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 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.

Mission

The mission of Cyber Security 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 & 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.

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;
4. Graduates will become successful security researcher in Cyber Security fields.

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
7. Able to implement security framework to obtain defense-in-depth on multiple technology layers
8. Able to implement system defense on network and infrastructure

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	CHAR6013001	Character Building: Pancasila	2	20
	MATH6025001	Discrete Mathematics	4	
	MATH6030001	Linear Algebra	2	
	COMP6047001	Algorithm and Programming[2] **(AOL)**	4/2	
	COMP6542001	Computer Security Fundamental[2] **(AOL)**	2	
	LANG6027001	Indonesian	2	
	STAT6171001	Basic Statistics	2	
	Foreign Language Courses		0	
2	CHAR6014001	Character Building: Kewarganegaraan	2	20
	MATH6031001	Calculus	4	
	COMP6048001	Data Structures[1&2] **(AOL)**	4/2	
	ENPR6311001	Creativity and Innovation	2	

Sem	Code	Course Name	SCU	Total
	MATH6183001	Scientific Computing **(AOL)**	2/1	
	CPEN6247001	Computer Networks **(AOL)**	2/1	
	Foreign Language Courses		0	
3	CHAR6015001	Character Building: Agama	2	23
	COMP6065001	Artificial Intelligence[2] **(AOL)**	4	
	COMP6798001	Program Design Methods[1] **(AOL)**	2	
	COMP6544001	Network Penetration Testing[2] **(AOL)**	2/2	
	SCIE6063001	Computational Physics **(AOL)**	2/1	
	COMP6049001	Algorithm Design and Analysis[1] **(AOL)**	4	
	COMP6062001	Compilation Techniques	4	
	Foreign Language Courses		0	
4	COMP6842001	Server and Network Administration[1&2]	2	20
	COMP6799001	Database Technology[2] **(AOL)**	2/1	
	COMP6100001	Software Engineering[2] **(AOL)**	4	
	COMP6549001	Software Security[1&2]	2	
	SCIE6062001	Computational Biology	2/1	
	COMP6844001	Mobile Penetration Testing[2]	2/2	
	LAWS6110001	Cyber Law	2	
	Foreign Language Courses		0	
5	ENPR6312001	Venture Creation	2	17
	COMP6697001	Operating System **(AOL)**	2	
	COMP6800001	Human and Computer Interaction[2] **(AOL)**	2/1	
	COMP6696001	Research Methodology in Computer Science[1] **(AOL)**	2	
	COMP6695001	Secure Programming[1&2] **(AOL)**	2	
	COMP6843001	Reverse Engineering and Binary Exploitation	2	
	COMP6646001	Computer Forensic[1&2] **(AOL)**	2	
	COMP6873001	Blockchain Fundamental	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 SCU

[1]) This course is delivered in English
[2]) Global Learning System Course

-) **(AOL)** *- Assurance of Learning Process System*

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*

Foreign Language Courses:
Students will take foreign language courses according to Beelingua Placement Test results. See foreign language courses appendix for the details. Students must pass with a minimum Grade of C.

Appendix Foreign Language Courses

Foreign Language Courses		SCU
ENGL6253001	English for Frontrunners	0
ENGL6254001	English for Independent Users	0
ENGL6255001	English for Professionals	0
JAPN6190001	Basic Japanese Language*	0
CHIN6163001	Basic Chinese Language*	0

*) This course is optional for students

1. *Students with Beelingua Placement Test score less than 60 are required to take English for Frontrunners and English for Independent Users.*
2. *Students with Beelingua Placement Test score between 60 and 99 are required to take English for Independent Users and English for Professionals.*
3. *Students with Beelingua Placement Test score greater than 99 are required to take English for Professionals. Additionally, students may choose to take either 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 – Beelingua*

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	IS	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	
18		v												v	
19						v		v							
20						v					v				
21						v						v			

Note:

IN	: Company Internship	SA	: Study Abroad
RS	: Research Fellowship	FS	: Fast Track

EN : Entrepreneurship
CD : Community Impact Internship
IS : Specific Independent Study
etc : Study Program Special Purposes

Description:
1. Students will take only one track in each Enrichment Program.
2. Students who failed in Enrichment Program I can retake according to the table above.
3. As for Enrichment Program II, students who failed should retake the same track, except Specific Independent Study.
4. For those who failed in the Study Abroad track will retake the courses from the home campus.

Company 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	

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	
Enrichment Program II			20
ENTR6651001	Product Launching in Cyber Security	8	
ENTR6652001	Business Development in Cyber Security	8	
ENPR6239001	EES Cyber Security Professional in Business Experience	4	

Research Fellowship 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	
Enrichment Program II			20
RSCH6216001	Research Experience II	8	
RSCH6529001	Scientific Writing II in Cyber Security	8	
RSCH6171001	Global EES II in Cyber Security Research Project Team	4	

Community Impact Internship 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	
Enrichment Program II			20
CMDV6140001	Community Development Project Implementation	8	
CMDV6311001	Community Development Cyber Security Project Design	8	
CMDV6090001	Employability and Entrepreneurial Skills in Cyber Security Field	4	

Study Abroad Track

Code	Course Name	SCU	Total
Elective courses list for study abroad*			20
Enrichment Program I			
GLOB6005001	Elective Course for Study Abroad 1	4	
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			20
GLOB6017001	Elective Course for Study Abroad 13	4	
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.*

Specific Independent Study

Code	Course Name	SCU	Total
Elective courses list for specific independent study*			
CSIS6001001	Course Certification	3	
CSIS6002001	Technical Skill Enrichment	4	
CSIS6003001	Industrial Project	9	
CSIS6004001	Soft Skill Enrichment	4	
CSIS6005001	Elective Course for Specific Independent Study 1	8	
CSIS6006001	Elective Course for Specific Independent Study 2	8	
CSIS6007001	Elective Course for Specific Independent Study 3	6	
CSIS6008001	Elective Course for Specific Independent Study 4	6	
CSIS6009001	Elective Course for Specific Independent Study 5	6	
CSIS6010001	Elective Course for Specific Independent Study 6	5	
CSIS6011001	Elective Course for Specific Independent Study 7	5	
CSIS6012001	Elective Course for Specific Independent Study 8	5	
CSIS6013001	Elective Course for Specific Independent Study 9	5	
CSIS6014001	Elective Course for Specific Independent Study 10	4	
CSIS6015001	Elective Course for Specific Independent Study 11	4	
CSIS6016001	Elective Course for Specific Independent Study 12	4	
CSIS6017001	Elective Course for Specific Independent Study 13	4	
CSIS6018001	Elective Course for Specific Independent Study 14	4	20
CSIS6019001	Elective Course for Specific Independent Study 15	3	
CSIS6020001	Elective Course for Specific Independent Study 16	3	
CSIS6021001	Elective Course for Specific Independent Study 17	3	
CSIS6022001	Elective Course for Specific Independent Study 18	3	
CSIS6023001	Elective Course for Specific Independent Study 19	3	
CSIS6024001	Elective Course for Specific Independent Study 20	3	
CSIS6025001	Elective Course for Specific Independent Study 21	2	
CSIS6026001	Elective Course for Specific Independent Study 22	2	
CSIS6027001	Elective Course for Specific Independent Study 23	2	
CSIS6028001	Elective Course for Specific Independent Study 24	2	
CSIS6029001	Elective Course for Specific Independent Study 25	2	
CSIS6030001	Elective Course for Specific Independent Study 26	2	
CSIS6031001	Elective Course for Specific Independent Study 27	2	
CSIS6032001	Elective Course for Specific Independent Study 28	2	
CSIS6033001	Elective Course for Specific Independent Study 29	1	
CSIS6034001	Elective Course for Specific Independent Study 30	1	
CSIS6035001	Elective Course for Specific Independent Study 31	1	
CSIS6036001	Elective Course for Specific Independent Study 32	1	

**) For students who take BINUS 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 specific independent study outside BINUS University. Transferred courses will be transferred based on credit transfer policies on study program with total of 20 credits.*

Fast Track

Code	Course Name	SCU	Total
Enrichment Program II			20
COMP6981001	Applied Technology in Computer Science	4	
COMP6816001	Wireless and Cloud Computing Technologies	4	
COMP6997001	IT Disaster Recovery	6	
Stream: Data Science			
COMP6998001	Knowledge Engineering	6	
Stream: Information Security Management			
COMP6980001	Networking and Security Concepts	6	

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

No.	Course Code	Course Name	Minimal Grade
1.	CHAR6013001	Character Building: Pancasila	B
2.	COMP6047001	Algorithm and Programming*	C
3.	COMP6048001	Data Structures*	C
4.	COMP6798001	Program Design Methods*	C
5.	COMP6100001	Software Engineering*	C
6.	COMP6799001	Database Technology	C
7.	COMP6697001	Operating System	C
8.	ENPR6312001	Venture Creation	C

*) Tutorial