THE STANDARD UNDERGRADUATE PROGRAM

Major: Computer and Information Science

Code: **52480105**

PART I: GENERAL INTRODUCTION

General information

- Discipline of the program:

    + In Vietnamese: Máy tính và Khoa học thông tin

    + In English: Computer and Information Science

- Code: 52480105

- Degree title: Bachelor

- Duration: 4 years

- Degree:

    + In Vietnamese: Cử nhân Máy tính và khoa học thông tin

    + In English: The Degree of Bachelor in Computer and Information Science

- The program is conducted at:

    VNU University of Science, Vietnam National University, Hanoi

Program Objective

The Computer and Information Science program was first in the list of education majors in Vietnam in 2012 to meet the training needs human resource having scientific knowledge, having capable of applying knowledge of computer science and information science to solve the problems of organizing, storing, finding information, discovering information and knowledge from data.

In an age when informatics plays an important role in the development of economy, politics, society as well as science and technology globally, the training of human resources for the field of computer and information science is one of the top priority developments of the Vietnamese government.

The CIS program in the Faculty of Mathematics - Mechanics - Informatics provides students the basic knowledge and advanced knowledge to exploit the strengths of the statistics in information science.

Student graduate of CIS program has sufficient capacity to work effectively in the information technology enterprises. Graduated students can develop their careers in high school, the colleges, the research institutes, and the universities in the field of computer science and information science. Excellent graduate students can continue studying in higher level such as master or Ph.D. program in national and international universities over the world.

Enrollment Information

- Based on the regulations of Vietnam National University, Hanoi.

PART II: EXPECTED LEARNING OUTCOMES OF THE PROGRAM

EOL1.1	*General knowledge:* Having ability to apply and interpret the knowledge about the Marxism -- Leninism and Ho Chi Minh ideology, the revolutionary strategy of the Communist Party of Vietnam on analyzing, evaluating matters for construction and protection of the country. Having ability to apply English and informatics for learning and researching.
EOL1.2	*General knowledge:* Having ability to understand the knowledge of foundational sciences in social sciences and humanities; in earth science and life science.
EOL1.3	*Area knowledge:* Having ability to understand the foundational knowledge of physics and related sciences.
EOL1.4	*Related-fields knowledge:* Having ability to apply statistical and mathematical models to optimize information processing problems.
EOL1.5	*Field knowledge:* Having ability to understand and apply knowledge of mathematics and computation in collecting, storing and analysis of data and information. Having the ability to apply foundational knowledge in mathematics, algorithmics and computer science in modeling and designing information systems, taking into account many constraints.
ELO2.1	*Professional skills:* Having the skill in searching, researching, surveying documents, collecting information and problem detection. Having ability in analysing, designing and building software systems. Having ability in assessing and choosing appropriate methods for the problems at hand.
ELO2.2	*Systematic thinking skill:* Having the skill in logical and multi-dimensional thinking, understanding the effects of information technology to society, environment in global scope. Having the ability to recognize and assess the trends of new technologies affecting the development of information technology in national or international scope.
ELO2.3	*Creative skill:* Having the ability to build personal objectives, create motivation and personal development. Having ability in changing objectives compatible to working requirements using prepared knowledge.
ELO2.4	*Personal skills:* Having ability in managing, organizing and arranging works in detail; scientifically working; reasoning skills and problem solving; self-learning and knowledge updating.
ELO2.5	*Working in group skill:* Having ability in working in groups, adapting to the change of grouping, having ability in organizing and implementing tasks in a flexible and effective ways, according to real-world situations.
ELO2.6	*Management and leadership skill:* Having the skill in managing and leading a group/unit; organizing and assigning tasks, evaluating the performance of group members and connecting different members of a group/unit.
ELO2.7	*Communication skill:* Having ability in effective communication, either directly or by document or other intermediates; having skill in presentation on a professional subject; mastering software-supporting communication.
ELO2.8	*Foreign language skill:* Having the skill in communicating in English, in everyday communication or professional communication, at the level of 3/6 in the 6-level scale used in Vietnam.

ELO3.1	*Personal ethics: Having a good ethics, humble, enthusiastics, sincerity, love of work, respect and collaboration with others.*
ELO3.2	*Professional ethics:* Having professional ethics, sincerity, responsibility for work; having autonomy in self-learning and professional improvement.
ELO3.3.	*Social ethics:* Having civil responsibility, respecting the law; be aware of defending the country; encourage the administrative organizations and people in protecting the environment, for the sustainable development of the society.

Potential jobs for students who have graduated

After graduating from the program of Bachelor in Computer and Information Science, students have enough health and professional qualifications to take the following positions:

- Do research and development at research institutes

- Management agencies and enterprises have information systems and need to exploit information effectively.

- Teaching at universities, colleges, and high schools in the field of Computer and Information Science.

Higher studying after graduation

Qualified students who wish to improve their knowledge in their area of expertise will be able to continue their studies at the Master's and Doctoral level.

PROGRAM CURRICULUM

1. Summary of program curriculum requirements

Total credits for graduation:	**139 credits**
- General education	**29 credits**

(Excluding Physical Education, National Defense Education and Soft skills)

- Courses in general science**:**	**6 credits**
- Courses in related science**:**	**6 credits**
- Core courses in major**:**	**32 credits**
- Specialized courses of Computer and Information Science	**66 credits**
+ *Mandatory courses*	*41 credits*
+ *Elective courses:*	*18 credits*
+ *Graduation thesis /Courses replacing graduation thesis:*	*7 credits*

2. Program curriculum

No	Course code	Course name	Credits	Lecture	Practice	Self-study	Prerequisite courses
				Credit hours			
I	**General education** *(Excluding courses 10, 11, 12)*		**29**				
1	PHI1004	*Fundamental Principles of Marxism - Leninism 1*	2	24	6		
2	PHI1005	*Fundamental Principles of Marxism - Leninism 2*	3	36	9		PHI1004
3	POL1001	*Ho Chi Minh Ideology*	2	20	10		PHI1005
4	HIS1002	*The Revolutionary line of the Communist Party of Vietnam*	3	42	3		POL1001
5	INT1003	*Introduction to Informatics 1*	2	10	20		
6	INT1006	*Introduction to Informatics 4*	3	20	23	2	INT1003
7	FLF2101	*General English 1*	4	16	40	4	
8	FLF2102	*General English 2*	5	20	50	5	FLF2101
9	FLF2103	*General English 3*	5	20	50	5	FLF2102
10		*Physical Education*	4				
11		*National Defence Education*	8				
12		*Soft Skills*	3				
II	**Courses in general science**		**6**				
13	HIS1056	*Fundamentals of Vietnamese Culture*	3	42	3		
14	GEO1050	*Earth and Life Sciences*	3	30	10	5	
III	**Courses in related sciences**		**6**				
15	PHY1100	*Mechanics - Thermodynamics*	3	30	15		MAT2401
16	PHY1103	*Electromagnetism - Optics*	3	30	15		MAT2401
IV	**Core courses in major**		**32**				
17	MAT2400	*Linear Algebra*	5	50	25		
18	MAT2401	*Analysis 1*	5	60	15		

No	Course code	Course name	Credits	Lecture	Practice	Self-study	Prerequisite courses
19	MAT2402	*Analysis 2*	5	60	15		MAT2401 MAT2400
20	MAT2403	*Differential Equations*	3	30	15		MAT2401 MAT2400
21	MAT2404	*Numerical Analysis*	4	45	15		MAT2402 MAT2403 INT1006
22	MAT2405	*Probability*	3	30	15		MAT2402
23	MAT2406	*Applied Statistics*	4	45	15		MAT2405
24	MAT2407	*Optimization*	3	30	15		MAT2402
V	**Specialized courses in Computer and Information Science**		**66**				
V.1	*Mandatory courses*		*41*				
25	MAT3500	*Discrete Mathematics*	4	45	15		MAT2400M AT2401
26	MAT3501	*Principles of Operating Systems*	3	30	15		INT1006
27	MAT3502	*Data Structures and Algorithms*	4	40	20		INT1006
28	MAT3503	*Object–Oriented Programming*	3	20	25		INT1006
29	MAT3504	*Algorithm Design and Analysis*	3	30	15		MAT2402 INT1006
30	MAT3505	*Computer Architecture*	3	30	15		INT1006
31	MAT3506	*Computer Networks*	3	40	5		INT1006
32	MAT3507	*Databases*	4	50	10		INT1006
33	MAT3508	*Introduction to Artificial Intelligence*	3	30	15		INT1006
34	MAT3509	*Formal Languages and Automata*	3	40	5		INT1006 MAT3500
35	MAT3510	*Software Development Project*	3	10	35		MAT3503

No	Course code	Course name	Credits	Credit hours			Prerequisite courses
				Lecture	*Practice*	*Self-study*	
							MAT3507
36	MAT3515	*Mini project*	2	15	15		
37	MAT3543	*Software Engineering*	3	30	15		MAT3510 MAT3504
V.2	**Elective courses**		*18*				
V.2.1		*Self-selection of software skills (Students can choose up to 1 module of programming language MAT3520, 3521, 3522, 3523)*	*6/14*				
38	MAT3520	*Progamming in C/C++*	2	10	20		MAT3503
39	MAT3521	*Programming in C#*	2	10	20		MAT3503
40	MAT3522	*Programming in Python*	2	12	15	3	MAT3503
41	MAT3523	*Programming in Perl*	2	10	20		INT1006
42	MAT3524	*Linux*	2	15	15		INT1006
43	MAT3525	*Practicum in Computing*	2	20	10		MAT2402
44	MAT3516	*Decision Support Systems*	2	15	15		MAT3507
V.2.2		*Tự chọn về khoa học máy tính và thông tin*	*12/43*				
45	MAT3531	*Distributed Computing*	3	35	10		MAT3501 MAT3503
46	MAT3533	*Machine Learning*	3	24	16	5	MAT3508 MAT2406
47	MAT3534	*Data Mining*	3	30	15		MAT3507 MAT2406
48	MAT3535	*Information retrieval*	3	24	16	5	MAT3514 MAT2406
49	MAT3536	*Computational Linguistics*	3	35	10		MAT3509 MAT3508

No	Course code	Course name	Credits	Credit hours			Prerequisite courses
				Lecture	*Practice*	*Self-study*	
50	MAT3537	*Image Processing*	3	35	10		MAT2402 INT1006
51	MAT3538	*Knowledge-Based Systems*	3	30	15		MAT3508 MAT3514 MAT3503
52	MAT3539	*Cryptography and Data Security*	3	30	15		INT1006
53	MAT3540	*Multimedia Database*	3	30	15		MAT3507
54	MAT3541	*Principles of Programming Languages*	3	45			INT1006
55	MAT3542	*Web Applications Development*	3	20	20	5	INT1006 MAT3510
56	MAT3544	*Analysis and Design of Information Systems*	4	20	40		MAT3510 MAT3504
57	MAT3452	*Multivariate Statistical Analysis*	3	30	15		MAT2406
58	MAT3453	*Sampling Methods*	3	30	12	3	MAT2406
V.3	**Graduation thesis / Courses replacing graduation thesis**		**7**				
59	MAT4080	*Undergraduate Thesis*	7				
		Courses replacing graduation thesis*: Select the subjects not yet studied in block V.2.2*	*7*				
Total			**139**				