comments or relevant additional evidence by the University, the experts confirm their above preliminary assessment and see this criterion as fulfilled.

**Criterion D 4 Supervision and Assessment**

**Evidence:**

- Self-Assessment Report
- Student evaluation surveys, 2021
- Academic Guide: Doctor of Computer Science 2022, BINUS
- Decision No.: 0300/SK/DSN-S3-UBN/X/2022, Rector of BINUS University, regarding Appointment of Academic Supervisor, BINUS
- Discussions with programme coordinators, lecturers, students, and industry representatives during the audit.

**Preliminary assessment and analysis of the experts:**

At the PhD level, modules as well as research work are graded on a letter grade scale as displayed below.

| Letter Grade | Range | Weight | Description |
|---|---|---|---|
| **A** | 90 – 100 | 4 | High Distinction |
| **A-** | 85 – 89 | 3.67 | Distinction |
| **B+** | 80 – 84 | 3.33 | Satisfactory |
| **B** | 75 – 79 | 3 | Pass |
| **B-** | 70 – 74 | 2.5 | Fail |
| **C** | 65 – 69 | 2 | |
| **D** | 50 – 64 | 1 | |
| **And** | 0 – 49 | 0 | |
| **F** | - | 0 | Incomplete |

Postgraduate students in Computer Science must repeat courses if they receive grades of B-, C, D, E, or F and have not achieved the minimum required grade specified for the course, or if their total GPA is below 3.00. An 'F' grade is awarded if students are ineligible for the final exam due to insufficient attendance or lateness, if they fail to take the final exam, or if they are found to have violated rules during the exam. For PhD students, the threshold is 75% attendance to qualify for final examinations, as specified in their relevant academic guidebook.

To be permitted graduation, doctoral students are obliged to maintain a minimum GPA of 3.00 across 42 credit hours, and successfully pass all stages and exams of the dissertation as outlined below.

For their dissertation, doctoral students within the Computer Science Program receive guidance from a so-called promoter team, comprised of a lead promoter and two co-promoters. Additionally, the department appoints three examiners to evaluate the dissertation. PhD students are required to pass a series of examinations; including the proposal exams, the qualification exam, the research results exam, the closed exam, and a public examination.

The *proposal exam* scrutinises the originality of the research, its potential contribution, and the implications of the proposed research model. The *Qualification Exam* assesses the students' grasp of mandatory subjects and their chosen stream, as well as their ability to apply and amalgamate knowledge from the courses completed in the first and second semesters. The *Research Result Exam* determines how effectively empirical data has been processed and analysed to support or verify the proposed research model. The *Closed Exam* then appraises the students' capability to assemble their research findings methodically, consistently, and comprehensively, expecting them to demonstrate tangible examples of research best practices. Finally, the *Open or Public Exam* critically assesses the entire dissertation academically by the examiners and pragmatically by industry professionals. Should a student not succeed, they are permitted one additional opportunity for re-examination.

All in all, the expert panel sees this criterion as fulfilled.

**Final assessment of the experts after the comment of the Higher Education Institution regarding criterion D 4:**

In the absence of further comments or relevant additional evidence by the University, the experts confirm their above preliminary assessment and see this criterion as fulfilled.

**Criterion D 5 Infrastructure**

**Evidence:**

- Self-Assessment Report
- List Of Professional E-Books, Library and Knowledge Center, 2022, BINUS
- Discussions with programme coordinators, lecturers, students, and industry representatives during the audit.

**Preliminary assessment and analysis of the experts:**

As highlighted by the University in their self-assessment report and during the audit, PhD students can draw from a range of facilities to support their timely graduation, including dedicated workspaces, a research laboratory with high-performance computing, as well as library access to extensive books, journals, and the Turnitin plagiarism checker.


*Secretariat for PhD students (left), NVIDIA – BINUS University AI R&D Center (right), BINUS. Source: ASIIN.*

As mentioned under criterion 3.2, computing hardware at the University include NVIDIA-sponsored Jetson Nano™ 2GB Developer Kits, a GPU server as well as Raspberry Pi HPE systems. All in all, the expert panel sees this criterion as fulfilled.

**Final assessment of the experts after the comment of the Higher Education Institution regarding criterion D 5:**

In the absence of further comments or relevant additional evidence by the University, the experts confirm their above preliminary assessment and see this criterion as fulfilled.

**Criterion D 6 Funding**

**Evidence:**

- Self-Assessment Report
- Samples of Research Collaboration Agreements

- List of Funding Grants
- Discussions with programme coordinators, lecturers, students, and industry representatives during the audit.

**Preliminary assessment and analysis of the experts:**
Funding for research is accessible through multiple sources, including the university itself, research grants from the Indonesian Ministry of Finance and Ministry of Education, or external organizations; the latter drawing from BINUS' network of industry collaborations. Further relevant aspects are discussed under criterion 3.2.

All in all, the expert panel sees this criterion as fulfilled.

**Final assessment of the experts after the comment of the Higher Education Institution regarding criterion D 6:**

In the absence of further comments or relevant additional evidence by the University, the experts confirm their above preliminary assessment and see this criterion as fulfilled.

**Criterion D 7 Quality Assurance**

**Evidence:**

- Self-Assessment Report
- Quality Management System Handbook, 2022, BINUS
- Curriculum Document, Doctor of Computer Science Study Program, 01/09/2022, BINUS
- Discussions with programme coordinators, lecturers, students, and industry representatives during the audit.

**Preliminary assessment and analysis of the experts:**
The university considers the on-time graduation of its PhD students as a key performance indicator, and thus monitors study time through the collection of student progression data.

Comprehensive academic and dissertation guidebooks are provided to the PhD students to support their doctoral journey. Furthermore, BINUS pursues a strict scientific integrity policy. Further relevant aspects are discussed under criterion 5 and criterion D 4.

All in all, the expert panel sees this criterion as fulfilled.

**Final assessment of the experts after the comment of the Higher Education Institution regarding criterion D 7:**

In the absence of further comments or relevant additional evidence by the University, the experts confirm their above preliminary assessment and see this criterion as fulfilled.

# E Additional Documents

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

D 1. Please provide an overview of the involved teaching staff by their main area of teaching according to the top two levels of the ACM Computing Classification System of 2012.

D 2. Please provide a detailed explanation concerning the assumed time-wise workload per credit (SKS) per week at BINUS at each programme level (Bachelor, Master, PhD), as well as regarding the number of course weeks per semester/term applicable at each programme level.

# F Comment of the Higher Education Institution (19.11.2023)

The institution provided the following additional information:

*D 1. Please provide an overview of the involved teaching staff by their main area of teaching according to the top two levels of the ACM Computing Classification System of 2012.*

**"Overview of The Involved Teaching Staff by Their Main Area of Teaching According to The Top Two Levels of The ACM Computing Classification System of 2012"**

| Campus | Jakarta | Bandung | Malang | Note |
|---|---|---|---|---|
| **General and reference** | | | | Not part of Courses but we delivered this information in the Orientation program - we have 1 weeks program for Academic orientation (15 hours work load) |
| Document types | | | | |
| Cross-computing tools and techniques | | | | |
| **Hardware** | | | | |
| Communication hardware | 6 | 1 | 1 | |
| Emerging technologies | 18 | 2 | 1 | |
| **Computer systems organization** | | | | |
| Embedded and cyber-physical systems | 8 | 2 | 1 | |
| Real-time systems | 10 | 2 | 1 | |
| **Networks** | | | | |
| Network protocols | 13 | 1 | 2 | |
| Network components | 8 | 2 | 2 | |
| **Software and its engineering** | | | | |
| Software notations and tools | 24 | 2 | 2 | |
| Software creation and management | 24 | 2 | 2 | |
| **Theory of computation** | | | | |
| Design and analysis of algorithms | 42 | 2 | 2 | |
| Theory and algorithms for application domains | 29 | 1 | 5 | |
| **Mathematics of computing** | | | | |
| Probability and statistics | 6 | 2 | 4 | |
| Discrete mathematics | 6 | 2 | 1 | |
| **Information systems** | | | | |
| Data management systems | 13 | 2 | 1 | |
| Information retrieval | 5 | 1 | 1 | |
| **Security and privacy** | | | | |
| Systems security | 8 | 1 | 1 | |
| Software and application security | 7 | 1 | 1 | |
| **Human-centered computing** | | | | |
| Human computer interaction (HCI) | 14 | 2 | 4 | |
| Interaction design | 17 | 1 | 3 | |
| **Computing methodologies** | | | | |
| Artificial intelligence | 17 | 1 | 2 | |
| Machine learning | 12 | 1 | 1 | |
| **Applied computing** | | | | We not assigned our lecturer to this section as |
| Education | | | | |

| | | | | |
|---|---|---|---|---|
| Computers in other domains | | | | this is more on the research topic and expertise that not part of the subjects |
| **Social and professional topics** | | | | |
| User characteristics | 6 | 1 | 1 | |
| Professional topics | 14 | 1 | 1 | |

*D 2. Please provide a detailed explanation concerning the assumed time-wise workload per credit (SKS) per week at BINUS at each programme level (Bachelor, Master, PhD), as well as regarding the number of course weeks per semester/term applicable at each programme level.*

We would like to thank the experts for their comments. For Bachelor level, 1 SKS equates to 170 minutes of weekly workload consisting of 50 minutes of scheduled face-to- face learning in the classroom with teaching staff, 60 minutes of structured activity, and 60 minutes of independent study. In one semester, the number of courses is around 6-7 courses. With total 13 sessions in one semester, therefore 1 SKS is approximately equal to 1.47 ECTS (~ 1.5 ECTS). This workload per SKS per week for Bachelor Level is in agreement with The Decree of Ministry of Education and Culture No. 3/2020 Chapter 19 verse 1. We acknowledge that there is a typo mistake in our internal guide of credit conversion in which we mentioned that one academic hour as 50 minutes (actually intended only for face-to-face meeting). Morover, we mistakenly use the conversion guide that intended only for bachelor levels to postgraduate levels as well. We have revised it accordingly and have also integrated the conversion guide for Master and Doctoral Level into the document. For Bachelor level, each courses runs for 16 weeks comprising 13 regular sessions, 1 “quiet week or period”, and mid and final exams.

According to the Ministry of Education and Culture Decree No. 3/2020 Chapter 19 verse 3, study program with distinct academic calender, primarily for joint degree program of postgraduate levels, are given a freedom to define the workload per credit per week required to achieved the intended student outcomes. In the case of Master level Study Program at Bina Nusantara University, the academic calender is based on term basis, where 1 semester consist of 2 quarters. Each of courses runs for 11 session consisting of 10 regular session and 1 final exam. For master level, 1 credit is equal to 60 minutes face-to-face meeting, 90 minutes of structured activity, and 90 minutes of independent study. Therefore, 1 SKS is equivalent to 1.6 ECTS. The number of course week per semester is around 4 courses (or 2 courses per quarter).

As for Doctoral level, the academic calender is based on the semester system, where each of courses runs for 13 weeks consisting of 12 regular session, and 1 final exams. Therefore, 1 credit equals to 60 minutes of face-to-face meeting, 90 minutes of structured activity, and 90 minute of independent study. Therefore, it can be conluded that 1 SKS is equal to 1.92 ECTS. The number of course week per semester is around

4 courses. It is important to note that every course in Doctor of Computer Science Study Program of Bina Nusantara University has the same credit which is 3 SKS.

as well as the following statement:

Criterion 1.1 Objectives and Learning Outcomes of a Degree Programme (Intended Qualifications Profile)

In the draft report in **p.14 line 9**, it is stated " Asked by the experts if there are any skills they would wish to see strengthened within the BINUS Computer Science graduates, various industry representatives stated that stronger business-related skills such as entrepreneurship skills, business acumen, customer focus and agile thinking would be desirable. The assessors accordingly suggest the University to consider this feedback."

**Response**: We appreciate the experts for the suggestion. As per Bina Nusantara University's Quality Objective 2021-2025, BINUS aims to achieve two out every three graduates work in the global companies or become entrepreneurs within six months upon graduation. Therefore, we aware that the business-related skills become our top priority. To achieve this goal, BINUS not only provides students with learning experience on campus through mandatory course Entrepreneurship: Ideation (2 SKS), but also gives direct experience in the industrial world, as well as an incubation program through Enrichment Program (3+1) with Entrepreneurship Track that can be chosen by the students. This enrichment program runs for 2 semester.

The aim of the Entrepreneurship Track Program is to provide real experience as an entrepreneur in creating and running a business, entrepreneurship skills, business acumen, customer focus and agile thinking. In the Entrepreneurship track program, students will learn to create, develop business ideas with Business Models, market development, create prototypes and product development by running a startup business. The target of the first semester is that students can make a prototype and carry out validation. The target for the second semester is to continue the results from the first semester so that business development can be carried out.

**Figure 1.** Students from the School of Computer Science track Entrepreneurship created a startup and created the WeKiddo application, which is an online learning activity application that has been used by hundreds of schools in DKI Jakarta to support the social distancing movement as an effort to prevent the spread of the Covid-19 virus.

Apart from that, the BINUS Incubator functions as a coaching and development forum for students who will develop business ideas into real businesses. BINUS Incubator has very adequate co-working spaces on several campuses, such as the Anggrek Campus (BeeHub), Alam Sutera campus, Bekasi campus, etc. To ensure that students will gain necessary skills to run business, BINUS Incubator has internationally and nationally certified coaches who have business experience in various fields.

There are other programs to accommodate student ideas. For example, the students' ideas and products will be displayed and presented at the BINUS FESTIVAL (BiFest), which is a student program that is routinely held twice a year. This event is a collaboration between the Student Club and Activity Center (SCAC) and Student Organizations. BiFest is aimed at motivating students to advance the Indonesian economy by developing products or services that can compete in national and international markets. This series of events, apart from seminars and presentations of student products, is expected to inspire students to develop their creative ideas into innovative business ideas and further grow their courage to step up to become entrepreneurs. Therefore, it is expected that BINUS Computer Science graduates possess business-related skills, especially entrepreneurship skills, business acumen, customer focus and agile thinking. From this program, BINUS and School of Computer Science have produced many successful entrepreneurs such as William Tanuwijaya (founder and CEO of e-commerce unicorn TOKOPEDIA), Tyovan Ari Widagdo ( founder of Bahaso – an english learning platform. He was one of 30 Under 30 Forbes Asia). Therefore, we believe that the business-related programs that we provide is sufficient.

### Criterion 1.2 Name of the Degree Programme

In the draft report in **p.15 line 15**, it is written "During their perusal of the provided documentation and the University's website, the experts note that the Master's programme is occasionally referred to as "Master of Information Technology" (e.g. here, here, here) instead."

**Response**: We thanks the experts for pointing out our mistakes. We have corrected the name of our Master of Computer Science Program in that websites.

### Criterion 1.3 Curriculum

In the **p.20 line 17**, the experts wrote " …In light of the provided elaborations during their exchanges on site, the experts find that an improved visibility of these reintegrated topics within the module descriptions would be desirable, and to not cover these important subjects in one course week each only."

**Response**: We appreciate the experts for their critical comments. The basics of theoretical computer science topics such as complexity, decidability, Turing machines or automata have been integrated in Compilation Technique Course, and Algorithm Design and Analysis Course. We understand the importance of that topics, thus in efforts to support the learning process and in an effort to increase students' understanding, those

topics are represented through several sessions in each course. Moreover, students are also given mentoring programs, and additional materials in the form of modules and digital content, in order to increase students' understanding of the module, which is explained as followed:

1. Additional materials in the Course Outline, Online Resources and Digital Content which can be accessed by Students and Lecturers at BINUSMAYA.
    a. Compilation Technique Course
        - Session 2: Introduction Automata: TheMethods and The Madness; Regular Expression - Introduction to Turing Machines

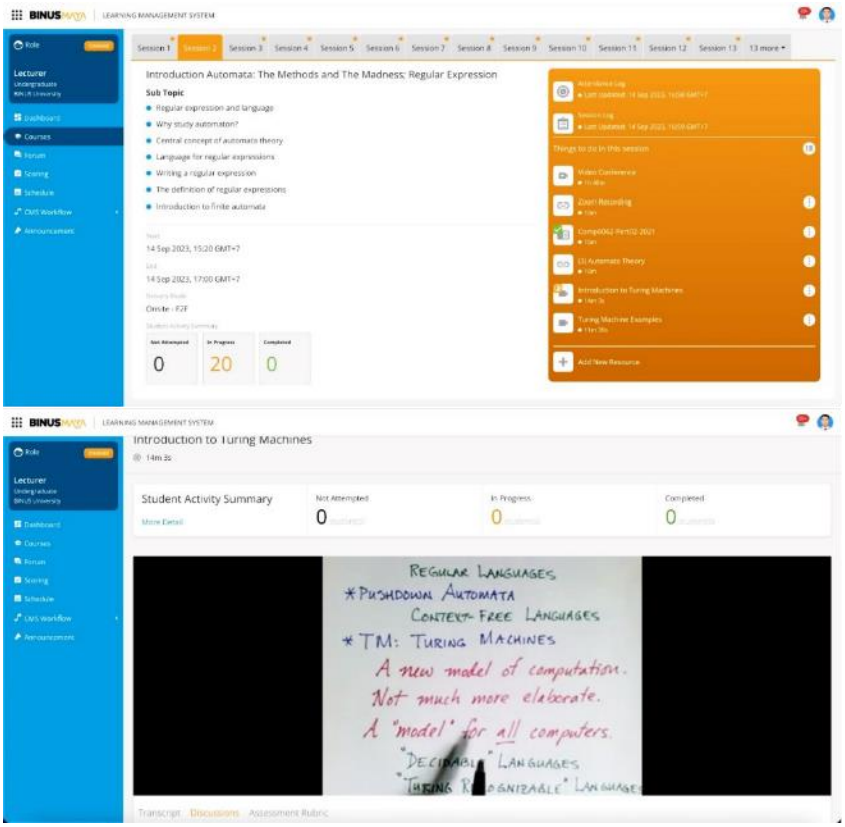
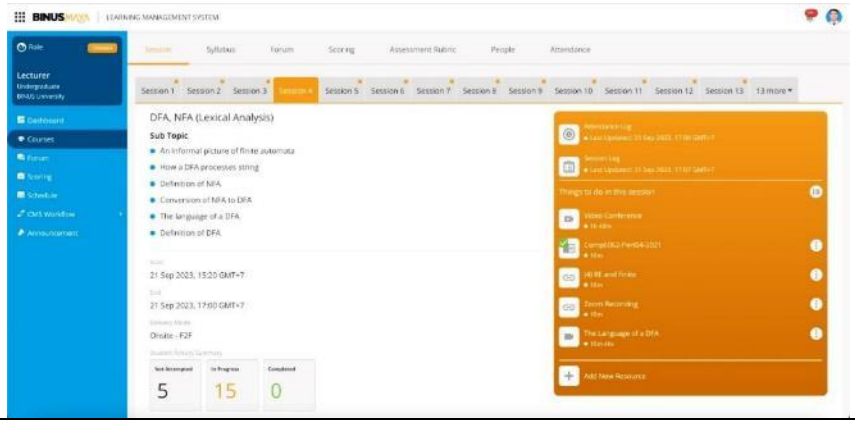



**Figure 2.** BINUSMAYA outlook for compilation technique course

- Session 4: DFA, NFA (Lexical Analysis) - The Language of a DFA



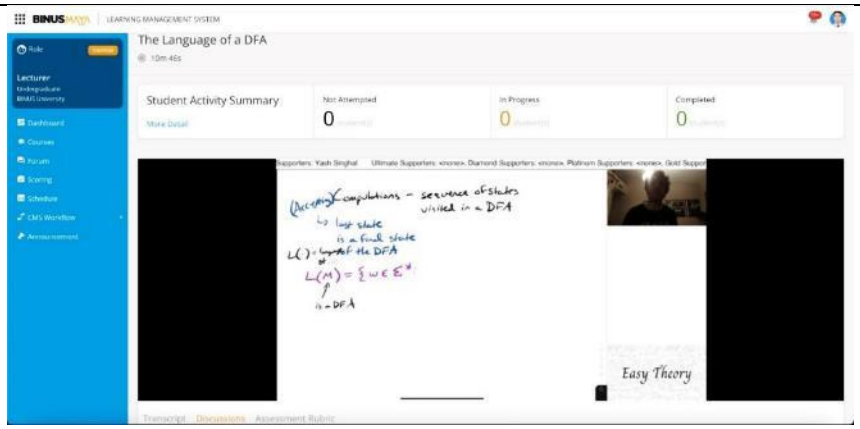



**Figure 3.** BINUSMAYA outlook for DFA, NFA (Lexical Analysis) session

- Session 18-19: Semantic Analyzer - Semantic Analysis and Syntax Directed Translation

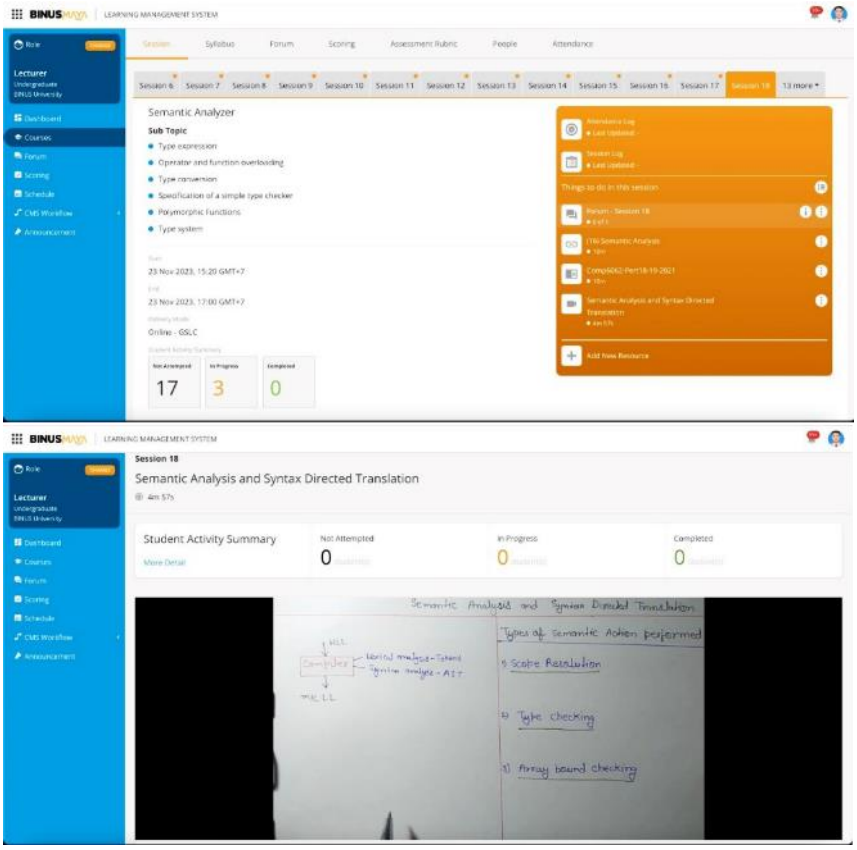
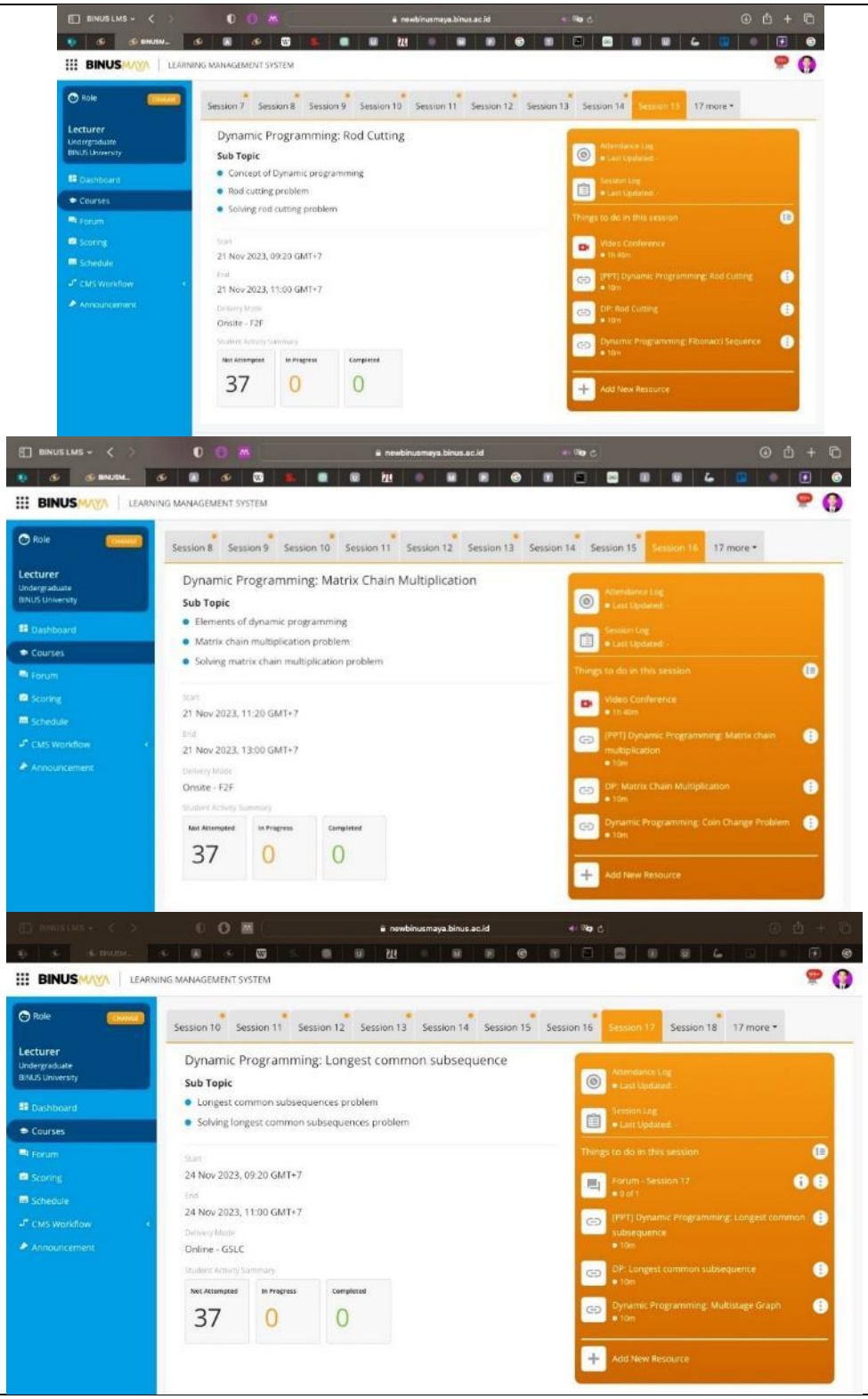



**Figure 4.** BINUSMAYA outlook for Semantic Analyzer - Semantic Analysis and Syntax Directed Translation

b. Algorithm Design and Analysis Course

This subject area is covered in several sessions in Dynamic Programming topic (session 15-18) and in Characterizing Running Time (Session 4) as shown below:


BINUSMAYA
LEARNING MANAGEMENT SYSTEM
Role
Lecturer
Undergraduate
BINUS University
Dashboard
Courses
Forum
Scoring
Schedule
CMS Workflow
Announcement
Session 7
Session 8
Session 9
Session 10
Session 11
Session 12
Session 13
Session 14
Session 15
17 more
Dynamic Programming: Rod Cutting
Sub Topic
Concept of Dynamic programming
Rod cutting problem
Solving rod cutting problem
Start
21 Nov 2023, 09:20 GMT+7
End
21 Nov 2023, 11:00 GMT+7
Delivery Mode
Onsite - F2F
Student Activity Summary
Not Attempted
In Progress
Completed
37
0
0
Things to do in this session
Video Conference
[PPT] Dynamic Programming: Rod Cutting
DP: Rod Cutting
Dynamic Programming: Fibonacci Sequence
Add New Resource
Session 16
Dynamic Programming: Matrix Chain Multiplication
Elements of dynamic programming
Matrix chain multiplication problem
Solving matrix chain multiplication problem
21 Nov 2023, 11:20 GMT+7
21 Nov 2023, 13:00 GMT+7
[PPT] Dynamic Programming: Matrix chain multiplication
DP: Matrix Chain Multiplication
Dynamic Programming: Coin Change Problem
Session 17
Session 18
Dynamic Programming: Longest common subsequence
Longest common subsequences problem
Solving longest common subsequences problem
24 Nov 2023, 09:20 GMT+7
24 Nov 2023, 11:00 GMT+7
Online - GSLC
Forum - Session 17
[PPT] Dynamic Programming: Longest common subsequence
DP: Longest common subsequence
Dynamic Programming: Multistage Graph

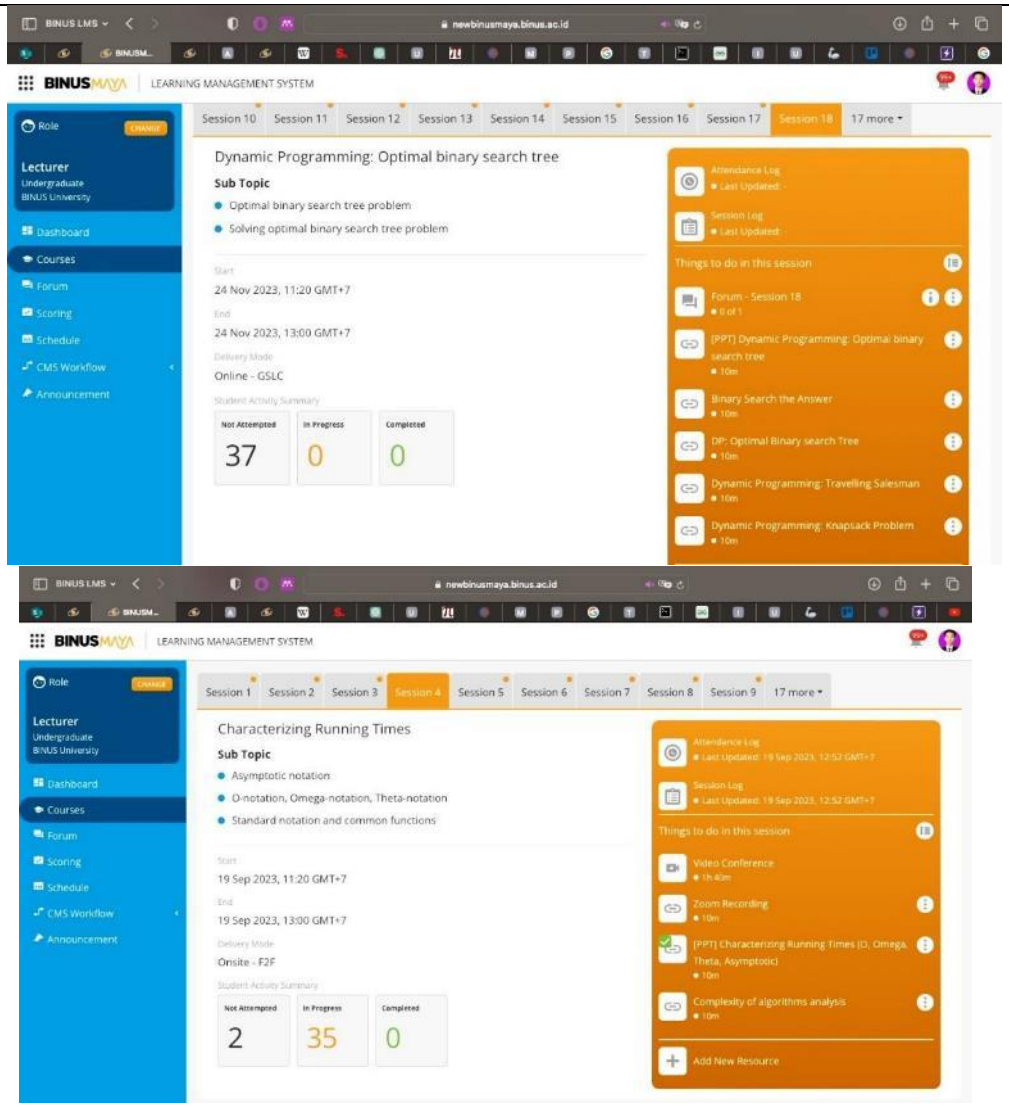



**Figure 4.** BINUSMAYA outlook for Algorithm Design and Analysis

From the pictures above, we can see the visibility of the reintegrated topics within the modules, and the subjects are covered in several course week each.

2. Student Assistance Program which is conducted in Coordination with Student Associations
    a. Compilation Technique Course : https://www.youtube.com/watch?v=SsdtEWeCb7s
    b. Scientific Computing Course : https://www.youtube.com/watch?v=0HqDyQ-Ax2I
    c. Algoritma Design and Analysis : https://www.youtube.com/watch?v=6KMKISrCU

We also would like to bring to the experts's attention that even though that the basics of theoretical computer science currently are not run as courses, and it dispersed as sessions instead, we always assure that the intended student outcomes can be attained by regularly measuring their attainment. During the last three years, our measurements indicate that the student outcomes can be achieved as can be seen from the link. An indirect measure of our student competence and student outcome attainment can be

proven by many academic achievements that have been obtained by the students. During the last five years, our computer science undergraduate students have successfully won numerous competition at national and international levels as shown in the **Table 3**, many of them which are considered prestigious. For example, our student team, namely Jollybee Team, had successfully solved 6 problems in the Programming Competition ICPC World Finals Dhaka in 2022, placing BINUS in the same ranks with other world famous institutions such as Technische Universität München, UCLA, KAIST, University of Toronto (see **Figure 5**). The latest is our computer science students won gold and silver medals in World Skills ASEAN 2023 which was held in Singapore for IT Software Solutions for Business and Web Technologies categories (**Figure 6**).

**Table 3.** Academic achievements of Computer Science Undergraduate Program

| Years | Jakarta | | Malang | | Bandung | | TOTAL |
|---|---|---|---|---|---|---|---|
| | National | International | National | International | National | International | |
| **2018/2019** | 18 | 27 | | 0 | 1 | 2 | 48 |
| **2019/2020** | 43 | 20 | 1 | 0 | 2 | 1 | 67 |
| **2020/2021** | 24 | 46 | 6 | 1 | 1 | 4 | 82 |
| **2021/2022** | 101 | 32 | 4 | 1 | 3 | 0 | 141 |
| **2022/2023** | 23 | 14 | 1 | 0 | 0 | 3 | 41 |
| **TOTAL** | 209 | 139 | 12 | 2 | 7 | 10 | **379** |

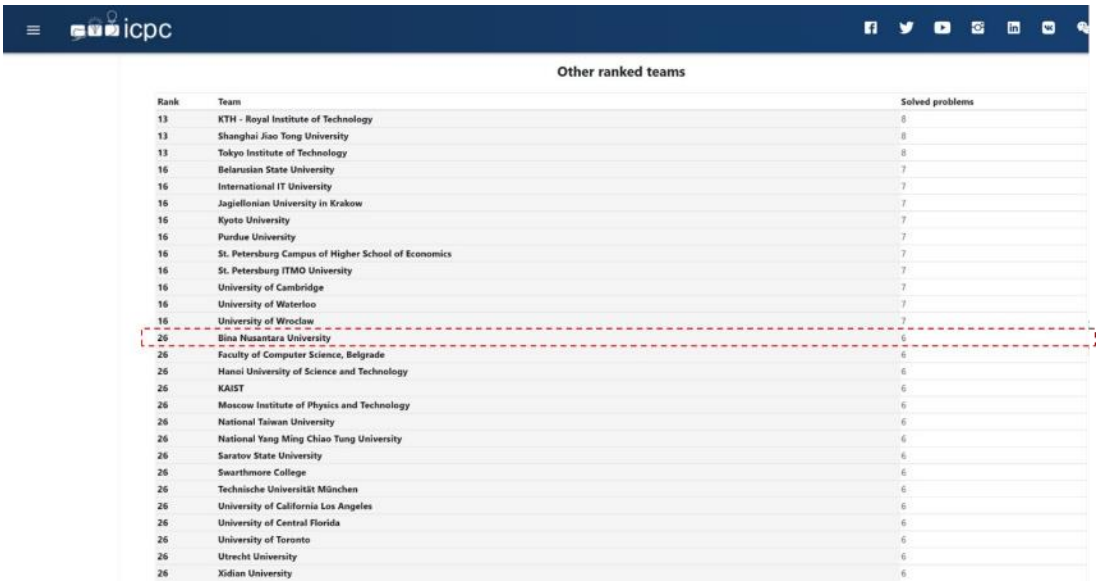



**Figure 5.** The results of ICPC World Finals Dhaka 2022 (https://icpc.global/worldfinals/results)

**Figure 6.** Computer Science Undergraduate Students took picture after won the World Skills ASEAN 2023 Competition

From these student outcomes attainment and academic achievements, we believe that basics of theoretical computer science topics that we provide for our students are sufficient implying that our curriculum is align well with Association for Computing Machinery (ACM) curriculum, as also supported with the mapping of involved teaching staffs based on main teaching area according to the ACM Computing Classification System of 2012 in the Table 2 above.

### Criterion 1.3 Curriculum

In the p.22 line 12, the experts wrote "..as the intended introduction of "car computing" as a further stream…"

**Response**: We would like to request the experts to correct the typo mistake from "car computing" to be "cloud computing".

### Criterion 4.1 Module Descriptions

In the **p.44 line 3** of the report, it is mentioned "..The auditors hence ask the programme coordinators to revise the columns "Assessments and Evaluation" and "Study and examination requirements and forms of examination" of the relevant module handbooks in this regard. Moreover, the experts observe that the module handbooks provided appear to be unavailable through the respective programmes' websites. To ensure accessibility to all interested stakeholders, however, the revised module descriptions need to be made publicly accessible in full."

**Response**: We would like to thank the experts for pointing out our mistakes. We acknowledge that we made mistakes during extracting the information from our original course outline (module handbook) into ASIIN' course outline template for all subjects. We have revised it accordingly. It is importance to note that the course outline basically can be found in the BINUSMAYA of the students and lecturers. However, to accommodate the ASIIN experts' suggestion, we are pleased to make it accessible to public (https://socs.binus.ac.id/computer-science-fix/) as can be seen from the Figure 7 below:

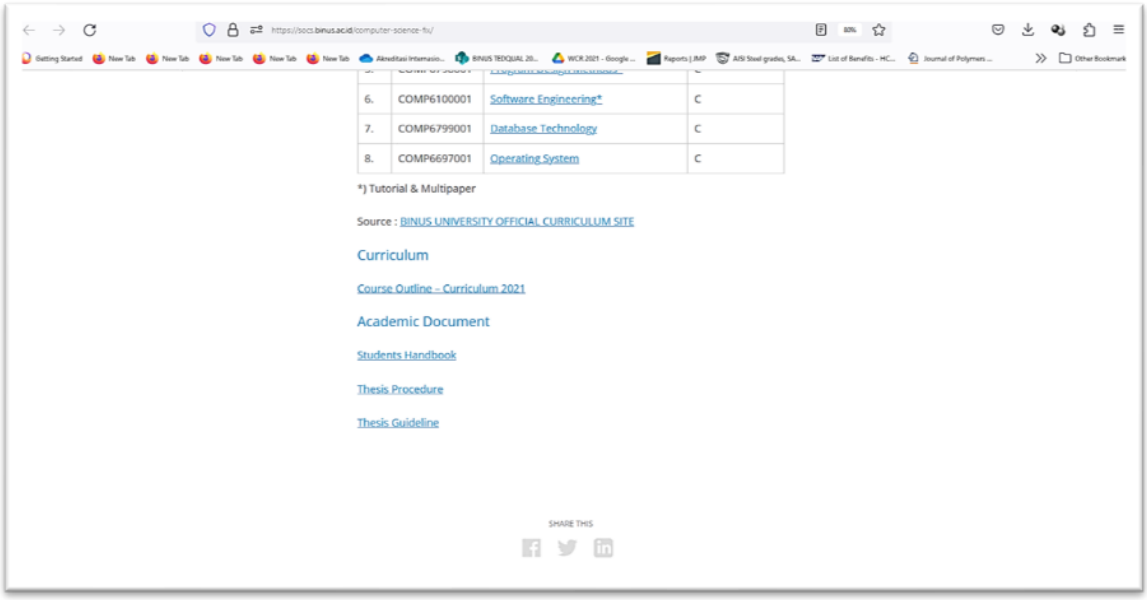



**Figure 7.** The outlook of CS@Jakarta webpage

## Criterion 4.3 Relevant Rules

In the **p.45 line 14**, it is stated "The auditors confirm that the rights and duties of both BINUS and the students are defined clearly and bindingly. The assessors especially commend the comprehensive Academic Guidelines, Thesis Writing Guidebook, and Curriculum Documents. This being said, the experts again observe that documents such as the abovementioned appear to be unavailable through the respective programmes' websites. To ensure accessibility to all interested stakeholders, however, crucial relevant documentation needs to be made publicly accessible."

**Response**: We appreciate for the experts' comments. The Academic Guidelines, Thesis Writing Guidebook, and Curriculum Documents are available in the BINUSMAYA (see **Figure 8**) and only can be accessed by students and lecturers using their own username and password. Nonetheless, to accommodate the experts's suggestion, we are pleased to make it open to public by placing it in our programmes' website (see **Figure 9-12**) as also mentioned in our response to Criterion 4.1 Module Descriptions.

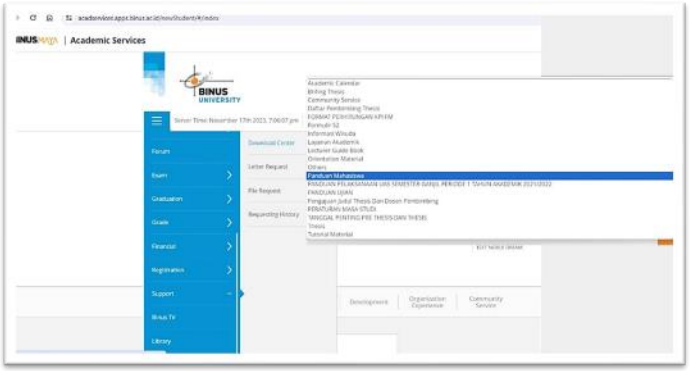



**Figure 8.** The detailed information in student's BINUSMAYA. Handbooks and guidelines can be accessed in "download" menu.

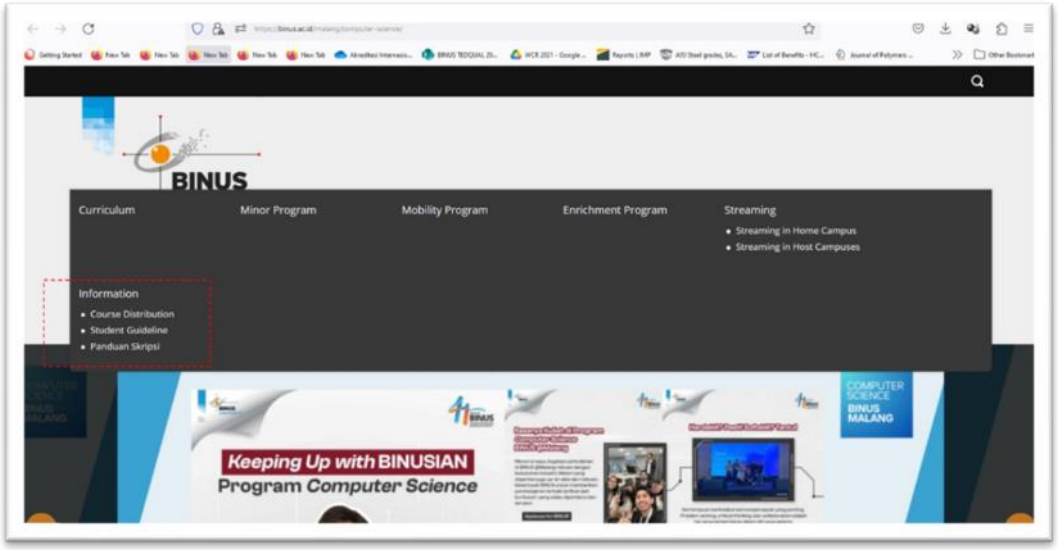



**Figure 9.** The webpage of CS@Malang (https://binus.ac.id/malang/computer-science/)

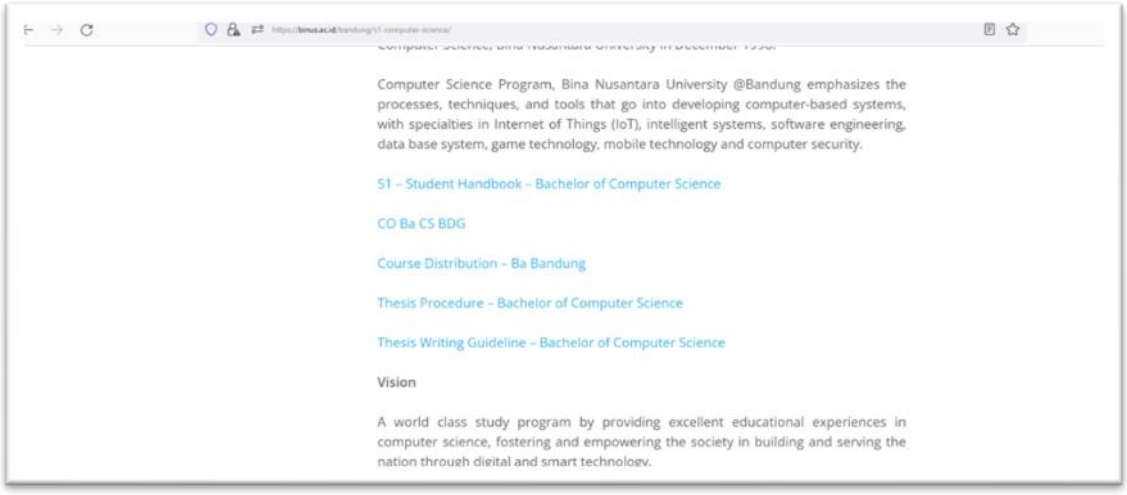



**Figure 10.** The webpage of CS@Bandung (https://binus.ac.id/bandung/s1-computer-science/)

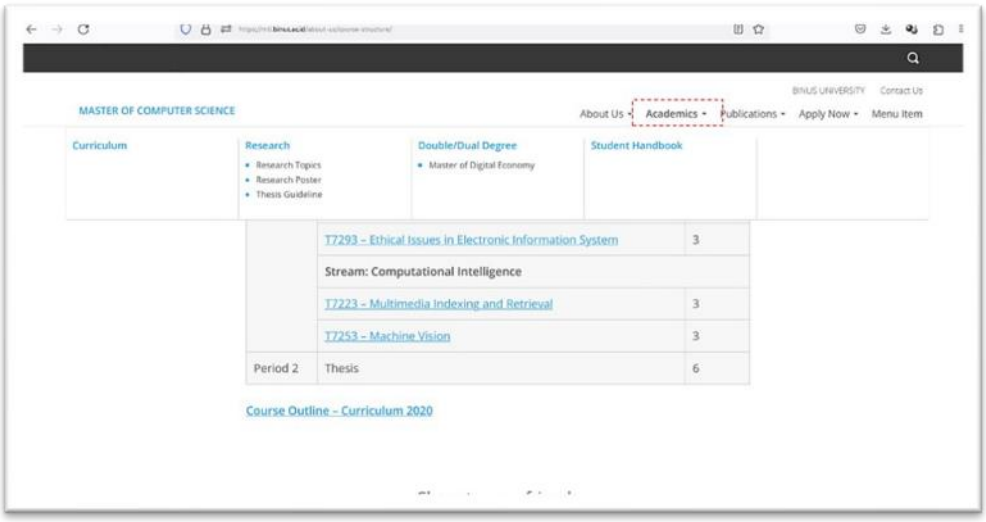



**Figure 11.** The webpage of Master of Computer Science (https://mti.binus.ac.id/)

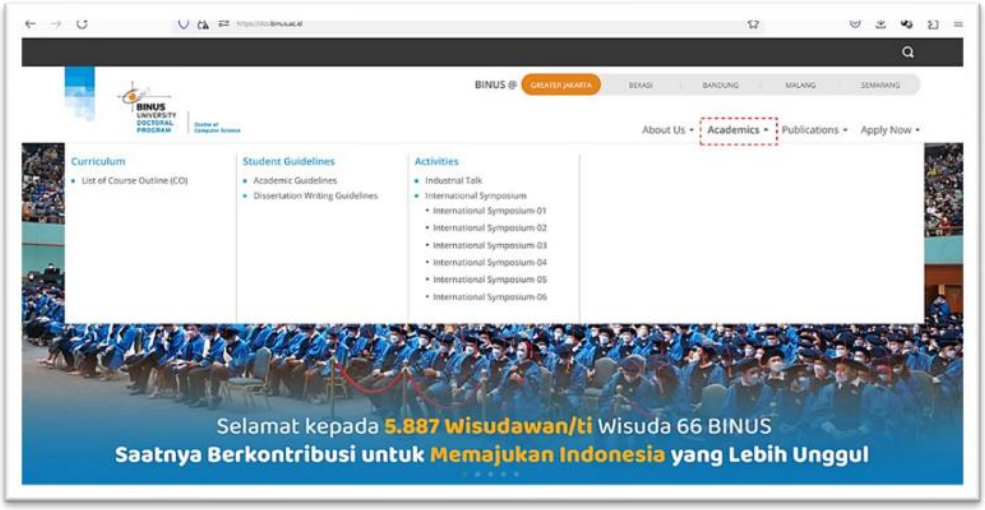



**Figure 12.** The webpage of Doctor of Computer Science (https://dcs.binus.ac.id/)

## Criterion 5 Quality management: quality assessment and development

In the **p.47 line 14**, it is stated "…The experts suggest the decision makers response to consider such integration of student representatives in decision-making structures at the Faculty level as a means for providing students with an appropriate voice within the development of their programmes."

**Response**: We would like to thank the experts for their comments. As a private university, Bina Nusantara University values its stakeholders highly by placing it to be one of targets in our performance indicator that being measured every year. We always strive our utmost to accommodate their needs and hear their opinions for program improvement through several means such as student experience survey (SES), teaching learning evaluation (TLE). In addition to suveys, the decision makers; i.e. Head of Department, Dean, and Board of Management; have organized several programs to hear their voice directly and to assure them that their aspirations are being heard. For examples, Dean organize a meeting session between him, head of study programs, and student representatives from every study program under his administration to get a feedback from them (see **Figure 13 and 14**). Beyond that, the student representatives from every study programs also have the opportunity to talk to rector to express their aspirations through a program namely Talk to Rector. This Talk to Rector Program have been started since 2020 until now. As for 2023, the Talk to Rector with newly elected rector, Dr. Nelly, will be held this 22 November 2023 and 5 December 2023 for undergraduate and graduate students, respectively (see **Figure 17 and 19**).


**Figure 13.** Undergraduate Students at School of Computer Science met with Dean and Head of Programs

**Figure 14.** Students from Doctor of Computer Science met with Head of Programs

**Figure 15.** Talk To Rector BINUS Program in 2021 for undergraduate students. It is worth noting that our staff from Student Advisory & Support Center (the most right) served as interpreter to assist a student with deafness (second from right).


**Figure 16.** Talk To Rector Program in 2022 for undergraduate students


**Figure 17.** The flyer of Talk To Rector Program 2023 for undergraduate students


**Figure 18.** The Talk To Rector Program in 2022 for graduate students


**Figure 19.** The flyer of Talk To Rector Program 2023 for graduate students

In addition to meet with student, Bina Nusantara University also has distinct routine programs namely Parents Meet Rector and Parents Meet Program to get feedbacks from the parents' side. For those parents who are unable to come to BINUS directly, Bina Nusantara University has provided a webpage where the parents can easily get the

meeting information and join via zoom (https://binus.ac.id/parents-meet-rector) .

**Figure 20.** Parents Meet Rector Program at Anggrek Campus


**Figure 21.** Parents Meet Rector Program Webpage


**Figure 22.** Parents Meet Rector Program via online

From various surveys and programs as explained above, it is evident that Bina Nusantara University has adequately accommodated the needs of students by providing many channels to express their aspiration. It is also evident that Bina Nusantara University has gone to great lengths to make sure that the students' voices are truly being heard. In a response to experts' comment regarding integration of student representatives in decision-making structures at the Faculty level, the respective Deans have issued a decree for the law enactment of student representation at faculty as can be seen from the link.

# G Summary: Expert recommendations (22.11.2023)

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

| Degree Programme | ASIIN Seal | Maximum duration of accreditation | Subject-specific label | Maximum duration of accreditation |
|---|---|---|---|---|
| Ba Computer Science (Jakarta) | Without requirements | 30.09.2029 | Euro-Inf® | 30.09.2029 |
| Ba Computer Science (Bandung) | Without requirements | 30.09.2029 | Euro-Inf® | 30.09.2029 |
| Ba Computer Science (Malang) | Without requirements | 30.09.2029 | Euro-Inf® | 30.09.2029 |
| Ma Computer Science | Without requirements | 30.09.2029 | Euro-Inf® | 30.09.2029 |
| PhD Computer Science | Without requirements | 30.09.2029 | – | – |

**Requirements**

None.

**Recommendations**

**For all degree programmes**

E 1. (ASIIN 3.2) It is recommended to enable access to the resources of the Institute of Electrical and Electronics Engineers (IEEE) for the students.

E 2. (ASIIN 4.1) It is recommended to display precise ECTS equivalencies in the respective module handbooks next to the stated number of Indonesian credits awarded.

**For the Ba Computer Science**

E 3. (ASIIN 1.1/1.3) It is recommended to (re-)strengthen the field of theoretical computer science within the curricula to foster further alignment with the Association for Computing Machinery (ACM) curriculum standards.

**For the Ba and Ma Computer Science**

E 4. (ASIIN 1.5/3) It is recommended to verify the workload of the Bachelor's and Master's theses against the credits awarded.

# H Comment of the Technical Committee 04-Informatics/Computer Science (28.11.2023)

*Assessment and analysis for the award of the ASIIN seal:*

The TC discusses the procedure and is in favour of an editorial change to recommendation E 3, as the term "theoretical Computer Science" is a translation of the German term, but in an international context is more commonly referred to as "theoretical foundations of computer science". Otherwise, the TC follows the experts' assessment without any changes.

*Assessment and analysis for the award of the Euro-Inf® Label*:

The Technical Committee deems that the intended learning outcomes of the degree programmes do comply with the Subject-Specific Criteria of the Technical Committee 04 – Informatics/Computer Science.

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

| Degree Programme | ASIIN Seal | Maximum duration of accreditation | Subject-specific label | Maximum duration of accreditation |
|---|---|---|---|---|
| Ba Computer Science (Jakarta) | Without requirements | 30.09.2029 | Euro-Inf® | 30.09.2029 |
| Ba Computer Science (Bandung) | Without requirements | 30.09.2029 | Euro-Inf® | 30.09.2029 |
| Ba Computer Science (Malang) | Without requirements | 30.09.2029 | Euro-Inf® | 30.09.2029 |
| Ma Computer Science | Without requirements | 30.09.2029 | Euro-Inf® | 30.09.2029 |
| PhD Computer Science | Without requirements | 30.09.2029 | – | – |

**For the Ba Computer Science**

E 3. (ASIIN 1.1/1.3) It is recommended to (re-)strengthen the ~~field of~~ theoretical foundations of computer science within the curricula to foster further alignment with the Association for Computing Machinery (ACM) curriculum standards.

# I Decision of the Accreditation Commission (08.12.2023)

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

The Accreditation Commission discusses the procedure and, apart from a minor rephrasing of recommendation E3, follows the assessment of the experts and the Technical Committee 04 without changes.

*Assessment and analysis for the award of the Euro-Inf® Label*:

The Accreditation Commission deems that the intended learning outcomes of the degree programmes do comply with the Subject-Specific Criteria of the Technical Committee 04 – Informatics/Computer Science.

The Accreditation Commission decides to award the following seals:

| Degree Programme | ASIIN Seal | Maximum duration of accreditation | Subject-specific label | Maximum duration of accreditation |
|---|---|---|---|---|
| Ba Computer Science (Jakarta) | Without requirements | 30.09.2029 | Euro-Inf® | 30.09.2029 |
| Ba Computer Science (Bandung) | Without requirements | 30.09.2029 | Euro-Inf® | 30.09.2029 |
| Ba Computer Science (Malang) | Without requirements | 30.09.2029 | Euro-Inf® | 30.09.2029 |
| Ma Computer Science | Without requirements | 30.09.2029 | Euro-Inf® | 30.09.2029 |
| PhD Computer Science | Without requirements | 30.09.2029 | – | – |

**Requirements**

None.

**Recommendations**

**For all degree programmes**

E 1. (ASIIN 3.2) It is recommended to enable access to the resources of the Institute of Electrical and Electronics Engineers (IEEE) for the students.

E 2. (ASIIN 4.1) It is recommended to display precise ECTS equivalencies in the respective module handbooks next to the stated number of Indonesian credits awarded.

**For the Ba Computer Science**

E 3. (ASIIN 1.1/1.3) It is recommended to (re-)strengthen the foundations of theoretical computer science within the curricula to foster further alignment with the Association for Computing Machinery (ACM) curriculum standards..

**For the Ba and Ma Computer Science**

E 4. (ASIIN 1.5/3) It is recommended to verify the workload of the Bachelor's and Master's theses against the credits awarded.

# Appendix: Programme Learning Outcomes and Curricula

According to the self-assessment report and the provided "Curriculum Documents", the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved:

## Ba Computer Science (Jakarta)

| Aspect | Code | Study Program Learning Outcome |
|---|---|---|
| Knowledge | K1 | Mampu menerapkan prinsip komputasi dan disiplin ilmu terkait lainnya untuk mengidentifikasi solusi<br>***Able to apply principles of computing and other relevant disciplines to identify solutions.*** |
| | K2 | Mampu merancang solusi berbasis komputasi untuk memenuhi serangkaian persyaratan komputasi tertentu dalam konteks ilmu computer<br>***Able to design a computing-based solution to meet a given set of computing requirements in the context of computer science.*** |
| | K3 | Mampu mengevaluasi solusi berbasis komputasi untuk memenuhi serangkaian persyaratan komputasi tertentu dalam konteks ilmu computer<br>***Able to evaluate a computing-based solution to meet a given set of computing requirements in the context of computer science.*** |
| | K4 | Mampu mengidentifikasi informasi yang dibutuhkan dalam berbagai konteks professional<br>***Able to identify information required in a variety of professional contexts.*** |
| | K5 | Mampu mengenali tanggung jawab profesional dalam praktik komputasi<br>***Able to recognize professional responsibilities in computing practice.*** |
| | K6 | Mampu menerapkan teori ilmu komputer yang digunakan untuk menghasilkan solusi berbasis komputasi<br>***Able to apply computer science theory used to produce computing-based solutions.*** |
| | K7 | Mampu menerapkan dasar-dasar pengembangan perangkat lunak untuk menghasilkan solusi berbasis komputasi<br>***Able to apply software development fundamentals to produce computing-based solutions.*** |
| Specific Skill | SS1 | Mampu menganalisis masalah komputasi yang kompleks<br>***Able to analyze a complex computing problem*** |
| | SS2 | Mampu mengimplementasikan solusi berbasis komputasi untuk memenuhi serangkaian persyaratan komputasi tertentu dalam konteks ilmu computer<br>***Able to implement a computing-based solution to meet a given set of computing requirements in the context of computer science.*** |
| | SS3 | Mampu membuat justifikasi yang terverifikasi dalam praktik komputasi berdasarkan prinsip hukum dan etika |

| | | |
|---|---|---|
| | | ***Able to make informed judgments in computing practice based on legal and ethical principles.*** |
| | **SS4** | Mampu melakukan kerja tim yang efektif dalam praktik komputasi<br>***Able to perform effective teamwork in computing practice.*** |
| | **SS5** | Mampu bekerja secara efektif sebagai pemimpin tim dalam praktik komputasi<br>***Able to perform effectively as a leader of a team in computing practice.*** |
| **General Skill** | **GS1** | Mampu menerapkan pemikiran logis, kritis, sistematis dan inovatif dalam konteks pengembangan atau implementasi ilmu pengetahuan dan teknologi yang memperhatikan dan menerapkan nilai humaniora yang sesuai dengan bidang keahliannya<br>***Having the ability to apply logical, critical, systematic and innovative thinking in the context of developing or implementing science and technology that applies and pays attention to humanities values according to their field of expertise.*** |
| | **GS2** | Mampu mengkaji implikasi pengembangan atau implementasi ilmu pengetahuan teknologi yang memperhatikan dan menerapkan nilai humaniora sesuai dengan keahliannya berdasarkan kaidah, tata cara dan etika ilmiah dalam rangka menghasilkan solusi, gagasan, desain atau kritik seni, menyusun deskripsi saintifik hasil kajiannya dalam bentuk skripsi atau laporan tugas akhir dan mengunggahnya dalam laman perguruan tinggi<br>***Having the ability to study the implications of the development or implementation of technological science that applies and pays attention to humanities values in accordance with their expertise based on scientific principles, procedures and ethics in order to produce solutions, ideas, designs or art criticism.*** |
| | **GS3** | Menyusun deskripsi saintifik hasil kajian tersebut di atas dalam bentuk skripsi atau laporan tugas akhir, dan mengunggahnya dalam laman perguruan tinggi<br>***Compiling a scientific description based on the results of the study in the form of a thesis or final project report, and upload it on the college website.*** |
| | **GS4** | Mampu mengambil keputusan secara tepat dalam konteks penyelesaian masalah di bidang keahliannya, berdasarkan hasil analisis informasi dan data<br>***Having the ability to make appropriate decisions in the context of solving problems in their area of expertise, based on the results of information and data analysis.*** |
| | **GS5** | Mampu mendokumentasikan, menyimpan, mengamankan, dan menemukan kembali data untuk menjamin kesahihan dan mencegah plagiasi<br>***Having the ability to document, store, secure, and retrieve data to ensure validity and prevent plagiarism.*** |
| **Attitude** | **A1** | Mampu menganalisis secara kritis persoalan-persoalan yang berkaitan dengan kebijakan publik, komunitas dan hubungan sosial kemasyarakatan untuk perubahan karakter diri dan transformasi sosial masyarakat yang lebih baik dari waktu ke waktu.<br>***Able to critically analyze issues related to public policy, community and social relations for changes in self-character and better social transformation of society from time to time.*** |
| | **A2** | Mampu menerapkan teknik komunikasi yang tepat dalam berbagai konteks profesional.<br>***Able to apply appropriate communication technique in a variety of professional contexts.*** |

The following **curriculum** is presented for the Jakarta (Anggrek) Campus:

## Stream: Software Enginering, Intelligent System, Interactive Multimedia, Database Technology, Network Technology

### SEMESTER 1

| Group | Course | | SCU |
|---|---|---|---|
| MPK | CHAR6013001 | Character Building: Pancasila | 2 |
| MKK | MATH6025001 | Discrete Mathematics | 4 |
| MKK | MATH6030001 | Linear Algebra | 2 |
| MKK | COMP6047001 | Algorithm and Programming** | 4/2 |
| MKB | COMP6798001 | Program Design Methods* | 2 |
| MKB | LANG6027001 | Indonesian | 2 |
| MKB | STAT6171001 | Basic Statistics | 2 |
| | **Total SCU** | | **20** |
| | **Cumulative SCU** | | **20** |

**) This course is delivered in English*

***) Global Learning System course*

### SEMESTER 2

| Group | Course | | SCU |
|---|---|---|---|
| MPK | CHAR6014001 | Character Building: Kewarganegaraan | 2 |
| MKK | COMP6048001 | Data Structures*&** | 4/2 |
| MKK | MATH6031001 | Calculus | 4 |
| MKB | ENTR6509001 | Entrepreneurship: Ideation | 2 |
| MKB | COMP6800001 | Human and Computer Interaction** | 2/1 |
| MKB | MATH6183001 | Scientific Computing | 2/1 |
| | **Total SCU** | | **20** |
| | **Cumulative SCU** | | **40** |

**) This course is delivered in English*

***) Global Learning System course*

### SEMESTER 3

| Group | Course | | SCU |
|---|---|---|---|
| MPK | CHAR6015001 | Character Building: Agama | 2 |
| MKK | COMP6049001 | Algorithm Design and Analysis* | 4 |
| MKB | CPEN6247001 | Computer Networks | 2/1 |
| MKB | COMP6065001 | Artificial Intelligence** | 4 |

| | | | |
|---|---|---|---|
| MKB | SCIE6063001 | Computational Physics | 2/1 |
| MKB | COMP6799001 | Database Technology** | 2/1 |
| MKB | COMP6820001 | Object Oriented Programming*&** | 2 |
| MKB | **English University Courses II** | | |
| MKB | ENGL6129001 | English Savvy | 2 |
| MKB | ENGL6131001 | English for Written Business Communication | 2 |
| **Total SCU** | | | **23** |
| **Cumulative SCU** | | | **63** |

**) This course is delivered in English*

***) Global Learning System course*

*For English University Courses, students with Binus University English Proficiency Test scores less than 500 will take English Savvy, and students with test scores greater than or equal to 500 will take English for Written Business Communication*

## SEMESTER 4

| Group | Course | | SCU |
|---|---|---|---|
| MKK | COMP6696001 | Research Methodology in Computer Science* | 2 |
| MKB | COMP6100001 | Software Engineering** | 4 |
| MKB | SCIE6062001 | Computational Biology | 2/1 |
| | **Stream: Software Engineering** | | |
| MKB | COMP6106001 | Code Reengineering | 4 |
| MKB | COMP6114001 | Pattern Software Design | 2/2 |
| MKB | COMP6107001 | Agile Software Development*&** | 2 |
| | **Stream: Intelligent System** | | |
| MKB | COMP6576001 | Natural Language Processing*&** | 2 |
| MKB | COMP6577001 | Machine Learning | 4 |
| MKB | COMP6822001 | Speech Recognition | 2/2 |
| | **Stream: Interactive Multimedia** | | |
| MKB | COMP8129001 | User Experience*&** | 2/2 |
| MKB | COMP6823001 | Multimedia Systems** | 2 |
| MKB | COMP7094001 | Multimedia Programming Foundation* | 2/2 |
| | **Stream: Database Technology** | | |
| MKB | COMP6481001 | Database Design | 2/1 |
| MKB | COMP6579001 | Big Data Processing*&** | 2/2 |
| MKB | COMP6710001 | Distributed Cloud Computing | 2/1 |
| | **Stream: Network Technology** | | |
| MKB | COMP6824001 | Computer Security* | 2/2 |
| MKB | COMP6584001 | Network and System Programming*&** | 2/2 |
| MKB | COMP6825001 | Introduction to Cloud Infrastructure | 2 |

| | | |
|---|---|---|
| MKB | **Minor Program** | 12 |
| MKB | **Free Electives** | 12 |
| **Total SCU of Streaming** | | **19** |
| **Group** | **Course** | **SCU** |
| **Total SCU of Minor/Free Elective** | | **21** |
| **Cumulative SCU of Streaming** | | **82** |
| **Cumulative SCU of Minor/Free Elective** | | **84** |

**) This course is delivered in English*

***) Global Learning System course*

*****) Conducted for student mobility program in BINUS @Bandung*

******) Conducted for student mobility program in BINUS @Malang*

*Students are required to choose Streaming or Minor Program or Free Electives*

*For Free Electives, students are required to choose from the list of Free Electives in Appendix.*

## SEMESTER 5

| Group | Course | | SCU |
|---|---|---|---|
| MKB | COMP6062001 | Compilation Techniques | 4 |
| MKB | COMP6697001 | Operating System | 2 |
| MKB | ENTR6511001 | Entrepreneurship: Market Validation | 2 |
| | **Elective Courses**[***] | | |
| MKB | MOBI6059001 | Mobile Programming | 2 |
| MKB | COMP6586001 | Embedded Systems | 2 |
| MKB | COMP6226001 | Competitive Programming[*] | 2 |
| MKB | COMP6821001 | Web Programming | 2 |
| | **Stream: Software Engineering** | | |
| MKB | COMP6122001 | Framework Layer Architecture | 2/2 |
| MKB | COMP6115001 | Object Oriented Analysis & Design[*] | 2/2 |
| | **Stream: Intelligent System** | | |
| MKB | COMP7116001 | Computer Vision[*] | 2/2 |
| MKB | COMP6826001 | Deep Learning | 2/2 |
| | **Stream: Interactive Multimedia** | | |
| MKB | COMP6583001 | Computer Graphics | 2/2 |
| MKB | COMP6589001 | Game Design Programming[*] | 4 |
| | **Stream: Database Technology** | | |
| MKB | COMP6590001 | Geographical Information System[*] | 2/2 |
| | COMP6140001 | Data Mining | 2/2 |
| | **Stream: Network Technology** | | |
| MKB | COMP6827001 | Linux System Administration and Security | 2/2 |

| | | | |
|---|---|---|---|
| MKB | COMP7142001 | Popular Network Technology | 2/2 |
| MKB | **Minor Program** | | 8 |
| MKB | **Free Electives** | | 8 |
| **Total SCU of Streaming** | | | **18** |
| **Total SCU of Minor/Free Elective** | | | **16** |
| **Cumulative SCU of Streaming** | | | **100** |
| **Cumulative SCU of Minor/Free Elective** | | | **100** |

**) This course is delivered in English*

***) Global Learning System course*

****) Students will choose 1 course (2 credits) from the list of elective courses. The elective courses are available only for students who choose streaming program in Binus Greater Jakarta.*

*****) Conducted for student mobility program in BINUS @Bandung*

******) Conducted for student mobility program in BINUS @Malang*

*Students are required to choose Streaming or Minor Program same with previous semester. For Free Electives, students are required to choose from the list of Free Electives in Appendix.*

## SEMESTER 6

| Group | Course | SCU |
|---|---|---|
| MKB | Enrichment Program I | 20 |
| **Total SCU** | | **20** |
| **Cumulative SCU** | | **120** |

*Student will take one of enrichment program tracks (off campus). See enrichment appendix for the tracks detail.*

## SEMESTER 7

| Group | Course | SCU |
|---|---|---|
| MKB | Enrichment Program II | 20 |
| **Total SCU** | | **20** |
| **Cumulative SCU** | | **140** |

*Student will take one of enrichment program tracks (off campus). See enrichment appendix for the tracks detail.*

## SEMESTER 8

| Group | Course | | SCU |
|---|---|---|---|
| MKB | COMP6747001 | Pre-Thesis | 2 |
| MKB | COMP6748001 | Thesis | 4 |
| MKB | COMP6861001 | Thesis | 6 |
| **Total SCU** | | | **6** |
| **Cumulative SCU** | | | **146** |

*Pre-thesis (2 SCU) & Thesis (4 SCU) can be taken in the 6$^{th}$ and/or 7$^{th}$ semester by the students who meet the requirements from the Study Program/Program.*

## Stream: Mobile Application & Technology

### SEMESTER 1

| Group | Course | | SCU |
|---|---|---|---|
| MPK | CHAR6013001 | Character Building: Pancasila | 2 |
| MKK | MATH6025001 | Discrete Mathematics | 4 |
| MKK | MATH6030001 | Linear Algebra | 2 |
| MKK | COMP6047001 | Algorithm and Programming** | 4/2 |
| MKB | COMP6798001 | Program Design Methods* | 2 |
| MKB | MOBI6071001 | Introduction to Mobile Technology & Programming *&** | 2 |
| MKB | LANG6027001 | Indonesian | 2 |
| **Total SCU** | | | **20** |
| **Cumulative SCU** | | | **20** |

**) This course is delivered in English*

***) Global Learning System course*

### SEMESTER 2

| Group | Course | | SCU |
|---|---|---|---|
| MKK | MATH6031001 | Calculus | 4 |
| MKK | COMP6048001 | Data Structures*&** | 4/2 |
| MKB | STAT6171001 | Basic Statistics | 2 |
| MKK | MATH6183001 | Scientific Computing | 2/1 |
| MKB | MOBI6069001 | Wearable Technology*&** | 3 |
| MKB | ENTR6509001 | Entrepreneurship: Ideation | 2 |
| **Total SCU** | | | **20** |
| **Cumulative SCU** | | | **40** |

**) This course is delivered in English*

***) Global Learning System course*

### SEMESTER 3

| Group | Course | | SCU |
|---|---|---|---|
| MPK | CHAR6014001 | Character Building: Kewarganegaraan | 2 |
| MKK | COMP6049001 | Algorithm Design and Analysis* | 4 |
| MKK | SCIE6063001 | Computational Physics | 2/1 |
| MKB | COMP6065001 | Artificial Intelligence** | 4 |

| | | | |
|---|---|---|---|
| MKB | MOBI6026001 | Mobile Cloud Computing* | 2/2 |
| MKB | COMP6799001 | Database Technology** | 2/1 |
| | **English University Courses** | | |
| MKB | ENGL6129001 | English Savvy | 2 |
| MKB | ENGL6131001 | English for Written Business Communication | 2 |
| **Total SCU** | | | **22** |
| **Cumulative SCU** | | | **62** |

**) This course is delivered in English*

***) Global Learning System course*

*For English University Courses, students with Binus University English Proficiency Test scores less than 500 will take English Savvy, and students with test scores greater than or equal to 500 will take English for Written Business Communication.*

## SEMESTER 4

| Group | Course | | SCU |
|---|---|---|---|
| MKB | CPEN6247001 | Computer Networks | 2/1 |
| MKB | MOBI6006001 | Mobile Community Solution*&** | 2/2 |
| MKB | COMP6100001 | Software Engineering** | 4 |
| MKK | SCIE6062001 | Computational Biology | 2/1 |
| MKB | COMP6062001 | Compilation Techniques | 4 |
| MKB | COMP6800001 | Human and Computer Interaction** | 2/1 |
| **Total SCU** | | | **21** |
| **Cumulative SCU** | | | **83** |

**) This course is delivered in English*

***) Global Learning System course*

## SEMESTER 5

| Group | Course | | SCU |
|---|---|---|---|
| MPK | CHAR6015001 | Character Building: Agama | 2 |
| MKB | COMP6696001 | Research Methodology in Computer Science* | 2 |
| MKB | COMP6697001 | Operating System | 2 |
| MKB | ENTR6511001 | Entrepreneurship: Market Validation | 2 |
| MKB | MOBI6009001 | Mobile Multimedia Solution** | 2/2 |
| MKB | MOBI6068001 | Web Design*&** | 2 |
| MKB | MOBI6070001 | Embedded System and Internet of Things*&** | 3 |
| **Total SCU** | | | **17** |
| **Cumulative SCU** | | | **100** |

**) This course is delivered in English*
***) Global Learning System course*

## SEMESTER 6

| Group | Course | SCU |
|---|---|---|
| MKB | Enrichment Program I | 20 |
| **Total SCU** | | **20** |
| **Cumulative SCU** | | **120** |

*Student will take one of enrichment program tracks (off campus). See enrichment appendix for the tracks detail.*

## SEMESTER 7

| Group | Course | SCU |
|---|---|---|
| MKB | Enrichment Program II | 20 |
| **Total SCU** | | **20** |
| **Cumulative SCU** | | **140** |

*Student will take one of enrichment program tracks (off campus). See enrichment appendix for the tracks detail.*

## SEMESTER 8

| Group | Course | | SCU |
|---|---|---|---|
| MKB | COMP6747001 | Pre-Thesis | 2 |
| MKB | COMP6748001 | Thesis | 4 |
| MKB | COMP6861001 | Thesis | 6 |
| **Total SCU** | | | **6** |
| **Cumulative SCU** | | | **146** |

*Pre-thesis (2 SCU) & Thesis (4 SCU) can be taken in the 6$^{th}$ and/or 7$^{th}$ semester by the students who meet the requirements from the Study Program/Program*

## Stream: Game Application & Technology

### SEMESTER 1

| Group | Course | | SCU |
|---|---|---|---|
| MPK | CHAR6013001 | Character Building: Pancasila | 2 |
| MKK | MATH6025001 | Discrete Mathematics | 4 |
| MKK | MATH6030001 | Linear Algebra | 2 |
| MKK | COMP6047001 | Algorithm and Programming** | 4/2 |
| MKK | GAME6002001 | Game Design*&** | 2 |
| MKB | LANG6027001 | Indonesian | 2 |
| MKB | GAME6081001 | 2D Game Art | 2 |
| **Total SCU** | | | **20** |
| **Cumulative SCU** | | | **20** |

**) This course is delivered in English*

***) Global Learning System course*

### SEMESTER 2

| Group | Course | | SCU |
|---|---|---|---|
| MPK | CHAR6014001 | Character Building: Kewarganegaraan | 2 |
| MKK | MATH6031001 | Calculus | 4 |
| MKK | COMP6048001 | Data Structures*&** | 4/2 |
| MKB | ENTR6509001 | Entrepreneurship: Ideation | 2 |
| MKB | COMP6232001 | Human and Computer Interaction** | 2/1 |
| MKB | MATH6183001 | Scientific Computing | 2/1 |
| **Total SCU** | | | **20** |
| **Cumulative SCU** | | | **40** |

**) This course is delivered in English*

***) Global Learning System course*

### SEMESTER 3

| Group | Course | | SCU |
|---|---|---|---|
| MPK | CHAR6015001 | Character Building: Agama | 2 |
| MKK | COMP6049001 | Algorithm Design and Analysis* | 4 |
| MKB | COMP6065001 | Artificial Intelligence** | 4 |
| MKB | STAT6171001 | Basic Statistics | 2 |
| MKB | SCIE6063001 | Computational Physics | 2/1 |
| MKB | GAME6085001 | Object Oriented Game Programming*&** | 2 |
| MKB | COMP6798001 | Program Design Methods* | 2 |

| | | | |
|---|---|---|---|
| MKB | **English University Courses II** | | |
| MKB | ENGL6129001 | English Savvy | 2 |
| MKB | ENGL6131001 | English for Written Business Communication | 2 |
| | **Total SCU** | | **21** |
| | **Cumulative SCU** | | **61** |

**) This course is delivered in English*

***) Global Learning System course*

*For English University Courses, students with Binus University English Proficiency Test scores less than 500 will take English Savvy, and students with test scores greater than or equal to 500 will take English for Written Business Communication.*

## SEMESTER 4

| Group | Course | | SCU |
|---|---|---|---|
| MKB | CPEN6247001 | Computer Networks | 2/1 |
| MKB | SCIE6062001 | Computational Biology | 2/1 |
| MKB | GAME6069001 | Game Programming*&** | 4 |
| MKB | COMP6100001 | Software Engineering** | 4 |
| MKB | GAME6082001 | Game Animation*&** | 2 |
| MKB | COMP6799001 | Database Technology** | 2/1 |
| MKB | COMP6697001 | Operating System | 2 |
| | **Total SCU** | | **21** |
| | **Cumulative SCU** | | **82** |

**) This course is delivered in English*

***) Global Learning System course*

## SEMESTER 5

| Group | Course | | SCU |
|---|---|---|---|
| MKK | COMP6696001 | Research Methodology in Computer Science* | 2 |
| MKB | COMP6062001 | Compilation Techniques | 4 |
| MKB | ENTR6511001 | Entrepreneurship: Market Validation | 2 |
| MKB | GAME6091001 | Advanced Game Development | 2 |
| MKB | GAME6084001 | Game Development Capstone Project*&** | 4 |
| MKB | GAME6071001 | 3D Modeling for Games*&** | 2 |
| MKB | GAME6092001 | Fundamental in Game Balancing | 2 |
| **Total SCU** | | | **18** |
| **Cumulative SCU** | | | **100** |

**) This course is delivered in English*

***) Global Learning System course*

## SEMESTER 6

| Group | Course | SCU |
|---|---|---|
| MKB | Enrichment Program I | 20 |
| **Total SCU** | | **20** |
| **Cumulative SCU** | | **120** |

*Student will take one of enrichment program tracks (off campus). See enrichment appendix for the tracks detail.*

## SEMESTER 7

| Group | Course | SCU |
|---|---|---|
| MKB | Enrichment Program II | 20 |
| **Total SCU** | | **20** |
| **Cumulative SCU** | | **140** |

*Student will take one of enrichment program tracks (off campus). See enrichment appendix for the tracks detail.*

## SEMESTER 8

| Group | Course | | SCU |
|---|---|---|---|
| MKB | COMP6747001 | Pre-Thesis | 2 |
| MKB | COMP6748001 | Thesis | 4 |
| MKB | COMP6861001 | Thesis | 6 |
| | **Total SCU** | | **6** |
| | **Cumulative SCU** | | **146** |

*Pre-thesis (2 SCU) & Thesis (4 SCU) can be taken in the 6th and/or 7th semester by the students who meet the requirements from the Study Program/Program.*

## Stream: Cyber Security

### SEMESTER 1

| Group | Course | | SCU |
|---|---|---|---|
| MPK | CHAR6013001 | Character Building: Pancasila | 2 |
| MKK | MATH6025001 | Discrete Mathematics | 4 |
| MKK | MATH6030001 | Linear Algebra | 2 |
| MKK | COMP6047001 | Algorithm and Programming** | 4/2 |
| MKK | COMP6542001 | Computer Security Fundamental** | 2 |
| MKB | LANG6027001 | Indonesian | 2 |
| MKB | STAT6171001 | Basic Statistics | 2 |
| **Total SCU** | | | **20** |
| **Cumulative SCU** | | | **20** |

***) Global Learning System course*

### SEMESTER 2

| Group | Course | | SCU |
|---|---|---|---|
| MPK | CHAR6014001 | Character Building: Kewarganegaraan | 2 |
| MKK | MATH6031001 | Calculus | 4 |
| MKK | COMP6048001 | Data Structures*&** | 4/2 |
| MKB | ENTR6509001 | Entrepreneurship: Ideation | 2 |
| MKK | MATH6183001 | Scientific Computing | 2/1 |
| MKB | CPEN6247001 | Computer Networks | 2/1 |
| **Total SCU** | | | **20** |
| **Cumulative SCU** | | | **40** |

**) This course is delivered in English*

***) Global Learning System course*

### SEMESTER 3

| Group | Course | | SCU |
|---|---|---|---|
| MPK | CHAR6015001 | Character Building: Agama | 2 |
| MKB | COMP6065001 | Artificial Intelligence** | 4 |
| MKB | COMP6798001 | Program Design Methods* | 2 |
| MKB | COMP6544001 | Network Penetration Testing** | 2/2 |
| MKK | SCIE6063001 | Computational Physics | 2/1 |

| | | | |
|---|---|---|---|
| MKK | COMP6049001 | Algorithm Design and Analysis* | 4 |
| | **English University Courses** | | |
| MKB | ENGL6129001 | English Savvy | 2 |
| MKB | ENGL6131001 | English for Written Business Communication | 2 |
| **Total SCU** | | | **21** |
| **Cumulative SCU** | | | **61** |

**) This course is delivered in English*

*For English University Courses, students with Binus University English Proficiency Test scores less than 500 will take English Savvy, and students with test scores greater than or equal to 500 will take English for Written Business Communication.*

## SEMESTER 4

| Group | Course | | SCU |
|---|---|---|---|
| MKB | COMP6842001 | Server and Network Administration*&** | 2 |
| MKB | COMP6799001 | Database Technology** | 2/1 |
| MKB | COMP6100001 | Software Engineering** | 4 |
| MKB | COMP6549001 | Software Security*&** | 2 |
| MKK | SCIE6062001 | Computational Biology | 2/1 |
| MKB | COMP6062001 | Compilation Techniques | 4 |
| MKB | COMP6844001 | Mobile Penetration Testing** | 2/2 |
| **Total SCU** | | | **22** |
| **Cumulative SCU** | | | **83** |

**) This course is delivered in English*

***) Global Learning System course*

## SEMESTER 5

| Group | Course | | SCU |
|---|---|---|---|
| MKB | ENTR6511001 | Entrepreneurship: Market Validation | 2 |
| MKB | COMP6697001 | Operating System | 2 |
| MKB | COMP6800001 | Human and Computer Interaction** | 2/1 |
| MKK | COMP6696001 | Research Methodology in Computer Science* | 2 |
| MKB | LAWS6110001 | Cyber Law | 2 |
| MKB | COMP6695001 | Secure Programming*&** | 2 |
| MKB | COMP6843001 | Reverse Engineering and Binary Exploitation | 2 |
| MKB | COMP6646001 | Computer Forensic*&** | 2 |
| **Total SCU** | | | **17** |

| | |
|---|---|
| **Cumulative SCU** | **100** |

**) This course is delivered in English*

***) Global Learning System course*

## SEMESTER 6

| Group | Course | SCU |
|---|---|---|
| MKB | Enrichment Program I | 20 |
| **Total SCU** | | **20** |
| **Cumulative SCU** | | **120** |

*Student will take one of enrichment program tracks (off campus). See enrichment appendix for the tracks detail.*

## SEMESTER 7

| Group | Course | SCU |
|---|---|---|
| MKB | Enrichment Program II | 20 |
| **Total SCU** | | **20** |
| **Cumulative SCU** | | **140** |

*Student will take one of enrichment program tracks (off campus). See enrichment appendix for the tracks detail.*

## SEMESTER 8

| Group | Course | | SCU |
|---|---|---|---|
| MKB | COMP6747001 | Pre-Thesis | 2 |
| MKB | COMP6748001 | Thesis | 4 |
| MKB | COMP6861001 | Thesis | 6 |
| **Total SCU** | | | **6** |
| **Cumulative SCU** | | | **146** |

*Pre-thesis (2 SCU) & Thesis (4 SCU) can be taken in the 6th and/or 7th semester by the students who meet the requirements from the Study Program/Program*

## Stream: Data Science

### SEMESTER 1

| Group | Course | | SCU |
|---|---|---|---|
| MPK | CHAR6013001 | Character Building: Pancasila | 2 |
| MKK | MATH6025001 | Discrete Mathematics | 4 |
| MKK | MATH6031001 | Calculus | 4 |
| MKK | COMP6047001 | Algorithm and Programming** | 4/2 |
| MKK | DTSC6001001 | Introduction to Data Science ** | 2 |
| MKB | COMP6798001 | Program Design Methods* | 2 |
| **Total SCU** | | | **20** |
| **Cumulative SCU** | | | **20** |

**) This course is delivered in English*

***) Global Learning Systems*

### SEMESTER 2

| Group | Course | | SCU |
|---|---|---|---|
| MPK | CHAR6014001 | Character Building: Kewarganegaraan | 2 |
| MKK | MATH6030001 | Linear Algebra | 2 |
| MKK | COMP6048001 | Data Structures*&** | 4/2 |
| MKK | STAT6171001 | Basic Statistics | 2 |
| MKB | ENTR6509001 | Entrepreneurship: Ideation | 2 |
| MKB | DTSC6005001 | Data Mining and Visualization*&** | 2/1 |
| MKK | MATH6183001 | Scientific Computing | 2/1 |
| **Total SCU** | | | **20** |
| **Cumulative SCU** | | | **40** |

**) This course is delivered in English*

***) Global Learning Systems*

### SEMESTER 3

| Group | Course | | SCU |
|---|---|---|---|
| MPK | CHAR6015001 | Character Building: Agama | 2 |
| MKB | LANG6027001 | Indonesian | 2 |
| MKB | COMP6065001 | Artificial Intelligence** | 4 |
| MKB | DTSC6006001 | Machine Learning*&** | 2/1 |
| MKK | SCIE6063001 | Computational Physics | 2/1 |

| | | | |
|---|---|---|---|
| MKB | DTSC6002001 | Data Management and Organization* | 2 |
| MKB | COMP6799001 | Database Technology** | 2/1 |
| | **English University Courses** | | |

| Group | Course | | SCU |
|---|---|---|---|
| MKB | ENGL6129001 | English Savvy | 2 |
| MKB | ENGL6131001 | English for Written Business Communication | 2 |
| **Total SCU** | | | **21** |
| **Cumulative SCU** | | | **61** |

**) This course is delivered in English*

***) Global Learning Systems course*

*For English University Courses, students with Binus University English Proficiency Test scores less than 500 will take English Savvy, and students with test scores greater than or equal to 500 will take English for Written Business Communication*

## SEMESTER 4

| Group | Course | | SCU |
|---|---|---|---|
| MKK | COMP6049001 | Algorithm Design and Analysis* | 4 |
| MKB | DTSC6009001 | Survey and Sampling Methods | 4 |
| MKB | COMP6800001 | Human and Computer Interaction** | 2/1 |
| MKB | CPEN6247001 | Computer Networks | 2/1 |
| MKK | SCIE6062001 | Computational Biology | 2/1 |
| MKB | DTSC6007001 | Deep Learning | 2 |
| MKB | DTSC6003001 | Big Data Infrastructure and Technology* | 2 |
| **Total SCU** | | | **21** |
| **Cumulative SCU** | | | **82** |

**) This course is delivered in English*

***) Global Learning Systems course*

## SEMESTER 5

| Group | Course | | SCU |
|---|---|---|---|
| MKB | ENTR6511001 | Entrepreneurship: Market Validation | 2 |
| MKB | COMP6697001 | Operating System | 2 |
| MKB | COMP6062001 | Compilation Techniques | 4 |
| MKK | COMP6696001 | Research Methodology in Computer Science* | 2 |
| MKB | DTSC6008001 | Text Mining | 2 |
| MKB | DTSC6004001 | Data Security | 2 |

| | | | |
|---|---|---|---|
| MKB | COMP6100001 | Software Engineering ** | 4 |
| **Total SCU** | | | **18** |
| **Cumulative SCU** | | | **100** |

**) This course is delivered in English*

***) Global Learning Systems course*

## SEMESTER 6

| Group | Course | SCU |
|---|---|---|
| MKB | Enrichment Program I | 20 |
| **Total SCU** | | **20** |
| **Cumulative SCU** | | **120** |

*Student will take one of enrichment program tracks (off campus). See enrichment appendix for the tracks detail*

## SEMESTER 7

| Group | Course | SCU |
|---|---|---|
| MKB | Enrichment Program II | 20 |
| **Total SCU** | | **20** |
| **Cumulative SCU** | | **140** |

*Student will take one of enrichment program tracks (off campus). See enrichment appendix for the tracks detail.*

## SEMESTER 8

| Group | Course | | SCU |
|---|---|---|---|
| MKB | COMP6747001 | Pre-Thesis | 2 |
| MKB | COMP6748001 | Thesis | 4 |
| MKB | COMP6861001 | Thesis | 6 |
| **Total SCU** | | | **6** |
| **Cumulative SCU** | | | **146** |

*Pre-thesis (2 SCU) & Thesis (4 SCU) can be taken in the 6$^{th}$ and/or 7$^{th}$ semester by the students who meet the requirements from the Study Program/Program*

***Notes : (Information for group table)***

MKK = Mata kuliah Keilmuan & Ketrampilan *(Science and Skill Course)*

MKB = Mata kuliah Keahlian Berkarya *(Creative Expertise Course)*

MPK = Mata kuliah Pengembangan Kepribadian *(Personality Development Course)*

MPB = Mata kuliah Perilaku Berkarya *(Creative Behavior Course)*

MBB = Mata kuliah Berkehidupan Bermasyarakat *(Social Living Course)*

## Ba Computer Science (Bandung)

The following **curriculum** is presented for the Jakarta (Bandung) Campus:

**SEMESTER 1**

| Group | Course | | SCU |
|---|---|---|---|
| MPK | CHAR6034031 | Character Building: Pancasila | 2 |
| MKK | MATH6128031 | Discrete Mathematics | 4 |
| | MATH6129031 | Linear Algebra | 2 |
| | STAT6190031 | Basic Statistics | 2 |
| | COMP6421031 | Algorithm and Programming ** | 4/2 |
| MKB | COMP6839031 | Program Design Methods * | 2 |
| | LANG6097031 | Indonesian | 2 |
| **Total SCU** | | | **20** |
| **Cumulative SCU** | | | **20** |

**) This course is delivered in English*

***) Global Learning System course*

**SEMESTER 2**

| Group | Course | | SCU |
|---|---|---|---|
| MPK | CHAR6035031 | Character Building: Kewarganegaraan | 2 |
| MKK | COMP6458031 | Data Structures * | 4/2 |
| | MATH6135031 | Calculus | 4 |
| | MATH6192031 | Scientific Computing ** | 2/1 |
| MKB | COMP6846031 | Human and Computer Interaction ** | 2/1 |
| | ENTR6522032 | Entrepreneurship: Ideation | 2 |
| **Total SCU** | | | **20** |
| **Cumulative SCU** | | | **40** |

**) This course is delivered in English*

***) Global Learning System course*

**SEMESTER 3**

| Group | Course | | SCU |
|---|---|---|---|
| MPK | CHAR6036031 | Character Building: Agama | 2 |
| MKK | COMP6472031 | Algorithm Design and Analysis * | 4 |
| | CPEN6249031 | Computer Networks ** | 2/1 |
| | SCIE6065031 | Computational Physics | 2/1 |
| | COMP6847031 | Database Technology | 2/1 |
| MKB | COMP6468031 | Artificial Intelligence | 4 |
| | COMP6848031 | Object Oriented Programming * | 2 |

| | | | |
|---|---|---|---|
| | **ENGLISH COURSES** | | |
| | ENGL6216031 | English Savvy | 2 |
| | ENGL6217031 | English for Written Business Communication | 2 |
| **Total SCU** | | | **23** |
| **Cumulative SCU** | | | **63** |

*student with score English Proficiency Test less than 500 will take English Savvy, and student with score test greater than or equal to 500 will take English for Written Business Communication reality*

**) This course is delivered in English*

***) Global Learning System course*

## SEMESTER 4

| Group | Course | | SCU |
|---|---|---|---|
| MKK | COMP6715031 | Research Methodology in Computer Science* | 2 |
| | SCIE6066031 | Computational Biology | 2/1 |
| MKB | COMP6466031 | Software Engineering** | 4 |
| | | | |
| | **STREAMING: INTERNET OF THINGS*** | | |
| | COMP6849031 | Embedded System | 2/2 |
| | COMP6850031 | Multimedia & Mixed Reality | 2/1 |
| | MOBI6072031 | Mobile Programming | 2/1 |
| | | | |
| | **STREAMING: DIGITAL CREATIVE TECHNOLOGY**** | | |
| | COMP6679004 | Web Programming** | 4 |
| | COMP6677004 | Multimedia Systems | 2/2 |
| | COMP6856004 | Popular Programming Technology* | 2 |
| | | | |
| | **STREAMING: INTELLIGENT SYSTEM***** | | |
| | COMP6576001 | Natural Language Processing*&** | 2 |
| | COMP6577001 | Machine Learning | 4 |
| | COMP6822001 | Speech Recognition | 2/2 |
| | | | |
| | **STREAMING: DATABASE TECHNOLOGY***** | | |
| | COMP6481001 | Database Design | 2/1 |
| | COMP6579001 | Big Data Processing*&** | 2/2 |
| | COMP6710001 | Distributed Cloud Computing | 2/1 |
| | | | |
| | **STREAMING: INTERACTIVE MULTIMEDIA***** | | |
| | COMP8129001 | User Experience*&** | 2/2 |
| | COMP6823001 | Multimedia System** | 2 |
| | COMP7094001 | Multimedia Programming Foundation* | 2/2 |
| | | | |
| | **STREAMING: NETWORK TECHNOLOGY***** | | |

| | | | |
|---|---|---|---|
| | COMP6824001 | Computer Security* | 2/2 |
| | COMP6584001 | Network and System Programming*&** | 2/2 |
| | COMP6825001 | Introduction to Cloud Infrastructure | 2 |
| | | | |
| | **STREAMING: GAME TECHNOLOGY******* | | |
| | COMP7094001 | Multimedia Programming Foundation* | 2/2 |
| | GAME6069001 | Game Programming *&** | 4 |
| | GAME6082001 | Game Animation*&** | 2 |
| | | | |
| | **STREAMING: MOBILE TECHNOLOGY******* | | |
| | MOBI6006001 | Mobile Community Solution*&** | 2/2 |
| | MOBI6069001 | Wearable Technology*&** | 3 |
| | COMP7094001 | Multimedia Programming Foundation* | 2/2 |
| | | | |
| | **STREAMING: DATA SCIENCE ****** | | |
| | DTSC6005001 | Data Mining and Visualization*&** | 2/1 |
| | DTSC6007001 | Deep Learning | 2 |
| | DTSC6003001 | Big Data Infrastructure and Technology* | 2 |
| | DTSC6009001 | Survey and Sampling Methods | 4 |
| | | | |
| | **STREAMING: CYBER SECURITY******* | | |
| | COMP6842001 | Server and Network Administration*&** | 2 |
| | COMP6549001 | Software Security*&** | 2 |
| | DTSC6003001 | Big Data Infrastructure and Technology* | 2 |
| | COMP6844001 | Mobile Penetration Testing** | 2/2 |
| | | | |
| | **STREAMING: SOFTWARE ENGINEERING******* | | |
| | COMP6106001 | Code Reengineering | 4 |
| | COMP6114001 | Pattern Software Design | 2/2 |
| | COMP6107001 | Agile Software Development | 2 |
| | | | |
| | **MINOR PROGRAM***,****&***** | | 12 |
| | **FREE ELECTIVES***** | | 12 |
| **Total SCU of Streaming: Digital Creative Technology, Intelligent System, Database Technology, Network Technology, Game Technology, Cyber Security, Software Engineering** | | | **19** |
| **Total SCU of Streaming : Mobile Technology, Data Science** | | | **20** |
| **Total SCU of Minor Program, Free Electives** | | | **21** |
| **Cumulative SCU of Streaming: Digital Creative Technology, Intelligent System, Database Technology, Network Technology, Game Technology, Cyber Security, Software Engineering, Minor Program, Free Electives** | | | **82** |
| **Cumulative SCU of Streaming : Mobile Technology, Data Science** | | | **83** |

| | | |
|---|---|---|
| **Total SCU of Minor Program, Free Electives** | | **84** |

*Students are required to choose Streaming or Minor Program or Free Electives*

*For Free Electives, students are required to choose from the list of Free Electives in Appendix.*

**) This course is delivered in English*

***) Global Learning System course*

****) Will be conducted in BINUS Bandung*

*****) Will be conducted in BINUS Malang*

******) Will be conducted in BINUS Jakarta*

## SEMESTER 5

| Group | Course | | SCU |
|---|---|---|---|
| MKK | COMP6470031 | Compilation Techniques | 4 |
| | COMP6716031 | Operating System | 2 |
| | ENTR6524032 | Entrepreneurship: Market Validation | 2 |
| | | | |
| | **STREAMING: INTERNET OF THINGS***** | | |
| | COMP6757031 | Computer vision in IoT | 2/2 |
| | COMP6882031 | IoT Development and Architecture | 2/2 |
| | COMP6655031 | Cyber Security in IoT | 2 |
| | | | |
| | **STREAMING: DIGITAL CREATIVE TECHNOLOGY****** | | |
| | COMP6678004 | Big Data Analytics for Business | 4 |
| | MOBI6063004 | Mobile Application Programming ** | 4 |
| | COMP6680004 | Data Visualization * | 2 |
| | | | |
| | **STREAMING: INTELLIGENT SYSTEM******* | | |
| | COMP7116001 | Computer Vision* | 2/2 |
| | COMP6826001 | Deep Learning | 2/2 |
| | Elective Course | | 2 |
| **Group** | **Course** | | **SCU** |
| MKB | | | |
| | **STREAMING: DATABASE TECHNOLOGY******* | | |
| | COMP6590001 | Geographical Information System* | 2/2 |
| | COMP6140001 | Data Mining | 2/2 |
| | Elective Course | | 2 |
| | | | |
| | **STREAMING: INTERACTIVE MULTIMEDIA******* | | |
| | COMP6583001 | Computer Graphics | 2/2 |
| | COMP6589001 | Game Design Programming* | 4 |
| | Elective Course | | 2 |
| | | | |
| | **STREAMING: NETWORK TECHNOLOGY******* | | |
| | COMP6827001 | Linux System Administration and Security | 2/2 |

| | | | |
|---|---|---|---|
| | COMP7142001 | Popular Network Technology | 2/2 |
| | | Elective Course | 2 |
| | | | |
| | **STREAMING: GAME TECHNOLOGY******* | | |
| | GAME6092001 | Fundamental in Game Balancing | 2 |
| | GAME6081001 | 2D Game Art | 2 |
| | GAME6084001 | Game Development Capstone Project *&** | 4 |
| | GAME6071001 | 3D Modeling for Games*&** | 2 |
| | | | |
| | **STREAMING: MOBILE TECHNOLOGY******* | | |
| | MOBI6070001 | Embedded System and Internet of Things *&** | 3 |
| | MOBI6009001 | Mobile Multimedia Solution ** | 2/2 |
| | MOBI6068001 | Web Design *&** | 2 |
| | | | |
| | **STREAMING: DATA SCIENCE******* | | |
| | DTSC6006001 | Machine Learning *&** | 2/1 |
| | DTSC6002001 | Data Management and Organization * | 2 |
| | DTSC6008001 | Text Mining | 2 |
| | DTSC6004001 | Data Security ** | 2 |
| | | | |
| | **STREAMING: CYBER SECURITY******* | | |
| | COMP6646001 | Computer Forensic*&** | 2 |
| | COMP6544001 | Network Penetration Testing ** | 2/2 |
| | COMP6695001 | Secure Programming *&** | 2 |
| | LAWS6110001 | Cyber Law | 2 |
| | | | |
| | **STREAMING: SOFTWARE ENGINEERING***** | | |
| | COMP6122001 | Framework Layer Architecture | 2/2 |
| | COMP6115001 | Object Oriented Analysis & Design | 2/2 |
| | | Elective Course | 2 |
| | | | |
| | **Elective Courses for Database Technology, Interactive Multimedia, Network Technology, Software Engineering** | | |
| | MOBI6059001 | Mobile Programming | 2 |
| | COMP6586001 | Embedded Systems | 2 |
| | COMP6226001 | Competitive Programming* | 2 |
| | COMP6681001 | Web Programming | 2 |
| | | | |
| | **MINOR PROGRAM ***,****&***** | | 8 |
| **Group** | **Course** | | **SCU** |
| | **FREE ELECTIVES ***** | | 8 |
| **Total SCU of Streaming:** | | | **18** |

| | |
|---|---|
| **Digital Creative Technology, Intelligent System, Database Technology, Network Technology, Game Technology, Cyber Security, Software Engineering** | |
| **Total SCU of Streaming : Mobile Technology, Data Science** | **17** |
| **Total SCU of Minor Program, Free Electives** | **16** |
| **Cumulative SCU** | **100** |

**) This course is delivered in English*

***) Global Learning System course*

****) Will be conducted in BINUS Bandung*

*****) Will be conducted in BINUS Malang*

******) Will be conducted in BINUS Jakarta*

## SEMESTER 6

| Group | Course | SCU |
|---|---|---|
| MKB | Enrichment Program I | 20 |
| **Total SCU** | | **20** |
| **Cumulative SCU** | | **120** |

*Student will take one of enrichment program tracks (off campus). See enrichment appendix for the tracks detail.*

## SEMESTER 7

| Group | Course | SCU |
|---|---|---|
| MKB | Enrichment Program II | 20 |
| **Total SCU** | | **20** |
| **Cumulative SCU** | | **140** |

*Student will take one of enrichment program tracks (off campus). See enrichment appendix for the tracks detail.*

## SEMESTER 8

| Group | Course | | SCU |
|---|---|---|---|
| MKB | COMP6760031 | Pre-Thesis | 2 |
| MKB | COMP6761031 | Thesis | 4 |
| MKB | COMP6501031 | Thesis | 6 |
| **Total SCU** | | | **6** |
| **Cumulative SCU** | | | **146** |

*Pre-Thesis (2 SCU) and Thesis (4SCU) can be taken in the 6$^{th}$ and/or 7$^{th}$ semester by students who meet requirements from the study program/program*

***Notes : (Information for group table)***

MKK = Mata kuliah Keilmuan & Ketrampilan *(Science and Skill Course)*

MKB = Mata kuliah Keahlian Berkarya *(Creative Expertise Course)*

MPK = Mata kuliah Pengembangan Kepribadian *(Personality Development Course)*

MPB = Mata kuliah Perilaku Berkarya *(Creative Behavior Course)*

MBB = Mata kuliah Berkehidupan Bermasyarakat *(Social Living Course)*

## Ba Computer Science (Malang)

The following **curriculum** is presented for the Jakarta (Malang) Campus:

### SEMESTER 1

| Group | Course | | SCU |
|---|---|---|---|
| MPK | CHAR6030002 | Character Building: Pancasila | 2 |
| MKK | MATH6118004 | Discrete Mathematics | 4 |
| | MATH6119004 | Linear Algebra | 2 |
| | COMP6764004 | Basic Statistics | 2 |
| | COMP6360004 | Algorithm and Programming ** | 4/2 |
| MKB | COMP6840004 | Program Design Methods* | 2 |
| | LANG6089004 | Indonesian Language | 2 |
| **Total SCU** | | | **20** |
| **Cumulative SCU** | | | **20** |

**) This course is delivered in English*

***) Global Learning System course*

### SEMESTER 2

| Group | Course | | SCU |
|---|---|---|---|
| MPK | CHAR6030004 | Character Building: Kewarganegaraan | 2 |
| MKK | COMP6362004 | Data Structures*&** | 4/2 |
| | MATH6120004 | Calculus | 4 |
| | MATH6193004 | Scientific Computing | 2/1 |
| MKB | COMP6851004 | Human and Computer Interaction** | 2/1 |
| | ENTR6519002 | Entrepreneurship: Ideation | 2 |
| **Total SCU** | | | **20** |
| **Cumulative SCU** | | | **40** |

**) This course is delivered in English*

***) Global Learning System course*

### SEMESTER 3

| Group | Course | | SCU |
|---|---|---|---|
| MPK | CHAR6032004 | Character Building: Agama | 2 |
| MKK | COMP6365004 | Algorithm Design and Analysis* | 4 |
| | CPEN6250004 | Computer Networks | 2/1 |
| | SCIE6067004 | Computational Physics | 2/1 |
| | COMP6852004 | Database Technology** | 2/1 |
| MKB | COMP6853004 | Artificial Intelligence** | 4 |

| | | | |
|---|---|---|---|
| | COMP6854004 | Object Oriented Programming*&** | 2 |
| | **ENGLISH COURSES** | | |
| | ENGL6201004 | English Savvy | 2 |
| | ENGL6200004 | English for Written Business Communication | 2 |
| **Total SCU** | | | **23** |
| **Cumulative SCU** | | | **63** |

**) This course is delivered in English*

***) Global Learning System course*

## SEMESTER 4

| Group | Course | | SCU |
|---|---|---|---|
| MKK | COMP6712004 | Research Methodology in Computer Science* | 2 |
| MKB | SCIE6068004 | Computational Biology | 2/1 |
| | COMP6855004 | Software Engineering** | 4 |
| MKB | **STREAMING: DIGITAL CREATIVE TECHNOLOGY** | | |
| | COMP6679004 | Web Programming** | 4 |
| | COMP6677004 | Multimedia Systems | 2/2 |
| | COMP6856004 | Popular Programming Technology | 2 |
| | | | |
| | **STREAMING: INTERNET OF THINGS*** ** | | |
| | COMP6849031 | Embedded System | 2/2 |
| | COMP6850031 | Multimedia & Mixed Reality | 2/1 |
| | MOBI6072031 | Mobile Programming | 2/1 |
| | | | |
| | **STREAMING: INTELLIGENT SYSTEM**** ** | | |
| | COMP6576001 | Natural Language Processing*&** | 2 |
| | COMP6577001 | Machine Learning | 4 |
| | COMP6822001 | Speech Recognition | 2/2 |
| | | | |
| | **STREAMING: DATABASE TECHNOLOGY**** ** | | |
| | COMP6481001 | Database Design | 2/1 |
| | COMP6579001 | Big Data Processing*&** | 2/2 |
| | COMP6710001 | Distributed Cloud Computing | 2/1 |
| | | | |
| | **STREAMING: INTERACTIVE MULTIMEDIA**** ** | | |
| | COMP8129001 | User Experience*&** | 2/2 |
| | COMP6823001 | Multimedia System** | 2 |
| | COMP7094001 | Multimedia Programming Foundation* | 2/2 |

| | | | |
|---|---|---|---|
| | | | |
| | **STREAMING: NETWORK TECHNOLOGY****** | | |
| | COMP6824001 | Computer Security* | 2/2 |
| | COMP6584001 | Network and System Programming*&** | 2/2 |
| | COMP6825001 | Introduction to Cloud Infrastructure | 2 |
| | | | |
| | **STREAMING: SOFTWARE ENGINEERING****** | | |
| | COMP6106001 | Code Reengineering | 4 |
| | COMP6114001 | Pattern Software Design | 2/2 |
| | COMP6107001 | Agile Software Development | 2 |
| | | | |
| | **STREAMING: GAME TECHNOLOGY****** | | |
| | COMP7094001 | Multimedia Programming Foundation* | 2/2 |
| | GAME6069001 | Game Programming *&** | 4 |
| | GAME6082001 | Game Animation*&** | 2 |
| | | | |
| | **STREAMING: MOBILE TECHNOLOGY****** | | |
| | MOBI6006001 | Mobile Community Solution*&** | 2/2 |
| | MOBI6069001 | Wearable Technology*&** | 3 |
| | COMP7094001 | Multimedia Programming Foundation* | 2/2 |
| | | | |
| | **STREAMING: DATA SCIENCE ****** | | |
| | DTSC6005001 | Data Mining and Visualization*&** | 2/1 |
| | DTSC6007001 | Deep Learning | 2 |
| | DTSC6003001 | Big Data Infrastructure and Technology* | 2 |
| | DTSC6009001 | Survey and Sampling Methods | 4 |
| | | | |
| | **STREAMING: NETWORK SECURITY****** | | |
| | COMP6842001 | Server and Network Administration*&** | 2 |
| | COMP6549001 | Software Security*&** | 2 |
| | COMP6844001 | Mobile Penetration Testing** | 2/2 |
| | DTSC6003001 | Big Data Infrastructure and Technology * | 2 |
| | | | |
| | **MINOR PROGRAM** | | 12 |
| | **FREE ELECTIVES****** | | 10 |
| **Total SCU of Streaming : Digital Creative Technology, Intelligent System, Database Technology, Network Technology, Game Technology, Network Security, Software Engineering, Free Electives** | | | **19** |

| | |
|---|---|
| **Total SCU of Streaming : Mobile Technology, Data Science** | **20** |
| **Total SCU of Minor Program** | **21** |
| **Cumulative SCU of Streaming : Digital Creative Technology, Intelligent System, Database Technology, Network Technology, Game Technology, Network Security, Software Engineering, Free Electives** | **82** |
| **Cumulative SCU of Streaming : Mobile Technology, Data Science** | **83** |
| **Cumulative SCU of Minor Program** | **84** |

- *Students are required to choose Streaming or Minor Program or Free Electives*
- *For Free Electives, students are required to choose from the list of Free Electives in Appendix.*

**) This course is delivered in English*

***) Global Learning System course*

****) Conducted for student mobility in Bandung*

*****) Conducted for student mobility in Jakarta*

## SEMESTER 5

| Group | Course | | SCU |
|---|---|---|---|
| MKK | COMP6390004 | Compilation Techniques | 4 |
| | COMP6713004 | Operating System | 2 |
| | ENTR6521002 | Entrepreneurship: Market Validation | 2 |
| | | | |
| | **STREAMING: DIGITAL CREATIVE TECHNOLOGY** | | |
| | COMP6678004 | Big Data Analytics for Business | 4 |
| | MOBI6063004 | Mobile Application Programming ** | 4 |
| | COMP6680004 | Data Visualization* | 2 |
| | | | |
| | **STREAMING: INTERNET OF THINGS*** ** | | |
| | COMP6757031 | Computer vision in IoT | 2/2 |
| | COMP6882031 | IoT Development and Architecture | 2/2 |
| | COMP6655031 | Cyber Security in IoT | 2 |
| | | | |
| | **STREAMING: INTELLIGENT SYSTEM**** ** | | |
| | COMP7116001 | Computer Vision* | 2/2 |
| | COMP6826001 | Deep Learning | 2/2 |
| | Elective Course | | 2 |
| | | | |
| MKB | **STREAMING: DATABASE TECHNOLOGY**** ** | | |
| | COMP6590001 | Geographical Information System* | 2/2 |
| | COMP6140001 | Data Mining | 2/2 |
| | Elective Course | | 2 |
| | | | |
| | **STREAMING: INTERACTIVE MULTIMEDIA**** ** | | |
| | COMP6583001 | Computer Graphics | 2/2 |

| | | |
|---|---|---|
| COMP6589001 | Game Design Programming* | 4 |
| | Elective Course | 2 |
| | | |
| | **STREAMING: NETWORK TECHNOLOGY**** | |
| COMP6827001 | Linux System Administration and Security | 2/2 |
| COMP7142001 | Popular Network Technology | 2/2 |
| | Elective Course | 2 |
| | | |
| | **STREAMING: SOFTWARE ENGINEERING**** | |
| COMP6122001 | Framework Layer Architecture | 2/2 |
| COMP6115001 | Object Oriented Analysis & Design | 2/2 |
| | Elective Course | 2 |
| | | |
| | **STREAMING: GAME TECHNOLOGY**** | |
| GAME6092001 | Fundamental in Game Balancing | 2 |
| GAME6081001 | 2D Game Art | 2 |
| GAME6084001 | Game Development Capstone Project *&** | 4 |
| GAME6071001 | 3D Modeling for Games*&** | 2 |
| | | |
| | **STREAMING: MOBILE TECHNOLOGY**** | |
| MOBI6070001 | Embedded System and Internet of Things *&** | 3 |
| MOBI6009001 | Mobile Multimedia Solution ** | 2/2 |
| MOBI6068001 | Web Design *&** | 2 |
| | | |
| | **STREAMING: DATA SCIENCE**** | |
| DTSC6006001 | Machine Learning *&** | 2/1 |
| DTSC6002001 | Data Management and Organization * | 2 |
| DTSC6008001 | Text Mining | 2 |
| DTSC6004001 | Data Security ** | 2 |
| | | |
| | **STREAMING: NETWORK SECURITY**** | |
| COMP6646001 | Computer Forensic*&** | 2 |
| COMP6544001 | Network Penetration Testing ** | 2/2 |
| COMP6695001 | Secure Programming *&** | 2 |
| LAWS6110001 | Cyber Law | 2 |

| Group | Course | SCU |
|---|---|---|
| | | |
| | **Elective Courses for Intelligent System, Database Technology, Interactive Multimedia, Network Technology, Software Engineering** | |
| | MOBI6059001 Mobile Programming | 2 |
| | COMP6586001 Embedded Systems | 2 |

| | | | |
|---|---|---|---|
| | COMP6226001 | Competitive Programming* | 2 |
| | COMP6681001 | Web Programming | 2 |
| | **MINOR PROGRAM** | | 8 |
| | **FREE ELECTIVES**** | | 10 |
| **Total SCU of Streaming: Digital Creative Technology, Intelligent System, Database Technology, Network Technology, Game Technology, Network Security, Software Engineering, Minor Program, Free Electives** | | | **18** |
| **Total SCU of Streaming: Mobile Technology, Data Science** | | | **17** |
| **Total SCU of Minor Program** | | | **16** |
| **Cumulative SCU** | | | **100** |

**) This course is delivered in English*

***) Global Learning System course*

****) Conducted for student mobility in Bandung*

*****) Conducted for student mobility in Jakarta*

## SEMESTER 6

| Group | Course | SCU |
|---|---|---|
| MKB | Enrichment Program I | 20 |
| **Total SCU** | | **20** |
| **Cumulative SCU** | | **120** |

*Student will take one of enrichment program tracks (off campus). See enrichment appendix for the tracks detail.*

## SEMESTER 7

| Group | Course | SCU |
|---|---|---|
| MKB | Enrichment Program II | 20 |
| **Total SCU** | | **20** |
| **Cumulative SCU** | | **140** |

*Student will take one of enrichment program tracks (off campus). See enrichment appendix for the tracks detail.*

## SEMESTER 8

| Group | Course | | SCU |
|---|---|---|---|
| MKB | COMP6747004 | Pre-Thesis | 2 |
| | COMP6748004 | Thesis | 4 |
| | COMP6872004 | Thesis | 6 |
| **Total SCU** | | | **6** |
| **Cumulative SCU** | | | **146** |

***Notes : (Information for group table)***

MKK = Mata kuliah Keilmuan & Ketrampilan *(Science and Skill Course)*

MKB = Mata kuliah Keahlian Berkarya *(Creative Expertise Course)*

MPK = Mata kuliah Pengembangan Kepribadian *(Personality Development Course)*

MPB = Mata kuliah Perilaku Berkarya *(Creative Behavior Course)*

MBB = Mata kuliah Berkehidupan Bermasyarakat *(Social Living Course)*

## Ma Computer Science

| Aspect | Code | Study Program Learning Outcome |
|---|---|---|
| Knowledge | K1 | Mampu memberikan solusi inovatif IT terhadap akar masalah sesuai kajian keilmuan dan praktik profesionalnya.<br>***Able to provide innovative IT solutions to the root of the problems according to scientific studies and professional practice.*** |
| | K2 | Mampu merancang solusi perangkat lunak untuk menyelesaikan masalah dengan Teknologi Informasi.<br>***Able to design software solutions to solve problems with Information Technology.*** |
| | K3 | Mampu mengembangkan perangkat lunak inter dan multidisiplin untuk menyelesaikan permasalahan pada lingkungan yang kompleks dan dinamis dengan menggunakan pendekatan penelitian ilmiah.<br>***Able to develop inter and multidisciplinary software to solve problems in complex and dynamic environments using a scientific research approach.*** |
| | K4 | Mampu menganalisis metode dan TIK menggunakan pendekatan penelitian inter dan multidisiplin<br>***Able to analyze methods and ICTs using inter and multidisciplinary research approaches.*** |
| | K5 | Mampu menghasilkan karya inovatif yang tepat guna dari hasil penelitian dengan pendekatan inter dan multidisiplin.<br>***Able to produce effective and innovative work from the results of inter and multidisciplinary research.*** |
| | K6 | Mampu mengusulkan solusi TIK berdasarkan kebutuhan industri.<br>***Able to propose ICT solutions based on the needs of industry.*** |
| | K7 | Mampu menggabungkan serta mengembangkan penelitian dalam komputasi intelegensia sesuai dengan kebutuhan industri.<br>***Able to combine research and development in computational intelligence in accordance with the needs of industry.*** |
| | K8 | Mampu merancang infrastruktur TIK yang mempunyai sistem keamanan yang baik.<br>***Able to design ICT infrastructure with a strong security system.*** |
| | K9 | Mampu merancang cetak biru TIK berbasis pelayanan.<br>***Able to design a blueprint of service-based ICT.*** |
| | K10 | Mampu menyusun rencana strategis TIK yang mempunyai sistem keamanan yang baik.<br>***Able to develop a strategic ICT plan with a strong security system.*** |
| Specific Skill | SS1 | (LObj 1.1) Mampu mengidentifikasi akar permasalahan IT sesuai kajian keilmuan dan praktik profesionalnya.<br>***Able to identify the root of IT problems according to scientific studies and professional practice.*** |
| | SS2 | (LObj 1.3) Mampu mempublikasikan hasil solusi inovatif pada jurnal internasional bereputasi atau jurnal nasional terakreditasi. |

| | | |
|---|---|---|
| | | ***Able to publish the results of innovative solutions in reputable international journals or accredited national journals.*** |
| | **SS3** | (LObj 3.3) Mampu mengembangkan metode TIK dengan analisa bisnis yang dapat dikomersialkan.<br>***Able to develop ICT methods in business analysis that can be commercialized.*** |
| | **SS4** | (LObj 4.1) Mampu menganalisis permasalahan proyek IT.<br>***Able to analyze problems of IT projects.*** |
| | **SS5** | (LObj 4.2) Mampu merancang solusi proyek IT.<br>***Able to design IT project solutions.*** |
| | **SS6** | (LObj 4.3) Mampu mengelola serta mengevaluasi efektivitas proyek IT.<br>***Able to manage as well as evaluate the effectiveness of IT projects.*** |
| | **SS7** | (LObj 5.3) Mampu mengusulkan penelitian inovatif.<br>***Able to propose innovative research.*** |
| **General Skill** | **GS1** | Mampu mengembangkan pemikiran logis, kritis, sistematis, dan kreatif melalui penelitian ilmiah, penciptaan desain atau karya seni dalam bidang ilmu pengetahuan dan teknologi yang memperhatikan dan menerapkan nilai humaniora sesuai dengan bidang keahliannya, menyusun konsepsi ilmiah dan hasil kajian berdasarkan kaidah, tata cara, dan etika ilmiah dalam bentuk tesis atau bentuk lain yang setara, dan diunggah dalam laman perguruan tinggi, serta makalah yang telah diterbitkan di jurnal ilmiah terakreditasi atau diterima di jurnal internasional.<br>***Having the ability to develop logical, critical, systematic and creative thinking through scientific research, creating designs or works of art in the fields of science and technology that pay attention to and apply humanities values according to their field of expertise, compiling scientific conceptions and study results based on rules, procedures and scientific ethics in the form of a thesis or other equivalent form, and uploaded on the university website, as well as papers that have been published in accredited scientific journals or accepted in international journals..*** |
| | **GS2** | Mampu menyusun ide, hasil pemikiran, dan argumen saintifik secara bertanggung jawab dan berdasarkan etika akademik, serta mengkomunikasikannya melalui media kepada masyarakat akademik dan masyarakat luas.<br>***Having the ability to compile ideas, thoughts and scientific arguments responsibly and based on academic ethics, and communicate them through the media to the academic community and the wider community.*** |
| | **GS3** | Mampu mengidentifikasi bidang keilmuan yang menjadi obyek penelitiannya dan memposisikan ke dalam suatu peta penelitian yang dikembangkan melalui pendekatan interdisiplin atau multidisiplin.<br>***Having the ability to identify the scientific field that is the object of research and position it on a research map developed through an interdisciplinary or multidisciplinary approach.*** |
| | **GS4** | Mampu mengambil keputusan dalam konteks menyelesaikan masalah pengembangan ilmu pengetahuan dan teknologi yang memperhatikan dan menerapkan nilai humaniora berdasarkan kajian analisis atau eksperimental terhadap informasi dan data.<br>***Having the ability to make decisions in the context of solving science and technology development problems that pay attention to and apply humanities values based on analytical or experimental studies of information and data.*** |

| | | |
|---|---|---|
| | **GS5** | Mampu meningkatkan kapasitas pembelajaran secara mandiri.<br>***Having the ability to increase learning capacity independently.*** |
| | **GS6** | Mampu mendokumentasikan, menyimpan, mengamankan, dan menemukan kembali data untuk menjamin kesahihan dan mencegah plagiasi<br>***Having the ability to document, store, secure, and retrieve data to ensure validity and prevent plagiarism.*** |
| **Attitude** | **A1** | Berkontribusi dalam peningkatan mutu kehidupan bermasyarakat, berbangsa, bernegara, dan kemajuan peradaban berdasarkan Pancasila;.<br>***Contribute to improving the quality of life in society, nation, state, and progress of civilization based on Pancasila;.*** |
| | **A2** | Menginternalisasi nilai, norma, dan etika akademik.<br>***Internalize academic values, norms and ethics.*** |
| | **A3** | Mampu mengelola proyek Teknologi Informasi serta mengevaluasi infrastruktur Teknologi Informasi yang efektif berdasarkan prinsip tata kelola yang baik.<br>***Having the ability to manage Information Technology projects and evaluate effective Information Technology infrastructure based on good governance principles.*** |

The following **curriculum** is presented:

**SEMESTER 1 – 1st Period**

| **Course** | | **SCU** |
|---|---|---|
| COMP8041041 | Internet of Things (IoT) | 4 |
| COMP8042041 | IT Risk Management and Audit | 4 |
| | **Total SCU** | **8** |
| | **Cumulative SCU** | **8** |

**SEMESTER 1 – 2nd Period**

| **Course** | | **SCU** |
|---|---|---|
| RSCH8079041 | IT Research Methodology | 4 |
| **Streaming: Data Science** | | |
| COMP8043041 | Machine Learning | 4 |
| **Streaming: Information Security Management** | | |
| CPEN8005041 | Network and Cyber Security | 4 |
| | **Total SCU** | **8** |
| | **Cumulative SCU** | **16** |

**SEMESTER 2 – 1st Period**

| **Course** | | **SCU** |
|---|---|---|
| RSCH8080041 | Pre-Thesis | 1 |
| **Streaming: Data Science** | | |

| Course | | SCU |
|---|---|---|
| COMP8044041 | Deep Learning and Its Applications | 4 |
| COMP8045041 | Optimization and Computational Intelligence | 4 |
| **Streaming: Information Security Management** | | |
| CPEN8006041 | Enterprise Network | 4 |
| COMP8046041 | Fundamental of Cyber Security | 4 |
| | **Total SCU** | **9** |
| | **Cumulative SCU** | **25** |

**SEMESTER 2 – 2nd Period**

| Course | | SCU |
|---|---|---|
| COMP8035041 | Big Data Analytics | 4 |
| **Streaming: Data Science** | | |
| COMP8047041 | Business Intelligence and Analytics | 4 |
| **Streaming: Information Security Management** | | |
| COMP8036041 | Services Oriented Architecture | 4 |
| | **Total SCU** | **8** |
| | **Cumulative SCU** | **33** |

**SEMESTER 3 – 1st Period**

| Course | | SCU |
|---|---|---|
| COMP8037041 | IT Strategic Planning & Enterprise Architecture | 4 |
| RSCH8081041 | Writing Paper & Colloquium Thesis | 2 |
| | **Total SCU** | **6** |
| | **Cumulative SCU** | **39** |

**SEMESTER 3 – 2nd Period**

| Course | | SCU |
|---|---|---|
| RSCH8082041 | Thesis | 3 |
| | **Total SCU** | **3** |
| | **Cumulative SCU** | **42** |

## PhD Computer Science

| Aspect | Code | Study Program Learning Outcome |
|---|---|---|
| Knowledge | K1 | Mampu memecahkan permasalahan sains dan teknologi dalam bidang Ilmu Komputer/ Informatika melalui pendekatan inter, multi, dan transdisipliner:<br>***Able to solve science and technology problems in the field of Computer Science/Information through an inter, multi and transdisciplinary approach.*** |
| | K2 | Mempunyai pengetahuan algoritma dan komputasi lanjut sehingga dapat membuat algoritma baru maupun pemecahan masalah pemodelan dan simulasi sistem sesuai keperluan.<br>***Have knowledge of advanced algorithms and computing so that you can create new algorithms and solve system modeling and simulation problems as needed.*** |
| | K3 | Mampu merumuskan masalah penelitian di bidang sistem informasi atau pengembangan ilmu komputer melalui berbagai penelitian terapan yang berimplikasi pada kualitas kehidupan masyarakat yang lebih baik.<br>***Able to formulate research problems in information systems or computer science field development through various applied research that has implications to a better quality of society's life.*** |
| | K4 | Mampu mengusulkan simulasi komputer untuk memecahkan masalah yang diterapkan untuk mengembangkan ilmu pengetahuan dan pengetahuan di bidang sistem informasi atau ilmu komputer.<br>***Able to propose computer simulation to solve the applied problem to develop science and knowledge in information systems or computer science field.*** |
| Specific Skill | SS1 | Mampu melakukan penelitian multidisiplin di bidang Sistem Informasi atau ilmu komputer untuk menciptakan karya yang inovatif dan terverifikasi dengan menerapkan pengetahuan, teknologi, dan algoritma canggih untuk memecahkan masalah pemodelan dan simulasi.<br>***Able to conduct multidisciplinary research in Information Systems or computer science knowledge to create innovative and verified works by applying knowledge, technology, and advanced algorithm to solve modelling and simulation problems.*** |
| | SS2 | Mampu memimpin penelitian di bidang sistem informasi atau ilmu komputer dengan pendekatan multidisiplin.<br>***Able to lead research in the information systems or computer science field with a multidisciplinary approach.*** |
| | SS3 | Mampu menulis laporan penelitian di bidang sistem informasi atau ilmu komputer melalui publikasi ilmiah yang dapat dipublikasikan di jurnal nasional maupun internasional.<br>***Able to write a research report in information systems or computer science fields through scientific publications that can be published in national or international journals.*** |
| | SS4 | Mampu menyebarluaskan hasil penelitian bidang sistem informasi atau ilmu komputer pada forum ilmiah nasional maupun internasional.<br>***Able to disseminate research results in information systems or computer science fields on a national or international scientific forum.*** |
| | SS5 | Mampu mensintesis teori dan metode dalam disiplin ilmu sistem informasi atau ilmu komputer dengan pembinaan dan pemberdayaan masyarakat. |

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| | | ***Able to synthesize the theories and methods in the disciplines of information systems or computer science with fostering and empowering society.*** |
| | SS6 | Mampu mensintesa suatu model atau kerangka inovasi dalam disiplin ilmu sistem informasi atau ilmu komputer dengan pembinaan dan pemberdayaan masyarakat.<br>***Able to synthesize an innovation model or framework in the disciplines of information systems or computer science with fostering and empowering society.*** |
| General Skill | GS1 | Mampu menemukan atau mengembangkan teori /konsepsi/gagasan ilmiah baru , memberikan kontribusi pada pengembangan serta pengamalan ilmu pengetahuan dan/atau teknologi yang memperhatikan dan menerapkan nilai humaniora di bidang keahliannya , dengan menghasilkan penelitian ilmiah berdasarkan metodologi ilmiah, pemikiran logis, kristis, sistematis, dan kreatif.<br>***Able to discover or develop new scientific theories/conceptions/ideas, contribute to the development and practice of science and/or technology that pays attention to and applies humanities values in their field of expertise, by producing scientific research based on scientific methodology, logical, critical, creative, and systematic thinking.*** |
| | GS2 | Mampu menyusun penelitian interdisiplin, multidisiplin, atau transdisiplin, termasuk kajian teoritis dan/atau eksperimen pada bidang keilmuan , teknologi, seni, dan inovasi yang dituangkan dalam bentuk disertasi dan makalah yang telah diterbitkan di jurnal internasional bereputasi.<br>***Able to organize interdisciplinary, multidisciplinary or transdisciplinary research, including theoretical studies and/or experiments in the fields of science, technology, arts and innovation which are outlined in the form of dissertations and papers that have been published in reputable international journals.*** |
| | GS3 | Mampu memilih penelitian yang tepat guna, terkini, termaju, dan memberikan kemashalahatan pada umat manusia melalui pendekatan interdisiplin, multidisiplin, atau transdisiplin, dalam rangka mengembangkan dan/atau menghasilkan penyelesaian masalah di bidang keilmuan , teknologi, seni, atau kemasyarakatan , berdasarkan hasil kajian tentang ketersediaan sumberdaya internal maupun eksternal.<br>***Able to choose research that is appropriate, current, most advanced, and provides benefit to humanity through an interdisciplinary, multidisciplinary, or transdisciplinary approach, in order to develop and/or produce solutions to problems in the fields of science, technology, art, or society, based on the results of studies on availability of internal and external resources.*** |
| | GS4 | Mampu mengembangkan peta jalan penelitian dengan pendekatan interdisiplin, multidisiplin, atau transdisiplin, berdasarkan kajian tentang sasaran pokok penelitian dan konstelasiya pada sasaran yang lebih luas.<br>***Able to develop a research roadmap with an interdisciplinary, multidisciplinary or transdisciplinary approach, based on a study of the main research targets and constellations of broader targets*** |
| | GS5 | Mampu menyusun argumen dan solusi keilmuan , teknologi atau seni berdasarkan pandangan kritis atau fakta, konsep, prinsip atau teori, yang dapat dipertanggungjawabkan secara ilmiah dan etika akademik serta mengkomunikasikannya melalui media massa atau langsung kepada masyarakat. |

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| | | ***Able to prepare scientific, technological or artistic arguments and solutions based on critical views or facts, concepts, principles or theories, which can be justified scientifically and academically and communicate them through mass media or directly to the public.*** |
| | GS6 | Mampu menunjukkan kepemimpinan akademik dalam pengelolaan , pengembangan dan pembinaan sumberdaya serta organisasi yang berada di bawah tanggungjawabnya.<br>***Able to demonstrate academic leadership in the management, development and guidance of resources and organizations under their responsibility.*** |
| | GS7 | Mampu mengelola , termasuk menyimpan , mengaudit, mengamankan dan menemukan kembali data dan informasi hasil penelitian yang berada di bawah tanggungjawabnya dan<br>***Able to manage, including storing, auditing, securing and rediscovering data and information resulting from research under his/her responsibility.*** |
| | GS8 | Mampu mengembangkan dan memelihara hubungan kolegial dan kesejawatan di dalam lingkungan sendiri atau melalui jaringan kerjasama dengan komunitas peneliti di luar lembaga.<br>***Able to develop and maintain collegial and peer relationships within one's own environment or through collaborative networks with research communities outside the institution*** |
| Attitude | A1 | ***Have faith in God and able to demonstrate religious manner.*** |
| | A2 | ***Uphold humanity values in carrying out task based on religiion, moral, and ethics.*** |
| | A3 | ***Contribute in the development of quality life in social , national, and civilization advancement based on Pancasila.*** |
| | A4 | ***Take part as a proud nation citizen who has national pride, nationalism, and responsibility for the country.*** |
| | A5 | ***Respect diversity of culture, view, religion, beliefs, opinion, or other people findings.*** |
| | A6 | ***Work Together , have social awareness , and care for society and environment.*** |
| | A7 | ***Obey the law and dicipline in social and national life.*** |
| | A8 | ***Internalize academic values, norms, and ethics.*** |
| | A9 | ***Demonstrate responsibility for work in the field independently.*** |
| | A10 | ***Internalize self-autonomy , perseverance , and entrepreneurship.*** |

The following **curriculum** is presented:

**SEMESTER 1**

| Course | | SCU |
|---|---|---|
| RSCH9012046 | Research Methodology | 3 |
| PHIL9001046 | Philosophy of Science | 3 |
| **Stream: Information Systems & Technology*** | | |
| ISYS9019046 | Recent Trends in Information Systems | 3 |
| ISYS9044046 | Advanced System & Architecture Enterprise | 3 |
| ISYS9045046 | Advanced Knowledge System | 3 |
| **Stream: Computer Science*** | | |
| COMP9018046 | Software Metric and Quality | 3 |
| COMP9019046 | Knowledge and Information Retrieval | 3 |
| COMP9020046 | Advanced Computer Security | 3 |
| | **Total SCU** | **12** |
| | **Cumulative SCU** | **12** |

**) Students have to choose one out of two streams. Only two subjects that will be admitted from three subjects that offered.*

**SEMESTER 2**

| Course | | SCU |
|---|---|---|
| RSCH9106046 | Proposal Dissertation | 4 |
| RSCH9107046 | Research Colloquium (Seminar) | 4 |
| **Stream: Information Systems & Technology*** | | |
| ISYS9046046 | Advanced Information Technology Governance | 3 |
| ISYS9022046 | e-Business & e-Government | 3 |
| **Stream: Computer Science*** | | |
| COMP9022046 | Advanced Softcomputing | 3 |
| COMP9023046 | Multimedia Computation | 3 |
| | **Total SCU** | **11** |
| | **Cumulative SCU** | **23** |

**) Students will select one out of two subjects*

**SEMESTER 3**

| Course | | SCU |
|---|---|---|
| RSCH9015046 | Dissertation I (Qualification Exam) | 2 |
| RSCH9016046 | Research Publication I | 2 |
| | **Total SCU** | **4** |
| | **Cumulative SCU** | **27** |

**SEMESTER 4**

| Course | | SCU |
|---|---|---|
| RSCH9017046 | Dissertation II (Research Result Examination) | 3 |

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| RSCH9018046 | Research Publication II | 2 |
| | **Total SCU** | **5** |
| | **Cumulative SCU** | **32** |

**SEMESTER 5**

| Course | | SCU |
|---|---|---|
| RSCH9019046 | Dissertation III (Closed Exam) | 4 |
| RSCH9020046 | Research Publication III | 2 |
| | **Total SCU** | **6** |
| | **Cumulative SCU** | **38** |

**SEMESTER 6**

| Course | | SCU |
|---|---|---|
| RSCH9108046 | Dissertation IV (Open Exam) | 4 |
| | **Total SCU** | **4** |
| | **Cumulative SCU** | **42** |