

Cyber Security

Introduction

Cyber attack is raising and threaten ubiquitous world on internet today. Industry and government need cyber security expert to counter and defend from this threat. Cyber Security Program offer dedicated degree in cyber security assurance and defence by giving students technical expertise they need to confidently enter cyber war. Cyber Security is designed specifically by Computer Science, BINUS UNIVERSITY to provide students with knowledge and expertise to penetrate testing system and network, design and implementation of cyber defense architecture in the field of cyber security. Cyber Security Program was found in 2015, under BINUS UNIVERSITY, it became one of the best programs under coordination of School of Computer Science and supported by government.

Cyber Security Program designed to adapt to changing cyber attack and defend landscape while ensuring a solid academic foundation and aligned to industry and government expectation. Cyber Security focuses on cyber security assurance and cyber defense. Course structures its program to allow students to gain valuable concept and practical experience in conducting penetration test and also to apply knowledge in building cyber defense architecture and technology. Cyber Security Program has a strong base in computer science foundation subject as well as offering theoretical and critical thinking behind the current cyber technology. Students learn in a project-orientated environment that encourages collaboration with industries and government and helps them to discover cyber threat challenge and build system defense. Students are encouraged to collaborate, work to deadlines, maintain attendance levels and develop strong communication skills. As a result, the graduates are internationally renowned for their expertise and confidence to enter the workplace as entry-level skilled professionals rather than technicians.

Vision

A study program of choice in Computer Science which focuses on developing cyber security solution for industry, is recognized internationally, champions innovation and delivers graduates with international qualifications.

Mission

The mission of Cyber Security Program is to contribute to the global community through the provision of world-class education by:

1. To educate students fundamental to advance knowledge, skill and practice in software development specialized in ethical hacking, cyber defense, and cyber forensic by providing an excellent learning environment and promoting research and collaboration with global industry;
2. To provide IT professional services with emphasis in application of knowledge in terms of society development;
3. To share application of knowledge related to cyber security for Indonesian and international community quality of life improvement;
4. To promote students & lecturers to be creative and value-adding talents in cyber security by creating suitable environment in order to be able to compete in international level;
5. To prepare students for becoming smart and good ethical cyber security professionals, leaders and entrepreneurs in global market or for continuing in advanced studies.

Program Objective

The objectives of the program are:

1. To provide students with a solid foundation of mathematical, algorithm principles, computer science knowledge and ethical that will be needed in IT practice;
2. To provide students with skills to apply design and development principles in the construction of software system applied in database technology, intelligence system, networking and multimedia development;
3. To prepare students with abilities to keep up-to-date with the latest Cyber Security trends, developments and industries;
4. To prepare students with abilities in problem solving and good communication skills to be able to work as an individual or in a team in an IT environment.

Student Outcomes

After completing the study, graduates are:

1. Able to create software application design with the implementation of database system principal design to solve structured and semi-structured data;
2. Able to design software application solution based on problem analysis which can be solved with structured approach in informatics area;
3. Able to assess technology trend in informatics area to deliver alternative solution of software development;
4. Able to conduct penetration testing using appropriate method that suitable to targeted technology;
5. Able to evaluate system risk from identification result;
6. Able to make a guideline that optimize necessary improvement to close gaps;
7. Able to fix the weakness-system by cyber defense approach and technique;
8. Able to implement secure system with secure software engineering methodology;
9. Able to apply interdisciplinary knowledge and skills in developing alternative solutions for problem-solving.

Prospective Career of the Graduates

After finishing the Program, the graduate of Cyber Security Program could follow a career as:

1. Penetration Tester
2. Secure Software Developer
3. Network Security Administrator
4. Information Security Analyst
5. Computer Security Architect
6. Cyber Intelligence Officer
7. Academician in cyber security (Lecturer, Trainer, Researcher)

Curriculum

The present curriculum used in the Cyber Security 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, national and international game industry (developer, publisher), up-to-date cyber attack and threat trends, so that the graduates of the Cyber Security Program are expected to be able to face cyber security challenge at both a national and international level. Generally, the subjects of the curriculum are divided into these following groups of subjects:

Core Computer Science Group

The objective of this group is to provide grounding in Cyber Security Program 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, databases, computer graphs, interactive multimedia, computer and human interaction, operation system, Cyber Security Analysis, Secure Web Technology and Cyber Forensic.

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 methodology, 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.

The Field of Cyber Security Subject

The objective of building the field of subject in Cyber Security is to give the students a solid foundation of secure software development skills and to introduce the specific skills needed for cyber security assurance and cyber defense. The students are expected to develop their skills and master the techniques which will allow them to conduct research for both their thesis and/or to continue their studies.

The field of Cyber Security subjects:

1. Network Security: to explore the various methodologies and techniques of penetration testing and defense in network technology.
2. System Defense: to explore the various methodologies and techniques of secure software engineering, secure computer network, and operating system.

All students of Cyber Security Program must follow these two fields to become Cyber Security graduates. The objective of these two fields is to provide the students with the knowledge and skills required by industry and government who want to defend their computer network and system.

Course Structure

Sem	Code	Course Name	SCU	Total	
1	CHAR6013	Character Building: <i>Pancasila</i>	2	20	
	MATH6025	Discrete Mathematics	4		
	MATH6030	Linear Algebra	2		
	COMP6047	Algorithm and Programming	4/2		
	COMP6542	Computer Security Fundamental**	2		
	STAT6171	Basic Statistics	2		
	English University Courses I				
	ENGL6128	English in Focus	2		
	ENGL6130	English for Business Presentation	2		
2	CHAR6014	Character Building: <i>Kewarganegaraan</i>	2	20	
	MATH6031	Calculus	4		

Sem	Code	Course Name	SCU	Total	
	COMP6048	Data Structures [*]	4/2		
	ENTR6509	Entrepreneurship: Ideation	2		
	CPEN6098	Computer Networks	2/2		
	English University Courses II				
	ENGL6129	English Savvy	2		
	ENGL6131	English for Written Business Communication	2		
3	CHAR6015001	Character Building: <i>Agama</i>	2	23	
	COMP6639001	Artificial Intelligence ^{*&***}	5		
	COMP6544001	Network Penetration Testing ^{**}	2/2		
	COMP6056001	Program Design Methods	4		
	COMP6062001	Compilation Techniques	4		
	COMP6049001	Algorithm Design and Analysis [†]	4		
4	LANG6027001	Indonesian	2	23	
	COMP6693001	Network Administration ^{*&**}	2		
	ISYS6169001	Database Systems	4/2		
	COMP6645001	Software Engineering ^{*&***}	5		
	COMP6549001	Software Security ^{*&**}	2		
	LAWS6110001	Cyber Law	2		
	Free Electives		4		
5	COMP6697001	Operating System	2	14	
	COMP6176001	Human and Computer Interaction	2/2		
	COMP6696001	Research Methodology in Computer Science	2		
	ENTR6511001	Entrepreneurship: Market Validation	2		
	COMP6695001	Secure Programming ^{*&**}	2		
	COMP6646001	Computer Forensic ^{*&**}	2		
6	Enrichment Program I		20	20	
7	Enrichment Program II		20	20	
8	COMP6749001	Pre-Thesis	2	6	
	COMP6750001	Thesis	4		
	COMP6192001	Thesis	6		
TOTAL CREDITS			146 Credits		

*) This course is delivered in English

**) Global Learning Systems Course

***) Entrepreneurship Embedded

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

English University Courses:

-) For 1st Semester: English University Courses I, students with Binus University English Proficiency Test score less than 500 will take English in Focus, and student with test score greater than or equal to 500 will take English for Business Presentation.

-) For 2nd Semester: English University Courses II, students with Binus University English Proficiency Test score less than 500 will take English Savvy, and students with test score greater than or equal to 500 will take English for Written Business Communication.

-) Students must pass English Savvy with a minimum Grade of C.

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 program.

Appendix: Free Electives (4th Semester)

No	Course Owner Department	Course Code	Course Name	SCU	Semester
1	Business Creation	ENTR6580005	Digital Business Transformation	2	4
2	Business Creation	ENTR6582005	Business Strategy	2	4
3	Business Management	MGMT6399005	Fundamentals of Supply Chain Management	2	4
4	Business Management	MGMT6401005	Digital Supply Chain Management	2	4
5	Business Management	MKTG6298005	Service Marketing Management	2	4
6	Global Business Marketing	MKTG6237005	Global Strategic Marketing: Asia Pacific Perspective	4	4
7	International Business Management	BUSS6162005	Market Entry Strategy	2	4
8	International Business Management	BUSS6191005	Export-Import Management	2	4
9	International Business Management	MGMT6369005	Corporate Strategy in International Business	2	4
10	Management	BUSS6088005	Current Issue in Business and Technology	2	4
11	Management	BUSS6109005	Business Development	4	4
12	Management	BUSS6171005	Business Sustainability	4	4
13	Management	BUSS6173005	Managing Innovation and Knowledge	4	4
14	Management	ISYS6079005	E-Business System	4	4
15	Management	MGMT6196005	Project Management	4	4
16	Management	MGMT6276005	Leadership & Managing Human Capital in Organization	4	4
17	Management	MGMT6371005	Human Resources Analytics	4	4
18	Management	MGMT6374005	Analysis on E-Business Investment	4	4
19	Management	MGMT6375005	Organizational Learning	4	4
20	Accounting	ACCT6353020	Management Information System	2	4
21	Accounting	ACCT6358020	Management Audit	4	4
22	Accounting	ACCT7141020	Accounting Information System and Internal Control	2/2	4
23	Accounting	TAXN6050020	Sales Tax and Customs	2	4
24	Accounting Bekasi	ACCT6382020	Business Process Analysis and Solution	2	4
25	Accounting Bekasi	ACCT6397020	ERP Fundamental	2/2	4
26	Marketing Communication	COMM6435019	Global Consumer Behavior	2	4
27	Marketing Communication	COMM6510019	Reportage & Interview Technique	2/2	4
28	Marketing Communication	COMM6533019	Creative Program Design	2/2	4
29	Marketing Communication	COMM6540019	Communication & Public Affairs	2	4
30	Tourism	TRSM6142022	Event Management	4	4
31	Tourism	TRSM6204022	Heritage Tourism	4	4
32	Architecture	ARCH6054014	Interior Design Principles	2	4
33	Architecture	ARCH6059014	Building Material Knowledge	2	4
34	Food Tech	FOOD6073015	Current Issues in Food Technology	2	4
35	Industrial Engineering	ISYE6041011	Engineering Economy	2	4

No	Course Owner Department	Course Code	Course Name	SCU	Semester
36	Industrial Engineering	ISYE6113011	Leadership & Organizational Behavior	2	4
37	Industrial Engineering	ISYE6181011	System Engineering & Analysis	2	4
38	Business Law	LAWS6017028	Intellectual Property Rights	4	4
39	Business Law	LAWS6159028	Legal Aspect in Business	2	4
40	Business Law	LAWS6168028	Banking-Financial Law & Islamic Business Law	4	4
41	Business Law	LAWS6169028	Capital Market, Legal Audit, & Due Diligence	4	4
42	Business Law	LAWS6170028	Investment Law	2	4
43	Business Law	LAWS6171028	Business Competition & Consumer Protection Law	2	4
44	Business Law	LAWS6181028	Industrial Relations & Alternative Dispute Resolution	2	4
45	Chinese Literature	CHIN6157026	Chinese Business for Etiquette (Beginner)	4	4
46	Chinese Literature	CHIN6158026	Chinese Business in Daily Communication	4	4
47	Chinese Literature	CHIN6159026	Chinese Character Writing	2	4
48	English Literature	ENGL6169024	English for Professionals	2	4
49	International Relations	INTR6143029	ASEAN Community: Security, Economic, and Socio Cultural Aspects	4	4
50	International Relations	INTR6144029	Contemporary Issues in European Society	2	4
51	International Relations	INTR6145029	Contemporary Issues in American Society	2	4
52	International Relations	INTR6146029	Contemporary Issues in East Asian Society	2	4
53	International Relations	INTR6147029	Contemporary Issues in African and Middle Eastern Societies	2	4
54	International Relations	INTR6148029	Multinational Corporations Global Strategy and Social Responsibility	2/2	4
55	International Relations	INTR8043029	International Media and State Role	4	4
56	Primary Teacher Education	EDUC6015030	Educational Research Methodology	4	4
57	Primary Teacher Education	EDUC6018030	Micro Teaching	4	4
58	Primary Teacher Education	EDUC6063030	English for Academic Purposes	2	4
59	Psychology	PSYC6124027	Psychology of Early Childhood Education	4	4
60	Psychology	PSYC6125027	Psychology of Special Needs Education	4	4
61	Psychology	PSYC6130027	Human Performance Technology	4	4
62	Psychology	PSYC6145027	Urban Psychology	4	4
63	Game Application & Technology	GAME6082001	Game Animation	2	4
64	Computer Science	COMP6231001	Human and Computer Interaction	2/2	4
65	Computer Science	COMP6745001	Machine Learning	2	4
66	Computer Science	COMP7084001	Multimedia Systems	2/1	4
67	Computer Science	ISYS6211001	Web Based Application Development	2/2	4
68	Animation	DSGN6692007	Character Animation	4	4

No	Course Owner Department	Course Code	Course Name	SCU	Semester
69	Animation	DSGN6693007	Motion Graphic	4	4
70	Animation	DSGN6694007	Visual Effect (VFX)	4	4
71	Animation	DSGN6695007	Asset Creation	4	4
72	Creative Advertising	DSGN6671007	Creative Writing for Commercials	4	4
73	Creative Advertising	MDIA6046007	Audio Visual (Pre Production and Production)	4	4
74	Creative Advertising	DSGN6651007	Photography	4	4
75	Film	FILM6026009	History of Indonesian Cinema	2	4
76	Film	FILM6027009	Film Theories	4	4
77	Film	FILM6080009	Southeast Asian Cinema & Popular Culture	4	4
78	New Media	DSGN6743007	Digital Graphic Reproduction	4	4
79	Interior Design	DSGN6608008	Interior Design and culture	2	4
80	Interior Design	DSGN6611008	Business in Interior Design	2	4
81	Interior Design	DSGN6886008	Rendering and Presentation Techniques	2	4
82	Business Information Technology	ISYS6574003	Information Retrieval	4	4
83	Business Information Technology	ISYS6577003	Machine Learning & Foundations	2	4
84	Business Information Technology	ISYS6606003	Smart Application	2	4
85	Information Systems	BUSS6043003	Introduction to E-Business	4	4
86	Information Systems	ISYS6016003	Social Media Fundamental	2	4
87	Information Systems	ISYS6084003	Database	2/2	4
88	Information Systems	ISYS6203003	Mobile Application Development	2/2	4
89	Information Systems	ISYS6210003	Data Visualization	2	4
90	Information Systems	ISYS6280003	Database Systems	4/2	4
91	Information Systems	ISYS6284003	Analytical Information System	4	4
92	Information Systems	ISYS6285003	Digital and New Media	2	4
93	Information Systems	ISYS6442003	Applied ERP: Fundamental	4	4
94	Information Systems	ISYS6478003	Research Methods in Information Systems	2	4
95	Information Systems	ISYS6567003	Applied Database: Database Programming With SQL and PL/SQL	4	4
96	Information Systems	ISYS6594003	Coding for Finance	2	4

Enrichment Program I (6th Semester) & Enrichment Program II (7th Semester):

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

Enrichment Track Scheme

Track	Semester 6							Semester 7						
	IN	RS	EN	CD	SA	IS	etc	IN	RS	EN	CD	SA	FS	etc
1	v							v						
2		v							v					
3			v							v				
4				v				v						
5				v							v			
6				v								v		
7					v			v						
8					v						v			
9					v							v		
10							v	v						
11							v				v			
12							v					v		
13	v												v	
14		v											v	
15						v		v						
16						v					v			
17						v						v		

Note:

IN	: Certified Internship	SA	: Certified Study Abroad
RS	: Certified Research	IS	: Certified Specific Independent Study
EN	: Certified Entrepreneurship	FS	: Further Study
CD	: Certified Community Development	etc	: Study Program Special Purposes

Description:

Student will take one of enrichment program tracks

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

Code	Course Name	SCU	Total
Enrichment Program I			20
COMP6561001	Industrial Experience in Cyber Security Domain	8	
COMP6758001	Cyber Security Practice in Industrial Experience	8	
COMP6698001	EES in Cyber Security Industry	4	
Enrichment Program II			20
COMP6564001	Professional Experience in Cyber Security Domain	8	
COMP6759001	Cyber Security Practice in Professional Experience	8	
COMP6566001	Professional Development in Cyber Security Industry	4	

Certified Entrepreneurship Track

Code	Course Name	SCU	Total
Enrichment Program I			20
ENTR6649001	New Venture Initiation in Cyber Security	8	
ENTR6650001	Product Development Process in Cyber Security	8	
ENTR6540001	EES Cyber Security Professional in New Business	4	20
Enrichment Program II			
ENTR6651001	Product Launching in Cyber Security	8	
ENTR6652001	Business Development in Cyber Security	8	
ENTR6540001	EES Cyber Security Professional in New Business	4	

Certified Research Track

Code	Course Name	SCU	Total
Enrichment Program I			20
RSCH6212001	Research Experience I	8	
RSCH6528001	Scientific Writing I in Cyber Security	8	
RSCH6458001	Global EES I in Cyber Security Research Project Team	4	20
Enrichment Program II			
RSCH6216001	Research Experience II	8	
RSCH6529001	Scientific Writing II in Cyber Security	8	
RSCH6171001	Global EES II in Cyber Security Research Project Team	4	

Certified Community Development Track

Code	Course Name	SCU	Total
Enrichment Program I			20
CMDV6126001	Community Outreach Project Implementation	8	
CMDV6310001	Community Outreach Cyber Security Project Design	8	
CMDV6257001	Employability and Entrepreneurial Skills in Cyber Security Field	4	20
Enrichment Program II			
CMDV6140001	Community Development Project Implementation	8	
CMDV6311001	Community Development Cyber Security Project Design	8	
CMDV6090001	Employability and Entrepreneurial Skills in Cyber Security Field	4	

Certified Study Abroad Track

Code	Course Name	SCU	Total
Elective courses list for study abroad*			
Enrichment Program I			
GLOB6005001	Elective Course for Study Abroad 1	4	20
GLOB6006001	Elective Course for Study Abroad 2	4	
GLOB6007001	Elective Course for Study Abroad 3	4	
GLOB6008001	Elective Course for Study Abroad 4	4	
GLOB6009001	Elective Course for Study Abroad 5	2	
GLOB6010001	Elective Course for Study Abroad 6	2	
GLOB6011001	Elective Course for Study Abroad 7	2	
GLOB6012001	Elective Course for Study Abroad 8	2	
GLOB6013001	Elective Course for Study Abroad 9	2	
GLOB6014001	Elective Course for Study Abroad 10	2	
GLOB6015001	Elective Course for Study Abroad 11	2	
GLOB6016001	Elective Course for Study Abroad 12	2	
GLOB6251001	Elective Course for Study Abroad 29	4	
Enrichment Program II			
GLOB6017001	Elective Course for Study Abroad 13	4	20
GLOB6018001	Elective Course for Study Abroad 14	4	
GLOB6019001	Elective Course for Study Abroad 15	4	
GLOB6020001	Elective Course for Study Abroad 16	4	
GLOB6021001	Elective Course for Study Abroad 17	2	
GLOB6022001	Elective Course for Study Abroad 18	2	
GLOB6023001	Elective Course for Study Abroad 19	2	
GLOB6024001	Elective Course for Study Abroad 20	2	
GLOB6025001	Elective Course for Study Abroad 21	2	
GLOB6026001	Elective Course for Study Abroad 22	2	
GLOB6027001	Elective Course for Study Abroad 23	2	
GLOB6028001	Elective Course for Study Abroad 24	2	
GLOB6253001	Elective Course for Study Abroad 31	4	

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

Certified Specific Independent Study

Code	Course Name	SCU	Total
Elective courses list for certified specific independent study*			
Enrichment Program I			
MICR6033001	Course Certification I	3	20
MICR6034001	Technical Skill Enrichment I	4	
MICR6035001	Industrial Project I	9	
MICR6036001	Soft Skill Enrichment I	4	
MICR6001001	Elective Course for Specific Independent Study 1	8	
MICR6002001	Elective Course for Specific Independent Study 2	8	
MICR6003001	Elective Course for Specific Independent Study 3	6	
MICR6004001	Elective Course for Specific Independent Study 4	6	

Code	Course Name	SCU	Total
MICR6005001	Elective Course for Specific Independent Study 5	6	
MICR6006001	Elective Course for Specific Independent Study 6	5	
MICR6007001	Elective Course for Specific Independent Study 7	5	
MICR6008001	Elective Course for Specific Independent Study 8	5	
MICR6009001	Elective Course for Specific Independent Study 9	5	
MICR6010001	Elective Course for Specific Independent Study 10	4	
MICR6011001	Elective Course for Specific Independent Study 11	4	
MICR6012001	Elective Course for Specific Independent Study 12	4	
MICR6013001	Elective Course for Specific Independent Study 13	4	
MICR6014001	Elective Course for Specific Independent Study 14	4	
MICR6015001	Elective Course for Specific Independent Study 15	3	
MICR6016001	Elective Course for Specific Independent Study 16	3	
MICR6017001	Elective Course for Specific Independent Study 17	3	
MICR6018001	Elective Course for Specific Independent Study 18	3	
MICR6019001	Elective Course for Specific Independent Study 19	3	
MICR6020001	Elective Course for Specific Independent Study 20	3	
MICR6021001	Elective Course for Specific Independent Study 21	2	
MICR6022001	Elective Course for Specific Independent Study 22	2	
MICR6023001	Elective Course for Specific Independent Study 23	2	
MICR6024001	Elective Course for Specific Independent Study 24	2	
MICR6025001	Elective Course for Specific Independent Study 25	2	
MICR6026001	Elective Course for Specific Independent Study 26	2	
MICR6027001	Elective Course for Specific Independent Study 27	2	
MICR6028001	Elective Course for Specific Independent Study 28	2	
MICR6029001	Elective Course for Specific Independent Study 29	1	
MICR6030001	Elective Course for Specific Independent Study 30	1	
MICR6031001	Elective Course for Specific Independent Study 31	1	
MICR6032001	Elective Course for Specific Independent Study 32	1	

*) 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

Code	Course Name	SCU	Total
Enrichment Program II			20
COMP6815001	IT Disaster Recovery	4	
COMP6816001	Wireless and Cloud Computing Technologies	4	
COMP6817001	Internet Tools and Services	4	
COMP6818001	Cyber Risk Management	4	
COMP6819001	Knowledge Engineering	4	

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

No.	Course Code	Course Name	Minimal Grade
1.	CHAR6013	Character Building: <i>Pancasila</i>	B
2.	ENTR6511001	Entrepreneurship: Market Validation	C
3.	COMP6047	Algorithm and Programming*	C
4.	COMP6048	Data Structures*	C
5.	COMP6056001	Program Design Methods*	C
6.	COMP6645001	Software Engineering*	C
7.	COMP6544001	Network Penetration Testing	C
8.	COMP6695001	Secure Programming	C

*) Tutorial & Multipaper