Computer Science

Introduction
In the new millennium and the global era, the role of information and automation in the various domains and activities of the business industry are becoming more important. The successes of the activities are determined by how computer science can support in managing the information. Information must be up-to-date, accurate and comprehensive to allow decision makers to determine the enterprise’s strategy. Furthermore, automation can facilitate human activity, accelerate the pace of work and make it more effective and efficient, while also increasing productivity in various activities. The development of communication and computer technology has made it possible to get information that is rapid, exact, and accurate. It also increases the application of automation in various fields such as industry, business, office affairs and development of science and technology.

Computer Science Undergraduate Study Program Bina Nusantara University Malang is one of the Study Programs of School of Computer Science Bina Nusantara University Jakarta. This study program focuses on learning process in the field of computer science with a Sarjana Komputer (S.Kom.) Academic Degree. The learning process is managed within 4 years by the 2 + 1 + 1 Program. The learning process in the first to third semesters is carried out in Malang Campus, East Java. The students then have the opportunity to study at Bina Nusantara Jakarta campus for a year, in the fourth and fifth semesters as part of the Mobility Program. Students also have the opportunity to enrich their learning with various partners of Bina Nusantara University for one year in the sixth and seventh semesters through Enrichment Program. The Enrichment Program offers seven optional tracks: Certified Internship, Certified Entrepreneurship, Certified Research, Certified Community Development, Certified Study Abroad, Certified Specific Independent Study, and Further Study. On the last semester every student takes a thesis as final course and will be guided by Faculty Member at Bina Nusantara University Malang.

Computer Science Study Program at Bina Nusantara University @Malang campus emphasizes the processes, techniques, and tools that go into developing computer-based systems.

Vision
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.

Mission
The mission of Computer Science Department 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 exemplary 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.

Program Objective
The objectives of the program are:
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.
Student Outcomes

After completing the study, graduates are:
1. Able to analyze 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

Prospective Career of the Graduates

After finishing the program, the graduate of Computer Science Program could follow a career as:

1. Full Stack Developer
2. Interactive Software Designer
3. Data Engineer & Analyst
4. Software Application Developer
5. Software Engineer/Developer
6. System Analyst/Developer
7. Web Engineer/Developer
8. IT Support/Consultant
9. Database/Network Designer/Programmer
10. Multimedia Designer
11. Game Designer/Developer
12. Academician

Curriculum

The curriculum of the Computer Science Study Program has been developed in line with the National Curriculum. Also, the local content has been developed in line with the Computer Science Curriculum standard of ACM (Association for Computing Machinery), several local and foreign universities, and market trends, so that the graduates of the Computer Science are expected to be able to face competition at both a national and international level.

Generally, the subjects of the curriculum are divided into these following groups of subjects:

Mathematics Group (Science)
The objective of this group is to provide an understanding of mathematics as one of the principal foundations of computer science. Another objective is to give an understanding of scientific methodology (data collection, hypothesis, research, analysis) in problem solving.

Character Building Group (Professional Practices)
The objective of this group is to develop the personal strengths of the student and to provide him or her with a professional character, professionalism in their field, management skills, oral and written communication skills, understanding of business ethic, ability to work as a team, and to develop a “Binusian” Character.

Core Group
The objective of this group is to provide a grounding in Computer Science through practice as well as applied theory which is required by business both now and in the future. The subjects that are included in this group are programming, algorithm design and analysis, software engineering, database systems, computer graphics, multimedia technology, human and computer interaction, operation systems, computer architecture, and computer network.

Streaming

All campuses of Computer Science Undergraduate Study Program Bina Nusantara University have the same core courses to ensure the main competency standards in Computer Science. However, every student also has the opportunity to enrich into various streaming in the fourth and fifth semesters. There are 12 streaming (specialization) options for students of Computer Science Undergraduate Study Program Bina Nusantara University Malang, namely Digital Creative Technology, Immersive technology, Intelligent System, Database Technology, Network Technology, Network Security, Game Technology, Mobile Technology, Interactive Multimedia, Software Engineering, Data Science, and Internet of Things.
Streaming BINUS @Malang Campus

- **Digital Creative Technology**: Focus on smart software application development based on big data analytics regarding business innovation and digital transformation on Industry 4.0 era (*Digital Business Innovation and Transformation*).
- **Immersive Technology**: Focus on development of immersive technology-based solutions supported by AR (Augmented Reality), VR (Virtual Reality), and XR (Extended Reality) technologies.

Streaming BINUS @Greater Jakarta Campus

- **Intelligent System**: Focus on smart software development through complex algorithm based on Artificial Intelligence to solve problem.
- **Database Technology**: Focus on software development through database technology for business operation and business analytics and business intelligent.
- **Network Technology**: Focus on software development on computer network through computer network design and computer network programming.
- **Network Security**: Focus on secure software development through secure computer network design and secure computer network programming.
- **Game Technology**: Focus on interactive software development through game art, game design and game programming for entertainment and business solution.
- **Mobile Technology**: Focus on software development through mobile devices platform.
- **Interactive Multimedia**: Focus in exploring interactive multimedia applications based on computer programming, design tools, and software engine.
- **Software Engineering**: Focus on development of software through software architecture, various methodologies and software engineering equipment.
- **Data Science**: Focus on exploring the latest technologies and various tools in finding solutions and reaching conclusions based on Data.

Streaming BINUS @Bandung Campus

- **Internet of Things**: Focus on various techniques and implementation of IoT.

Course Structure

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- Streaming Game Technology, Network Security, Mobile and Game Technology: 19
- Streaming Data Science: 20
- Minor Program, Free Electives: 19
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<td><strong>Streaming: Interactive Multimedia</strong>&lt;sup&gt;6)&lt;/sup&gt;</td>
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<tr>
<td>COMP6583001</td>
<td>Computer Graphics</td>
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<tr>
<td>COMP6589001</td>
<td>Game Design Programming&lt;sup&gt;1)&lt;/sup&gt;</td>
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<tr>
<td>Elective Course</td>
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<tr>
<td><strong>Streaming: Network Technology</strong>&lt;sup&gt;6)&lt;/sup&gt;</td>
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<tr>
<td>COMP6627001</td>
<td>Linux System Administration and Security</td>
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<tr>
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<td>Popular Network Technology</td>
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<tr>
<td><strong>Streaming: Software Engineering</strong>&lt;sup&gt;6)&lt;/sup&gt;</td>
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<tr>
<td>COMP6122001</td>
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<tr>
<td>COMP6115001</td>
<td>Object Oriented Analysis &amp; Design&lt;sup&gt;1)&lt;/sup&gt;</td>
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<tr>
<td><strong>Streaming: Game Technology</strong>&lt;sup&gt;6)&lt;/sup&gt;</td>
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<tr>
<td>GAME6093001</td>
<td>Serious Game &amp; Gamification</td>
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<td>Game Development Capstone Project&lt;sup&gt;1), 2)&lt;/sup&gt;</td>
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<td>3D Modeling for Games&lt;sup&gt;1), 2)&lt;/sup&gt;</td>
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<td>GAME6092001</td>
<td>Fundamental in Game Balancing</td>
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<tr>
<td>GAME6091001</td>
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<tr>
<td><strong>Streaming: Mobile Technology</strong>&lt;sup&gt;6)&lt;/sup&gt;</td>
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<tr>
<td>MOB6026001</td>
<td>Mobile Cloud Computing&lt;sup&gt;1)&lt;/sup&gt;</td>
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<tr>
<td>MOBI6009001</td>
<td>Mobile Multimedia Solution&lt;sup&gt;2)&lt;/sup&gt;</td>
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<tr>
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<td>Web Design&lt;sup&gt;1), 2)&lt;/sup&gt;</td>
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<tr>
<td>MOBI6070001</td>
<td>Embedded System and Internet of Things&lt;sup&gt;1), 2)&lt;/sup&gt;</td>
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<td><strong>Streaming: Data Science</strong>&lt;sup&gt;6)&lt;/sup&gt;</td>
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<tr>
<td>DTSC6010001</td>
<td>Bayesian Data Analysis</td>
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<tr>
<td>DTSC6006001</td>
<td>Machine Learning&lt;sup&gt;1), 2)&lt;/sup&gt;</td>
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<tr>
<td>DTSC6002001</td>
<td>Data Management and Organization&lt;sup&gt;1)&lt;/sup&gt;</td>
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<sup>1)</sup> Minor Program, <sup>2)</sup> Free Electives
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<tr>
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<td>DTSC6004001</td>
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<td><strong>Streaming: Network Security</strong></td>
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<tr>
<td>COMP6544001</td>
<td>Network Penetration Testing 2)</td>
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<tr>
<td>COMP6695001</td>
<td>Secure Programming 1), 2)</td>
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<td>COMP6843001</td>
<td>Reverse Engineering and Binary Exploitation</td>
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<tr>
<td>COMP6646001</td>
<td>Computer Forensic 1), 2)</td>
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<tr>
<td>COMP6873001</td>
<td>Blockchain Fundamental</td>
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<tr>
<td><strong>Streaming: Mobile And Game Technology</strong></td>
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<tr>
<td>COMP6897051</td>
<td>Game Design &amp; Programming</td>
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</tr>
<tr>
<td>COMP6898051</td>
<td>User Experience</td>
<td>2</td>
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<tr>
<td>COMP6899051</td>
<td>Machine Learning</td>
<td>2</td>
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<tr>
<td>COMP6900051</td>
<td>Mobile Embedded Systems</td>
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<td>COMP6897051</td>
<td>Game Design &amp; Programming</td>
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<tr>
<td><strong>Free Electives</strong></td>
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<td><strong>6</strong> Enrichment Program I</td>
<td>20</td>
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<tr>
<td><strong>7</strong> Enrichment Program II</td>
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<td><strong>8</strong> COMP6747004 Pre-Thesis</td>
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<tr>
<td><strong>8</strong> COMP6748004 Thesis</td>
<td>4</td>
<td>6</td>
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<tr>
<td><strong>8</strong> COMP6872004 Thesis</td>
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</table>

Total Credits 146 SCU

---

1) This course is delivered in English
2) Global Learning System course
3) Students will take foreign language courses according to BINUS University English proficiency test results. See foreign language courses appendix for the detail.
4) Conducted in BINUS@Malang
5) Conducted in BINUS@Bandung
6) Conducted in BINUS@Greater Jakarta
7) Conducted in BINUS@Semarang
8) Students choosing stream/minor in @Malang must take general course Database Design in semester 4.
9) Students undertaking mobility (Jakarta/Bandung) are required to take a general course/FE (2 SCU) on the host campus in semester 5.
8) Students will choose 1 course (2 credits) from the list of elective courses who enrolled in Computer Science BINUS@Bandung in semester 5
9) Students will choose 1 course (2 credits) from the list of elective courses for Streaming Software Engineering, Intelligent Systems, Interactive Multimedia, Database Technology, Network Technology, Minor Program, Free Electives, and Multidisciplinary Stream at Jakarta in semester 5

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

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
Appendix Foreign Language Courses

Foreign language courses are personalized courses that can be taken by the students according to their own pace from semester 1 until semester 4 or before they take enrichment. The courses are available at BINUSMAYA – Beelingu.

The following are the provisions of the courses that must be taken by students:

<table>
<thead>
<tr>
<th>Group</th>
<th>Foreign Language Courses</th>
<th>SCU</th>
</tr>
</thead>
<tbody>
<tr>
<td>MKB</td>
<td>ENGL6268002 English for Frontrunners</td>
<td>0</td>
</tr>
<tr>
<td>MKB</td>
<td>ENGL6269002 English for Independent Users</td>
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</tr>
<tr>
<td>MKB</td>
<td>ENGL6267002 English for Professionals</td>
<td>0</td>
</tr>
<tr>
<td>MKB</td>
<td>JAPN6208002 Basic Japanese Language</td>
<td>0</td>
</tr>
<tr>
<td>MKB</td>
<td>CHIN6185002 Basic Chinese Language</td>
<td>0</td>
</tr>
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</table>

1. Students with Binus University English Proficiency Test score less than 437 are required to take English for Frontrunners and English for Independent Users.
2. Students with Binus University English Proficiency Test score less than 520 are required to take English for Independent Users and English for Professionals.
3. Students with Binus University English Proficiency Test score equal to or greater than 520 are required to take English for Professionals and choose Basic Japanese Language or Basic Chinese Language.
4. Students are required to pass the foreign language courses before they take enrichment.
5. Students can see the requirements to pass the foreign language courses at BINUSMAYA – Beelingu.

Minor Scheme

<table>
<thead>
<tr>
<th>Minor Program</th>
<th>Semester 4</th>
<th>Semester 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Minor @ Binus Kemanggisan</strong></td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Digital Ecosystem</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Human Capital in Digital Workplace</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Sustainable Development</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Cross Cultural Communication</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Interactive &amp; Users Experience Design</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Data Analytics</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Robotic Process Automation</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Event Business and Entertainment</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Creative Digital Storytelling</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Digital Banking</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Blockchain Technology and Business</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td><strong>Minor @ Binus Alam Sutera</strong></td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Digital Transformation</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td><strong>Minor @ Binus Bekasi</strong></td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Virtual Services Experience</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Culinary</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td><strong>Minor @ Binus Malang</strong></td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Digital Technopreneur</td>
<td>V</td>
<td>V</td>
</tr>
</tbody>
</table>
The minor programs can change anytime based on the trends of knowledge and industry each year. Students will receive information about the updated minor programs during the registration period.

1. **Minor Program: Digital Ecosystem**

   **Fundamental Courses**
   
<table>
<thead>
<tr>
<th>Course</th>
<th>SCU</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP6683001 Introduction to Artificial Intelligence</td>
<td>2/2</td>
</tr>
<tr>
<td>ISYS6549003 Digital Innovation</td>
<td>4</td>
</tr>
<tr>
<td>COMP6937001 Current Trends in Technology</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total SCU</strong></td>
<td><strong>10</strong></td>
</tr>
</tbody>
</table>

   **Supporting Courses**
   
<table>
<thead>
<tr>
<th>Course</th>
<th>SCU</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMM6501019 Narrative Development</td>
<td>4</td>
</tr>
<tr>
<td>DSGN6834007 Visual Identity</td>
<td>4</td>
</tr>
<tr>
<td>COMP6685001 Cyber Security for Business</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total SCU</strong></td>
<td><strong>10</strong></td>
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</tbody>
</table>

2. **Minor Program: Human Capital in Digital Workplace**

   **Fundamental Courses**
   
<table>
<thead>
<tr>
<th>Course</th>
<th>SCU</th>
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</thead>
<tbody>
<tr>
<td>PSYC6174027 Psychology in The Workplace</td>
<td>4</td>
</tr>
<tr>
<td>MGMT6349005 Digital Workplace Strategy</td>
<td>4</td>
</tr>
<tr>
<td>ISYS6551003 Digital Workplace and Technology</td>
<td>4</td>
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<tr>
<td>LAWS6157028 Legal Aspects in Digital Workplace</td>
<td>4</td>
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<tr>
<td>PSYC6175027 Human Resources Development</td>
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3. **Minor Program: Sustainable Development**

   **Fundamental Courses**
   
<table>
<thead>
<tr>
<th>Course</th>
<th>SCU</th>
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<tbody>
<tr>
<td>ISYE6154011 Sustainable Design and Manufacture</td>
<td>4</td>
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<tr>
<td>CPEN6217010 Digital for Sustainable Development</td>
<td>4</td>
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<tr>
<td>ARCH6119014 Introduction to Sustainable Development</td>
<td>2</td>
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<td><strong>Total SCU</strong></td>
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</table>
### Supporting Courses

<table>
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<tr>
<th>Course</th>
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<tbody>
<tr>
<td>ISYE6155011 Occupational, Health, Safety, and Administration in Engineering</td>
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<tr>
<td>DSGN6835008 Engineering Material</td>
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<td>CIVL6118013 Engineering Economic</td>
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### 4. Minor Program: Cross Cultural Communication

**Fundamental Courses**

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<tbody>
<tr>
<td>CHIN6132026 Chinese Conversation in Daily Activities</td>
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<tr>
<td>COMM6502019 Communication in Diversity</td>
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<tr>
<td>BUS6170025 Asian Business Ethics</td>
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**Supporting Courses**

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<tbody>
<tr>
<td>CHIN6134026 Chinese Conversation in Business Communication</td>
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<tr>
<td>LAWS6158028 Private International Law</td>
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<td>INTR6135029 Comparative Politics</td>
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### 5. Minor Program: Interactive & Users Experience Design

**Fundamental Courses**

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<tr>
<td>ISYS6553003 User-Centered Research and Evaluation</td>
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<tr>
<td>PSYC6176027 Psychology and User Experience</td>
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<td>DSIN6003007 Fundamental of Interface Design</td>
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**Supporting Courses**

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<tbody>
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<td>ISYS6554003 Core Principles: Interactive Design</td>
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<tr>
<td>DSGN6837007 Digital Design Production</td>
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<tr>
<td>ISYS6556003 Information Architecture</td>
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### 6. Minor Program: Data Analytics

**Fundamental Courses**

<table>
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<tr>
<th>Course</th>
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<tr>
<td>ISYS6680003 Introduction to Data Analytics</td>
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<tr>
<td>ISYS6681003 Data Management &amp; Descriptive Analytics</td>
<td>4</td>
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<tr>
<td>STAT6198049 Statistical for Decision Making</td>
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<td>Course</td>
<td>SCU</td>
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**Supporting Courses**

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<td>Application of Predictive Analytics to Business Data</td>
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<tr>
<td>ISYS6683003</td>
<td>Prescriptive Analytics and Optimization</td>
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<td>MKTG6312005</td>
<td>Digitalization of Markets and Consumption</td>
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**7. Minor Program: Robotic Process Automation**

**Fundamental Courses**

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<tr>
<td>COMP6857001</td>
<td>Basic Programming for Automation</td>
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<tr>
<td>COMP6858001</td>
<td>RPA Concept &amp; Design</td>
</tr>
<tr>
<td>ISYS6684003</td>
<td>RPA Developer Fundamental</td>
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<td>ISYS6687003</td>
<td>Business Process Improvement</td>
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**Supporting Courses**

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<tr>
<td>ISYS6685003</td>
<td>RPA Developer Advance</td>
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<td>ISYS6686003</td>
<td>RPA Business Analytics Fundamental</td>
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<td>COMP6859001</td>
<td>Intelligence Automation</td>
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**8. Minor Program: Event Business and Entertainment**

**Fundamental Courses**

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<tr>
<td>HTMN6151021</td>
<td>Event Marketing Management</td>
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<tr>
<td>HTMN6152021</td>
<td>Catering Management</td>
</tr>
<tr>
<td>TRSM6232022</td>
<td>MICE (Meeting, Incentive, Convention, Exhibition) Management</td>
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**Supporting Courses**

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<th>SCU</th>
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<tbody>
<tr>
<td>TRSM6233022</td>
<td>Event Sponsorship and Funding</td>
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<tr>
<td>TRSM6234022</td>
<td>Sport and Entertainment Event Management</td>
</tr>
<tr>
<td>TRSM6235022</td>
<td>Festival &amp; Cultural Event</td>
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9. Minor Program: Creative Digital Storytelling

**Fundamental Courses**

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<tr>
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<tr>
<td>DSIN6033007</td>
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<tr>
<td>ENGL6275024</td>
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<td>FILM6118009</td>
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**Supporting Courses**

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<td>ENGL6276024</td>
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<tr>
<td>ENGL6277024</td>
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10. Minor Program: Digital Banking

**Fundamental Courses**

<table>
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<th>Course</th>
<th>SCU</th>
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11. Minor Program: Blockchain Technology and Business

**Fundamental Courses**

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### 12. Minor Program: Digital Transformation

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### 13. Minor Program: Virtual Service Experience

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### 14. Minor Program: Culinary

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**Total SCU: 10**

*SCU for HTMN6008021, HTMN6128021 are practical*
### Supporting Courses

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*SCU for HTMN6155021, HTMN6125021 are practical*

### 15. Minor Program: Digital Technopreneur

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### 16. Minor Program: Designpreneur

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### 17. Minor Program: Metaverse in Business

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# 18. Minor Program: Content Creation

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## Appendix: Free Electives

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**Enrichment Track Scheme**

Track scheme for semester 6 and semester 7

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### Description:
Student will take one enrichment program track.

Students who failed in Enrichment Program I can retake with the same track or change into another track. As for Enrichment Program II, student who failed with Internship, Research, Community Development, and Study Abroad track on Enrichment Program II, can retake with the same track or change into another track. However, students who take Entrepreneurship track on Enrichment Program II, should retake with another track.

### CERTIFIED INTERNSHIP TRACK
#### Enrichment Program I

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### CERTIFIED RESEARCH TRACK

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**Total SCU 20**

#### Enrichment Program II

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**Total SCU 20**

### CERTIFIED ENTREPRENEURSHIP TRACK

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### CERTIFIED COMMUNITY DEVELOPMENT TRACK

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### CERTIFIED STUDY ABROAD TRACK

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*) Transferred courses will be transferred based on credit transfer policies on study program with total of 20 credits.

#### Elective courses list for study abroad*

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*) Transferred courses will be transferred based on credit transfer policies on study program with total of 20 credits.

**CERTIFIED SPECIFIC INDEPENDENT STUDY**

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For students who take BINUS certified specific independent study courses, they should take the first 4 courses on the list above (20 credits). Meanwhile, electives courses 1 to 32 are transferred courses for students who take certified specific independent study outside BINUS University. Transferred courses will be transferred based on credit transfer policies on study program with total of 20 credits.

FURTHER STUDY TRACK

Enrichment Program II
Fast track M.MSI

<table>
<thead>
<tr>
<th>Group</th>
<th>Course Code</th>
<th>Course Name</th>
<th>SCU</th>
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<td>ISYS6655003</td>
<td>Change Management for Enterprise</td>
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<td>Visualization and Descriptive Analytics</td>
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Total SCU 20

Fast track M.TI

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<td>COMP6816001</td>
<td>Wireless and Cloud Computing Technologies</td>
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<td>COMP6817001</td>
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Total SCU 20

Student should pass all of these quality controlled courses as listed below:

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